International Conference
On Geospatial Information Science 2013

NOVEMBER 14th ~ 15th, 2013

Coex Seoul, KOREA

● Program Overview_International Seminar

Nov. 14th, 2013 / ROOM 307, COEX SEOUL, KOREA

Time	Content	Speaker
09:00~09:30	Registration	
09:30~09:40	Opening Remarks	Kyung-Hwan Kim President, Korea Research Institute for Human Settlements(KRIHS)
09:40~09:50	Welcome statement	Yun-Soo Choi Chairman, Korea Spatial Information Society(KSIS)
09:50~10:00	Congratulatory Address	Tae-Ho Ro Ministry of Land, Infrastructure, and Transport
Session1		
10:00~10:30	Duking It Out At The Smartphone Mobile Mapping App Corral : Apple, Google, And The Competition	Hanan Samet University of Maryland, USA
10:30~11:00	Making Smart Cities Smarter - Connecting Cyberspace with Physical Space	Anthony Gar-On Yeh University of Hong Kong, HK
11:00~11:30	Free and Open Source Geoinformatics: Past, Present and Future	Venkatesh Raghavan Osaka City University, JAPAN
11:30~13:00	Luncheon	Invited Speakers & Organizers
Session2		
13:00~13:30	The Role of Innovation and Authoritative Mapping to Develop National Economic Growth	Steven Ramage Ordnance Survey, UK
13:30~14:00	Research and Operations for National Topographic Mapping using Geographic Information Systems Technology	E. Lynn Usery USGS, USA
14:00~14:30	Switzerland on its way to Spatial Enablement : with focus on cadastral information	Daniel Steudler Swiss Federal Office of Topography
14:30~15:00	Coffee Break	
Session3		
15:00~15:30	How GIS can Help Address the Uncertain Geographic Context Problem	Mei-Po Kwan Univ. of Illinois at Urbana Champaign, USA
15:30~16:00	A Smart Digital Street for the Impaired Pedestrian Road Safety	Hoon Han University of New South Wales, AUS
16:00~16:30	The Dynamic Change of Land Use/cover and Eco-security Evaluation in Tumen River Transboundary Region during the Last 100Years	Ying NAN Yanbian University, China
Session4		
16:30~17:50	Future Directions in Geospatial Information Science (Discussion)	Invited Speakers & Organizers
17:50~18:00	Closing	
18:00~20:00	Dinner	Invited Speakers & Organizers

● Program Overview_Academic Publication

Nov. 15th, 2013 / ROOM 304·306·307·308, COEX SEOUL, KOREA

Time	Content		Venue
09:00~09:30	Registration		
09:30~12:30	Session1	A Way Forward after the ICGIS(Invited Speakers)	306
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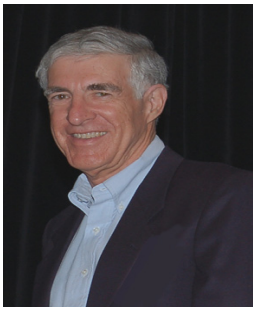
	Session3	GIS Compatibility and Interoperability	307A
		Web and Mobile GIS	
	Session4	GIS application in Smart city, Urban Planning, Transportation, Education and etc.	307B
	Session5	Natural Resources & Land Management	307C
	Session6	Surveying & Global Position & Navigation Systems	308A
	Session7	Spatial Data Modeling and Mining	308B
	Session8	NSDI Policy and Planning of 7 Countries	327C
	Session9	Poster Session	308C
12:30~14:00	Luncheon		
14:00~18:00	Session1	GI Policy and SDI	306
	Session2	NSDI Policy and Planning of 7 Countries	304
	Session3	Data Infrastructure and Security of Data	307A
		Surveying & Global Position & Navigation Systems	
		Open Source GIS	
	Session4	Spatial Data Modeling and Mining	307B
		Natural Resources & Land Management	
		GIS application in Smart city, Urban Planning, Transportation, Education and etc.	
	Session5	Natural Resources & Land Management	307C
	Session6	GIS application in Smart city, Urban Planning, Transportation, Education and etc.	308A
	Session7	Poster Session	308B
	Session8	Poster Session	308C
18:00~20:00	Dinner		

Session 1



"Duking It Out At The Smartphone Mobile Mapping App Corral : Apple, Google, And The Competition"

Hanan Samet
Professor – University of Maryland, USA

Hanan Samet (http://www.cs.umd.edu/~hjs/) is a Distinguished University Professor of Computer Science at the University of Maryland. He has a Ph.D from Stanford University. His doctoral dissertation dealt with proving the correctness of translations of LISP programs. He is the author of "Foundations of Multidimensional and Metric Data Structures" published in 2006 and an award winner in the 2006 best book in Computer and Information Science. He is the Founding Editor-In-Chief of the ACM Transactions on Spatial Algorithms and System (TSAS). He received best paper awards at both the 2008 SIGMOD and SIGSPATIAL Conferences, the 2012 SIGSPATIAL Workshop on Mobile Geographic Information Systems (MobiGIS). His paper at the 2009 IEEE International Conference on Data Engineering (ICDE) was selected as one of the best papers for publication in the IEEE Transactions on Knowledge and Data Engineering.

"Making Smart Cities Smarter - Connecting Cyberspace with Physical Space"

Anthony Gar-On Yeh
Professor – University of Hong Kong, Hong Kong

Prof. Anthony G.O. Yeh is Chair Professor and Head of Department of Urban Planning and Design, Director of GIS Research Centre, and Director of Institute of Transport Studies at the University of Hong Kong, Hong Kong SAR. He is an Academician of the Chinese Academy of Sciences and a Fellow of TWAS(The World Academy of Sciences for the Developing World), Hong Kong Institute of Planners (HKIP). He is the Secretary General of the Asian Planning Schools Association. He has been very active in promoting GIS activities and initiated a number of international conferences. His research interests are in the applications of GIS as planning support system and urban planning and development in Hong Kong and China. He has published over 30 books and monographs and over 180 international journal papers and book chapters. He received the UN-HABITAT Lecture Award in 2008.

"Free and Open Source Geoinformatics: Past, Present and Future"

Venkatesh Raghavan
Professor – Osaka City University, Japan

Prof. Venkatesh Raghavan (aka Venka) is one of the early proponents of Free and Open Source Software for Geoinformatics (FOSS4G) and has been involved in Open Source Geospatial Foundation (OSGeo) since their inception in 2006. He was one of the Directors in the first OSGeo Board and recipient of the 2012 OSGeo Sol Katz award for leadership and significant contributions to advancement of Open Source Geospatial technology. He is actively involved in OSGeo Local Chapters in Asia. Presently based in Japan as Professor of Geoinformatics at Osaka City University. His research interest includes Geospatial Services, Sensor Web and Remote Sensing for change detection. Recently, involved in ZOO WPS Platform and goGPS Projects. He is a team leader and member in several national and international R&D projects and capacity building initiatives in Goeinformatics.

Session 2

"The Role of Innovation and Authoritative Mapping to Develop National Economic Growth"

Steven Ramage
Head of Ordnance Survey International – Ordnance Survey, UK

Steven Ramage is the Head of Ordnance Survey International, part of the Ordnance Survey Group that offers technology and vendor-independent government to government advisory services. Steven works with governments around the world providing advice on knowledge transfer, capacity building and national economic growth underpinned by authoritative mapping. Prior to joining Ordnance Survey International, Steven was Executive Director Marketing and Communications at the Open Geospatial Consortium (OGC) with global responsibility for communicating the value of open standards. He has held management positions at a variety of organisations in the geospatial industry, including Oceonics (now part of Fugro), Navteq (now part of Nokia) and 1Spatial. His international industry experience includes working with local and central government, defence, national mapping authorities and commercial organisations.

"Research and Operations for National Topographic Mapping using Geographic Information Systems Technology"

E. Lynn Usery
Director – USGS, USA

E. Lynn Usery is a Research Physical Scientist and Director of the Center of Excellence for Geospatial Information Science (CEGIS) of the U.S. Geological Survey (USGS). He currently teaches at the Missouri University of Science and Technology. He is a vice-president of the American Society for Photogrammetry and Remote Sensing (ASPRS). He is a Fellow of CaGIS, received the CaGIS Distinguished Career Award, and was elected to the first class of Fellows of UCGIS. Dr. Usery is currently the Chair of the U.S. National Committee to the International Cartographic Association (ICA) and chairs the Local Organizing Committee and is the Conference Director for the 2017 International Cartographic Conference to be held in Washington, D.C. Dr. Usery received his BS in geography from the University of Alabama and MA and Ph.D. degrees in geography from the University of Georgia.

"Switzerland on its way to Spatial Enablement : with focus on cadastral information"

Daniel Steudler
Director – Swiss Federal Office of Topography, Federal Directorate for Cadastral Surveying, Switzerland

Dr. Daniel Steudler has a degree from the Swiss Federal Institute of Technology (ETH) in Zurich, Switzerland, the University of New Brunswick, Canada and from the University of Melbourne, Australia.
In 1985, he earned the Swiss license for licensed land surveyors, and since 1991 he is a scientific associate with the Swiss Federal Office of Topography swisstopo, active for the Federal Directorate for Cadastral Surveying. Since 2006, he also is part-time lecturer at ETH in Zurich and Lausanne.
Since 1994, Daniel is involved in FIG-Commission 7 activities, first as co-author of "Cadastre 2014", as chair of working groups and as chair of the Task Force on "Spatially Enabled Societies". He also published widely in the cadastral field and consulted internationally in land administration and cadastral issues.

Session 3

"How GIS can Help Address the Uncertain Geographic Context Problem"

Mei-Po Kwan
Professor – University of Illinois at Urbana Champaign, USA

Mei-Po Kwan is Professor of Geography and Geographic Information Science at the University of Illinois at Urbana-Champaign. She received the 2005 UCGIS Research Award for outstanding contributions to GIS science from the University Consortium for Geographic Information Science (UCGIS). Kwan is currently Editor of the Annals of the Association of American Geographers and the book series entitled "SAGE Advances in Geographic Information Science and Technology." She has made outstanding contributions to geographic information science and geography, especially in developing geo-computational algorithms for implementing space-time accessibility measures that are sensitive to individual differences, 3D interactive geo-visualization, network-based 3D topological data models, GIS-based intelligent emergency response systems (GIERS), the protection of geoprivacy through geographical masks, and computational-process modeling of activity-travel decisions.

"A Smart Digital Street for the Impaired Pedestrian Road Safety"

Hoon Han
Professor – University of New South Wales, Australia

Hoon Han is Convenor of Emergent Digital Technologies Research Cluster (EDTRC) and Senior lecturer in the Faculty of Built Environment, University of New South Wales*, Sydney Australia. His research interest focuses on the spatial and temporal changes in urban form, housing market and location decision; in particular the dynamic changes occurring in response to constraints and opportunities within an economic geography context. He published over 60 scholarly peer reviewed articles including 8 journal papers in Thomson Reuters Social Sciences Citation Index (SSCI). He currently sits on an editorial board member of the Journal of City, Culture and Society (Elsevier) and International Journal of Knowledge-based Development (Inderscience). He has designed many research projects and taught courses from a wide range of both discipline-specific and multi-disciplinary perspectives in urban economics and quantitative research methods in University of New South Wales.

"The Dynamic Change of Land Use/cover and Eco-security Evaluation in Tumen River Transboundary Region during the Last 100 Years"

NAN, Ying
Professor – Yanbian University, China

Ying Nan is a professor of Geography at Yanbian University, China. His research interests are mainly in the GIS & RS applications, especially in the LUCC. The past ten years, He and his research team have been working on the Tumen River area and the Changbai Mountain area, Northeast Asia. He is the director of the Institute of Urban & Environmental Ecology of Yanbian University, and vice-chair of the Geographical Society of Jilin Province. Recently, he was appointed president of Yanbian University of Science & Technology, which is the first Chinese-foreign joint university in China. Ying Nan received BS in geography from the Northeast Normal University of China, MA from Yanbian University and PhD from Seoul National University, Korea.

● Session 4: Future Directions in Geospatial Information Science

In this session, invited speakers from all over the world and ICGIS committee members will discuss about future directions in Geospatial Information Science.

Moderator
Mei-Po Kwan

Professor
UIUC, USA

Anthony Gar-On Yeh

Professor
UHK,
Hong Kong

Venkatesh Raghavan

Professor
OCU, Japan

Steven Ramage

Head
OS, UK

E. Lynn Usery

Director
USGS, USA

Daniel Steudler

Director
Swisstopo,
Switzerland

Hanan Samet

Professor
UMD, USA

Hoon Han

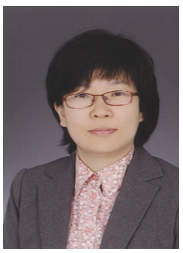
Professor
UNSW,
Australia

NAN, Ying

Professor
YBU, China

Joon Heo

Professor
Yonsei University,
Korea



Eunmi Chang

CEO
Ziinconsulting,
Korea

Minsoo Kim

Principal
Researcher
ETRI, Korea

Contents

[AM] GIS Compatibility and interoperability (Chairman : Chung-Weon Oh)

09:30-11:00 (Room307A)	A-3-1	The Visualization Module, "Viz-icoN" for the Optimization of Geo-spatial Information Service on the Smart City	Mi-Yun Kim, Dong-Jo Seo	Seoul Digital University
	A-3-2	Analysis on the interoperability between Apartment House BIM and 3D GIS for urban environment planning	Jun-Young choi, Sung-Hwan Kim	Korea Land and Housing Corporation
	A-3-3	Study on Demand Adaptive Bus Route Optimization using GIS in Suwon, Korea	Cheol-Gyu Park	Univ of Seoul
	A-3-4	Volunteered Geographic Information System in Web Environment	Chung-Weon Oh	Namseoul Univ.

[AM] Web and Mobile GIS (Chairman : Kwang-Woo Nam)

11:00-12:30 (Room307A)	A-3-5	Design of Web GIS System for Water Information Service	Yong-Gil Park Kye-Hyun Kim Sung-Joo Lee	INHA UNIVERSITY
	A-3-6	Development of Spatial Data Compression based on coordinates for Mobile Spatial Database	Sung-Hoon Jung	realtimetech.co
	A-3-7	Evaluating the usability of web-based statistical map using eye-tracker	Seong-Gook Moon, Chul-Sue Hwang	Kyung Hee University
	A-3-8	Efficient Aggregation of Spatial Web Objects	Pyoung-Woo Yang, Hyun-Goo Joe, Yon-Sik Lee, Kwang-Woo Nam	Kunsan University

[PM] Data Infrastructure and Security of Data / Open Source GIS (Chairman : Eui-Myeong Kim)

14:00-16:00 (Room307A)	P-3-1	Selection Methodology of Building data using Reverse Engineering for Topographic Map Generalization	Woo-Jn Park, Ki-Yun Yu	Seoul National University
	P-3-2	Development of Technology for the Standard Services of Street Tree Information Using Open Source	Moon-Joung Kim, Eui-Myoung Kim	Namseoul University
	P-3-3	The Establishment Of The Rate Of Sunshine Based On Solar Energy Resource Map Using Gis Spatial Analysis : The Case Of Gyeongsan City	Myung-heeJo, Do-Ryeong Kim, Sung-Jae Kim	GEO C&I Co. ltd.
	P-3-4	Development Of Utilizing Techniques Of River Survey Data For The Analysis Of River Topography Changes	Myung-Hee Jo, Kyung-jun Kim, Hyun-jung Kim	GEO C&I Co. ltd.
	P-3-5	Training Improvement Using Building Edges for Automatic Building Extraction of Quickbird-2 Image	Jun-Ho Yeom, Yon-Gil Kim	Seoul National University

[PM] Surveying & Global Position & Navigation Systems (Chairman : Jun-Hee Yun)

16:00-18:00 (Room307A)	P-3-6	A Practical Mobile Localization using Signage	Won-Il Shim, Jong-Il Park	Hanyang University
	P-3-7	Accuracy Analysis of FKP for Public Surveying and Cadastral Resurvey	Jin-Sol Park, Joong-Hee Han, Jay-Hyoun Kwon	University of Seoul
	P-3-8	Adjustment of Orhtometric Height Level Network in Korea	Chang-Kyung Lee, Ji-Yeong Moon	Kunsan University
	P-3-9	Establishment of local geodetic datum based on time-series analysis of GNSS processing	Tae-Suk Bae, Su-Kyung Kim	SejongUniversity

[AM] GIS application in Smart city, urban planning, transportation, education and etc. (Chairman : Soo-Hee Han)

09:30-11:00 (Room307B)	A-4-1	Bike road modeling for commuting transportation in Seoul	Young-Ho Kim	Korea University
	A-4-2	A Study on Link Application Possibility of Public Open Database with Community-Mapping Database Using Google Fusion Tables	Joong-Ock Yoo, Jun-Hwan Koh	University of Seoul
	A-4-3	Design of Smart Crime Prevention Map based on Mash-up Service by using NSDI	Yong-Jin Joo	Inha Technical College
	A-4-4	A Study on Error Verification of air pollutant emissions data in Asia region : Focusing on SOx, NOx, VOC	Don-Gon Choi Jin-Mu Choi	Kyunghee University

[AM] GIS application in Smart city, urban planning, transportation, education and etc. (Chairman : Yong-Jin Joo)

11:00-12:30 (Room307B)	A-4-5	Estimation of threshold discharge for flood alert system in a watershed using GIS technique	In-Tae Yang, Keon Park, Acharya Tr iDev	Kangwon Natioal University
	A-4-6	Food Deserts	Pil Kwon, Seong-HwanCho, Ki-Yun Yu,	Seoul National University
	A-4-7	Extraction of Crime Risk Areas Using Digital Map 2.0	Hyun-Mi Park, Eui-Myoung Kim,	Namseoul University
	A-4-8	Genetic and Dijkstra algorithm comparison for Optimal Infiltration Route analysis	Sang-Pil Kim, Hong-Gyoo Sohn, Soo-NamBang, Bin Li,	Yonsei University

[PM] Spatial data modeling and mining (Chairman : Young-Hoon Kim)

14:00-15:20 (Room307B)	P-4-1	Gis-Based Landslide Susceptibility Mapping Using Analytical Hierarchy Process And Ordinary Least Square In Penang Island, Malaysia	Sara khodadad	Kongju National University
	P-4-2	Fast Detection of Power-Line Points Using a Laser Scanner for Flight Obstacle Avoidance	Mi-Jin Lee, Seong-Joon Kim, Im-Pyeong Lee	University of Seoul
	P-4-3	Georeferensing of Indoor Omni-directional Images acquired by Stereo Rotating Line Camera using Linear Features	So-Jung Oh, Im-Pyeong Lee	University of Seoul
	P-4-4	Application of geodemographic methods to classify Seoul City area: data, methods and classifications	Young-Hoon Kim, So-Yeol Jeon	Korea National University of Education

[PM] Spatial data modeling and mining (Chairman : Byong-Woon Jun)

15:20-16:40 (Room307B)	P-4-5	Analysis the Effect of Information on Inundated Road Using Agent-based Model	Yu-Gyung Na, Jin-Mu Choi	Kyung Hee University
	P-4-6	A Study on the Exploratory Spatial Data Analysis of the Distribution of Longevity Population and the Scale Effect of Modifiable Areal Unit Problem(MAUP)	Don-Jeong Choi, Yong-Cheol Suh	Pukyung National University
	P-4-7	Segmentation of Building Roofs Using Airborne Laser Scanning Data	Dong-Cheon Lee, Eun-Jin Yoo, So-Young Park	Sejong University
	P-4-8	Exploring Spatial Dependence and Spatial Non-stationarity in Satellite Imagery Based Population Estimation	Byong-Woon Jun	Kyungpook National University

[PM] Natural Resources & Land Management / GIS application in Smart city, urban planning, transportation, education and etc. (Chairman : Min-Ho Kim)

16:40-18:00 (Room307B)	P-4-9	Band selection by Spectral Derivative for vegetation index using CASI-1500 Hyperspectral Imagery	Tae-Woo Kim, Hyun-Soo Heo, Yong-Cheol Suh	Pukyung National University
	P-4-10	Comparison of Slope Measurement Methods to Evaluate the Feasibility of Forest Land Conversion	Soon-Duk Kwon, Won-Kyung Kim	Korea Forest Research Institute
	P-4-11	An Implementation Method of the Multi-cross GIS Techniques for the Big Data Activation	Jong-Woo Oh	Namseoul University
	P-4-12	Noise pollution in Urban Area	Min-Ho Kim	Sangmyung University

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[AM] Natural Resources & Land Management (Chairman : Chang-Jae Kim)

09:30-11:00 (Room307C)	A-5-1	A Study on SNS as a Spatial Big data	Ju-Yong Lee, June-Hwan Koh	
	A-5-2	How has RICS advanced their standard in land, property and construction?	Seung-Han Ro, Seon-Jong Yoo	Konkuk University
	A-5-3	Generation of DEM based on Korea cadastral resurvey results	Won-Sik Kim	Spatial Information Research Institute
	A-5-4	A Study on Alternative Resolution Method for Marine Spatial Conflicts Using Delimitation of Maritime Boundary	Jin Kim, Gil-Jae Lee, Choon-won Lee	Spatial Information Research Institute

[AM] Natural Resources & Land Management (Chairman : Mun-Sung Koh)

11:00-12:30 (Room307C)	A-5-5	Comparison of Geometric Calibration Accuracy for X-band SAR Images using various DEM data	Seung-Hwan Hong, Hong-Gyoo Sohn, Hyo-Guen Park, Il-Suk Park	Yonsei University
	A-5-6	A Study on Strengthening Map Services through Business Registration System	Hyun-Jin Kim	Korea Cadasral Survey Corp.
	A-5-7	An approach to effective land registration based on the satellite photogrammetry: Case study in Baharly, Ahal Velayat, Turkmenistan	Hyun-Il Yoo	Korea Cadasral Survey Corp.
	A-5-8	A Study on the strategy for developing land registration projects in Caribbean Countries	Mun-Sung Koh, Young-Ho Lee,	Korea Cadasral Survey Corp.

[PM] Natural Resources & Land Management (Chairman : Sun-Yurp Park)

14:00-15:20 (Room307C)	P-5-1	The Efficient Method to Precisely Measure Time-series Land Surface Temperature Variations	Sung-Hwan Park, Hyung-Sup Jung, Han-Sup Shin	University of Seoul
	P-5-2	Visualization for public transportation analysis:Mapping of Phoenix light rail corridor	Bog-Yeong Min, Du-Shin Lee	Spatial Information Research Institute
	P-5-3	A Study on Korean Next-Generation Integrated Cadastral Information System Model Design	Sun-Geon Hong	Cheongju University
	P-5-4	Landuse Structure, Human Residence and Malaria Incidence in Korea	Sun-Yurp Park	Pusan National University

[PM] Natural Resources & Land Management (Chairman : Joon-Bhang Kon)

15:20-16:40 (Room307C)	P-5-5	Calibration and accuracy verification of land surface temperature derived from satellite image based on in-situ measurement considering multi-temporal	Bong-Geun-Song, Kyung-HunPark	Changwon National University
	P-5-6	Estimation of ground-level air temperature based on surface temperature derived from satellite image	Bong-Geun-Song, Kyung-HunPark	Changwon National University
	P-5-7	Measuring surface water availability using Landsat and computerer simulation	Kon-Joon Bhang, FrankW.Schwartz, Jin-Duk Lee	Kumoh Institute of Technology
	P-5-8	Compensation of the temporal gaps of remote sensing images in assessing the spatiotemporal variations of chlorophyll-a in Paldang of Korea	Kon-Joon Bhang, Jin-Duk Lee, Jae-Hwan Kwak	Kumoh Institute of Technology

[PM] Natural Resources & Land Management (Chairman : Jong-Suk Park)

16:40-18:00 (Room307C)	P-5-9	A transfer learning approach to the integration of spectral information with temporal contextual information from an existing land-cover map for land-cover classification	Hee-Young Yoo, No-Wook Park, Ye-Seul Kim, Hog-Il Lee	Inha University
	P-5-10	Effects of Building Generalization on Hazard Assessment for Urban Inundation using Dual-drainage Model	In-Hyeok Park, Jeong-Yong Lee, Gi-Ho Jin, Sung-Ryong Ha	Chungbuk National University
	P-5-11	Estimation of Velocity Pressure Exposure Coefficients Using the Digital Topographic Map	Eun-Su Seo, Se-Hyu Choi, Seung-Woo Lee, Hyun-Jae Jo	Kyungpook National University
	P-5-12	Investigating Periodic Properties of Major Urban Plants on the Light Reflectance for Vegetation Type Mapping	Seul-Ong Kim, Gab-Sue Jang	Yeungnam University

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[AM]Surveying & Global Position & Navigation Systems (Chairman : Joon-Kyu Park)

09:30-11:00 (Room308A)	A-6-1	Texture mapping of 3D objects using depth camera and multiple images	Soo-Hyeon Kim, Jae-hoon Jeong, Tae-Jung Kim	INHA UNIVERTSITY
	A-6-2	Rectification method of Image Sequence for Free Moving Multi-Camera System	Jae-In Kim Tae-Jung Kim	Inha University
	A-6-3	Automated 3D Information Generation from Smartphone Images	Hee-Ran Ahn, Soo-ahm Lee, Jae-In Kim, Tae-Jung Kim	INHA UNIVERTSITY
	A-6-4	GNSS.asia Project and Future Plans	Eun-Mi Chang, TomaszWierzbowski, Sang-Uk Lee	Ziin Consulting

[AM] Surveying & Global Position & Navigation Systems (Chairman : Kyeong-Sik Park)

11:00-12:30 (Room308A)	A-6-5	Korean Meteorological Satellite Education Programmes for College Students	EunmiChang,ByungkiKang,YongjaePark,SunahMoon	Ziin Consulting
	A-6-6	Generation of Tunnel Cross Section Using Mobile Mapping Systems	Jin-Yi Park, Eui-Myoung Kim, Jin-Young Yu	Namseoul University
	A-6-7	SpectralMixtureAnalysisUsingModifiedIEAAlgorithmforForestClassification	Ah-Ram Song, You-Kyung Han, Young-Hyun Kim, Yong-Il Kim	Seoul National University
	A-6-8	A Study on Automatic Co-registration of Cloud-covered Multi-temporal KOMPSAT-2 Imagery	You-Kyung Han, Yong-Il Kim	Seoul National University

[PM] GIS application in Smart city, urban planning, transportation, education and etc.
(Chairman : Gi-Hong Kim)

14:00-15:20 (Room308A)	P-6-1	Current State and Research Topics to Infer Home Location of Twitter Messages	Aetti Kang, Youngok Kang	Ewha Womans University
	P-6-2	A Study on Automatic Coastline Extraction using Landsat Images	Mi-Kyeong Kim, Hong-Gyoo Sohn, Hyo-Seon Jang, Hyoung-Sig Cho,	Yonsei University
	P-6-3	Tactile map for blind people in Korea	Chung-Weon Oh	Namseoul University
	P-6-4	The Influence of Neighborhood Open Space on Physical Activity and Health	Su-Kyeong Baek, Kyung-Hun Park, Woo-Sung Lee	Changwon National University

[PM] GIS application in Smart city, urban planning, transportation, education and etc.
(Chairman : Jae-Myeong Kim)

15:20-16:40 (Room308A)	P-6-5	Spatial Analysis of CCTV location for crime prevention in Ansan	Min-Jung Lee	Korea University
	P-6-6	The Effect of the neighborhood environment on park usage for physical activity	Su-Kyeong Baek, Kyung-Hun Park, Woo-Sung Lee, Seul-Gi Lee	Changwon National University
	P-6-7	Impacts of the neighborhood environment on walking for transportation or recreation purposes	Hwa-Young Lee, Kyung-Hun Park	Changwon National University
	P-6-8	A Strategic Plan for Application of Creative Education Based on Geospatial Technology	Young-Ok Kang, Ae-Tti Kang, Na-Hye Cho, Ji-Young Park	Ewha Womans University

[PM] GIS application in Smart city, urban planning, transportation, education and etc.
(Chairman : Youn-Gok Kang)

16:40-18:00 (Room308A)	P-6-9	Next Generation Satellite for GIS Application in KOREA	Hee-Seob Kim, Deog-Gyu Lee, Yong-Seung Kim	Korea Aerospace Research Institute
	P-6-10	Analysis of impact on the safety of walk to physical environment of surrounding elementary school : Focused on elementary school in changwon city	Hwa-Young Lee, Kyung-Hun Park, Ji-Hye Byeon	Changwon National University
	P-6-11	Discriminate between green roof and small green spaces using Airborne Hyperspectral Imagery	Tae-Woo Kim, Hyun-Soo Heo, Yong-Cheol Suh	Pukyung National University
	P-6-12	Exploring spatial augmented reality for SMART Education	Young-Hoon Kim Jeong-Hwan Park	KoreaNationalUniversityofEducation

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[AM] Spatial data modeling and mining (Chairman : Jin-Mu Choi)

09:30-11:00 (Room308B)	A-7-1	Estimation of Near Surface Air Temperature with MODIS Land Surface Temperature Data Using Geostatistics	Hyu-Seok Shin, Eun-Mi Chang, Sung-Wook Hong	Ziin Consulting
	A-7-2	A study on development of indoor space data model	Yun-Ji Kim	University of Seoul
	A-7-3	Comparison of Volcanic Eruption Reports and Mapping	Eun-Kyung Kim, Eun-Mi Chang, Min-Hee Chung, Kyeong Park	Ziin Consulting
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[AM] Spatial data modeling and mining (Chairman : Min-Soo Kim)

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[AM] NSDI Policy and Planning of 7 Countries

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	A-8-4	Kazakhstan NSDI Policy and Planning	Kuat Sagadiyev, Dana Meirzhan	Kazakhstan
	A-8-5	Uzbekistan NSDI Policy and Planning	AlisherYakubov, InaraAbdurakhmanova	Uzbekistan
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Session_1

[PM] GI Policy and SDI

Human Resource Development for Geospatial Information Industry
- KOREA's Experience & Action Plan-

Eun-sun Im

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Abstract

In terms of that Human Resource development (HRD) is a core policy for countries to secure its national competitiveness, the presentation aims to introduce current status of a HRD policy as a part of a Korean SDI policy. Its major outcomes such as an online education system and capacity building programs in universities will be presented. HR development in the geospatial information sector includes training in knowledge technology attitude related to spatial information, and also includes the overall system that enables active circulation and utilization of human resources with such training. In addition, the master plan of the geospatial HRD for the next 5 years from 2014 will be introduced.

Development of GI Policy in South Korea

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Abstract

Ever since the early 1990s, several local governments and public corporates introduced Geographic Information System (GIS) for effective management of the utilities, but the produced geospatial information was not shared and duplicated. Many negative problems also occurred including unorganized land development, aging infrastructure, natural disaster, and accident. Korean government tried to solve these two issues through introducing GIS, but yet the GIS technology of the private sector was immature.

As a result, the Government initiated its National Geographic Information System (NGIS) project since 1995. The 1st Master Plan ('95 - '00) was focused on establishing spatial database through digitization of topographic and cadastral maps and developing standardization and technology. The Government tried to establish Spatial Data Infrastructure (SDI) from this phase. During the 2nd Master Plan ('01 - '05), SDI was continued to be created. Also sectoral GIS application systems (e.g., land-use, underground utility, environment, agriculture, forestry) were developed. From the 3rd Master Plan ('06 - '09), almost all geospatial information from application system of each producing organization was shared and further disseminated in the form of web-based information service. The 4th Master Plan ('10 - '12) was focused on higher usage of geospatial information based on the integration of the application systems.

Korea's geospatial information (GI) policy has taken step-by-step approach of SDI establishment, application facilitation, and service integration. Some characteristics can be identified in Korea's GI policy. First of all, it was changed from government supply-basis to user demand-basis. Market has been expanded in the private sector, which was triggered by the public sector. Cross-cutting application was developed from single-topic application. The GI application is also moved from simply managing materials to supporting decision-making process. Last but not least, the focus of GI policy expanded from individual application into value network at the national-level.

Implementation of Smart City in Korea - Ubiquitous City

Jae-Yong Lee

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Abstract

"Ubiquitous City" (also known as U-City) is the brand name of Korean smart city. After city grown, there have been many urban problems including traffic congestion, crime, natural disaster, environment problem, and etc. Korean government constructs an ambitious strategy to solve various urban problems with the help of cutting-edged Information and Communication Technology. The term "Ubiquitous City" emerged first in 2004. The object of U-City is to create city where any citizen can get any services anywhere and anytime through ubiquitous technology to increase citizen's quality of life. This concept attracts large attention from academic, politic, and research field in Korea. Finally, the "Act on Ubiquitous City Construction" became effective from March 2008 by the government. Based on this law, more than 40 cities have planned or constructed "ubiquitous city". Korean government also has supported ubiquitous city project with various ways including comprehensive planning, R&D investment, human resource development, technology and service development, testbed construction, and etc. In this presentation, I will give an overview of Korean policy for ubiquitous construction. After the introduction of the policy, current status of ubiquitous city in Korea will be presented.

Land Use Change Prediction with Big Data

Dae-Jong Kim

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Abstract

Land Use Change Prediction with Big Data Big Data is emerging as a new source to discover insight to solve complicated issues and to predict the future because it is collective intelligence of billions of people's thoughts, opinion, behavior and plan. Big data characterized by volume, velocity and variety are created not only on web search engine, social media, blog etc. but also on computers for public services such as the electronic government. Technologies and methodologies are required for web crawling, mining, storage, managing and visualization. Land use change prediction is crucial for effective urban growth management by preventing urban sprawl or unplanned development. Land transaction data in undeveloped area is a good source for predicting land use change for growing city because land conversion is likely to occur in the transacted land. In other words, land developers need to purchase agricultural and forest land to develop for urban use and the spatiotemporal pattern of land transactions in this case is not normal. Developers want to save time cost by purchasing land as soon as possible and this creates land transactions clustered spatially and temporarily. In this presentation, I will brief the concept of big data and a couple of applications, and present the spatiotemporal pattern analysis method to predict land use change prediction in a growing city in South Korea.

Korea Planning Support System(KOPSS)

Hye-Jung Sung

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Abstract

KOPSS (KOrea Planning Support System) is a decision support system for territorial planning, regional planning, urban planning, public facility planning and landscape planning based on geospatial open source technologies and sophisticated analytical methodologies. KOPSS is a computer system to support spatial planning and policy making in a scientific way. Spatial data such as land, building, cadastre, topography have been created since the launching of national geographic information system development project in 1995 in Korea. KOPSS currently has five models for regional planning, land use planning, urban regeneration planning, public facility planning and landscape planning. Each model has adopted its own analytical methodologies. Regional planning support model (REPSUM) diagnoses and monitors balanced development over time across the country by computing spatial patterns of various indicators. REPSUM also locates clusters or hot spots for those indicators. In addition, REPSUM analyzes location quotient based on extended distance and visualizes traffic volumes among regions. Land use planning support model is a tool for reviewing locational conditions, analyzing development potential and supporting population projection, demand calculation for land use types, land suitability analysis and allocation. Urban regeneration planning support model delineates areas to regenerate based on outworn buildings, household density and the rate of very small parcels etc. Public facility planning support model evaluates supply sufficiency of public facilities compared to demand using parcel-based population data, and simulates change between demand and supply for a new facility based on Huff model, and recommends optimize d locations to minimize total travel distance. Finally, landscape planning support model analyzes visibility, skyline, view-shaft, sunshine light, blockage ratio etc. for a new land/building development in three dimensional space.

Session_2

[AM] Natural Resources & Land Management (Chairman : Bong-Bae JANG)

09:30-11:00 (Room304)	A-2-1	A Study on Reorganization of the Spatial-information Legislative System	p.11
	A-2-2	Inland temperature data availability verification using MODIS land surface temperature data	p.12
	A-2-3	3D Visualization of forest information using Aerial LiDAR Data and Biotop Map	p.13
	A-2-4	Current State of the 3-D Geospatial Data in South Korea and a Case Study on the Building 3-D Cadastre	p.14

[AM] Natural Resources & Land Management (Chairman : Jae-Bin Lee)

11:00-12:30 (Room304)	A-2-5	A Cartography Scheme for Use in Estimation of the Amount of Non-point Source Pollutants	p.15
	A-2-6	A Study on the Korean Reach File based Catchment map Construction	p.16
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A Study on Reorganization of the Spatial-information Legislative System

Hyung-Taek Lim[1)]
[1)] Principal Researcher in Spatial Information Research Institute

Abstract

Recently, spatial-information industry registers rapid growth. Multinational corporations, including Google, lead the growth of spatial-information industry. However, yet, the spatial-information industry is at an early stage. Accordingly, if the Korean government gives the spatial-information industry full support, it is likely that the spatial-information corporations of Korea become one of the leading spatial-information corporations in the world.

Reorganization of the spatial-information legislative system is one of the Korean government's support. Korea enacted and has enforced the Framework Act on National Informatization in order to contribute to sustainable development of knowledge information society and improve the quality of life of the nation by setting a basic direction of national informatization. Korea enacted and has enforced the Act on Personal Information Protection in order to protect the privacy of personal life against collection, spill, misuse, and abuse of personal information by providing the details on processing of personal information.

Also, the Act on National Spatial Information provides the contents on efficient building and comprehensive utilization and administration of national spatial-information system. Besides, Korea enacted and has enforced the Act on Spatial-information Industry Promotion in order to promote the spatial-information industry and strengthen its competitiveness, the Act on Land Survey, Waterway Survey and Cadastral Records in order to acquire location information as an important base of spatial information, and the Act on Protection, Use, etc. of Location Information in order to protect the privacy of personal life against spill, misuse, and abuse of location information which seems to be the core of spatial information and revitalize the use of location information by fostering the environment for its safe use.

Like this, Korea enacted and has enforced different laws related to the development of spatial information directly or indirectly. However, there was no through examination with functional role of each law in an unified system of spatial information. As a result, quite a few problems have arisen. In addition, we need to set definite criteria on the protection of personal spatial information for stable development of spatial-information industry, but until now, we have no criterion. For this reason, this Article tries to prepare the ground for reorganization of the spatial-information legislative system.

Keywords : Spatial Information Industry, Act on Spatial Information, KLIS

Inland temperature data availability verification using MODIS land surface temperature data

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Abstract

Due to natural disasters(hurricanes, heavy rain) that occur each year, people focus on climate changes. Many climate changes are predicted by meteorological model that using land cover data, inland water temperature, etc. for input data. Land surface temperature is observed in meteorological station, but temperature data that is far from meteorological station has inaccuracy. To improve this problem, there are many research that construct temperature data using satellite image(Jones et al., 2004). Jones et al.,(2004) estimated night lowest temperature using MODIS Land Surface Temperature(LST), checked night temperature variability. Colornbi et al.,(2007) proved ways of availability using MODIS LST.

Satellite data can used not only measurement of air temperature but also measurement of water temperature. For detailed measurement of water temperature, dense and wide equipment is needed. But using many equipment for measurement of water temperature lead to expensive research costs. To construct a reasonable and cost-effective data, using MODIS LST data is suggested in this study.

For a accuracy verification, MODIS LST data compare with water automatic monitoring equipment's data on "time" and "region". In this result, the lowest error is observed in October~November in the daytime and lowest error is observed in July~August in the nighttime. Regardless of region, the lowest error is observed in October~November in the daytime. During July~September, Han River recorded lowest error in the nighttime.

3D Visualization of forest information using Aerial LiDAR Data and Biotop Map

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Abstract

Recently, 3D GIS (Geographic Information System) is established in lots of fields such as urban design, resource and environment management, disaster information management, land management, etc. 3D GIS provides intuitional and realistic simulation to users by expressing geography and objects in 3D. Until now, visualizing efforts of 3D GIS on objects were limited to buildings mainly until now, but tries to visualize other objects except for buildings like actualities are recently increased. Meanwhile, 3D visualization of forest resources is conducted. But, forest resources are visualized by expressing with only geographical factors in most of cases. In spite of the 3D visualization, there are many cases which are not realistic or not suitable for simulation.

Unlike the past when social requests for forest resources focused only financial feasibility, they recently tend to focus environmental□ecological function and value of landscape resources. Environmental and ecological management such as natural landscape's preservation, protection, etc. is specially becoming an important part. Therefore, efforts to manage various information effectively and visualize it like actualities are necessary so as to manage forest rationally and effectively.

Generally, data of forest is stored as polygon and it's expressed by attribute information of tree density. But, for data visualized by only information of density, it's difficult to grasp forms and scale by tree kind of forest area, influence of visibility by tree height, etc. Also, in case of trees modeled in 3D GIS, there are many cases to be unified to one form and texture. Most of cases are that reality is reduced or there are differences from actual object due to the low density of texture.

This research intends to visualize forest area more actually with LiDAR(Light detection and ranging) data, biotop map and satellite images and let users recognize forest information instinctively and realistically in GIS. By visualizing forest information actually, it will be effectively applied to the analysis for urban design, recovery and preservation of ecological resources.

Keyword : Visualization, Vegetation modeling, LiDAR, Biotop map

Current State of the 3-D Geospatial Data in South Korea and a Case Study on the Building 3-D Cadastre

Bong-Bae JANG[1)]

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Abstract

In order to become top 10 countries in the geospatial information industry over the world by the building of National Spatial Data Infrastructure (NSDI) and the spread of ubiquitous environments, and thus it has continually invested a variety of fields, and enacted concerned laws. The spatial information industry converged and integrated with Information & Communication Technology and high technology such as digital aerial photogrammetry, satellite image, and terrestrial LiDAR, is expected to extend its scope in the world as well as in the Korean market.

This study is targeted at introduction of the current state of the 3-D geospatial data infrastructures, such as u-Korea & u-City, and at showing a case study on the building 3-D cadastre by digital map, Total Station and ground LiDAR in South Korea.

The result of this study is expected that the geospatial information industry will be largely applied to various industries, such as not only cadastral survey but also leisure activities, transportation, finance, health, environment, national defense.

Keywords: National Spatial Data Infrastructure, 3-D Geospatial Data Infrastructures, Cadastral Map, Information & Communication Technology

A Cartography Scheme for Use in Estimation of the Amount of Non-point Source Pollutants

Lee, Chol Young*, Kim, Kye Hyun**, Kwak, Geun Ho***

Abstract

The management of non-point source pollution should be considered as the core of the successful progression of the Total Maximum Daily Loads (TMDLs). In order to manage the non-point source pollution under Best Management Practices (BMPs), the determination of major causes and the priority definition of management target are crucial. At this moment, the accurate calculation of the amount of non-point pollutants according to each land cover type is required. The amount of non-point pollutants has simply been estimated by the pollutant loading unit method according to each parcel's land use type and its area data. However, if the area of a parcel is wide and various land types exist in a parcel, inaccurate results could be calculated. Thus, an estimation method using a land cover map has been suggested in previous studies; however, it could not be instantly applied to TMDLs because land cover maps are not updated annually.

The purpose of this study is to suggest a cartography scheme for use in the estimation of the amount of non-point pollutants. Initially, the problems of the existing method were confirmed and summarized case-by-case. As the target area, Bupyeong-gu in Incheon was selected. The latest Kompsat-3 images (taken on May 8) and ortho aerial photos in 25cm spatial resolution were collected; these were utilized in overlay analysis with the cadastral map and the land cover map. It was confirmed that there were problems related to omission of land type classification in small areas, and time-series variation. Therefore, to overcome these problems, a cartography scheme by partial updates based on a mid-level land cover map was suggested. First, as the updates target area, parcels in the class of "urban area", whose pollutant loading units are relatively high, were extracted from the continuous cadastral map using ArcGIS. The detailed land cover type information in those parcels, which were interpreted from satellite images, ortho aerial photos, and topography maps, were reflected in the mid-level land cover map. It is expected that the suggested cartography scheme could be adopted for utilization in TMDLs as an alternative that will allow more accurate calculation. In future studies, the practical application and the accuracy verification of the scheme are necessary. Furthermore, after confirmation of potential applications, efficient management of non-point source pollution loads should be achieved through applying this scheme to TMLDs.

Keywords : Cartography Scheme, TMDLs, Non-point Source Pollutants, Land Cover Map

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A Study on the Korean Reach File based Catchment map Construction

Choi, Yong Kuk*, Kim, Kye Hyun**, Yoo, Jae Hyun***, Oh, Sung Kwang****

Abstract

For efficient GIS-based watershed and water quality management, the National Institute of Environmental Research(NIER) has designed and constructed the Korean Reach File(KRF), which facilitates stream reach-based network analysis, by benchmarking the EPA River Reach File(RF) of the United States. However, there has yet to be a definition of stream reach-based catchment areas, which has led to difficulty in analyzing areas of influence. For stream reach-based water quality management in a GIS environment, it is essential to analyze areas of influence to identify pollutants included in each stream reach. The present study therefore aims at suggesting a way of constructing catchment area maps that are applicable to stream reach-based water quality and watershed management. The Gyeong'an Stream watershed was selected as the object of study and digital elevation map(DEM) data were collected. In general, it is impossible to divide watersheds only with ArcHydro to reflect perfectly the phenomena of the real world when the boundaries of catchments are partitioned, and, for stream definition, only changing the number of cells(NC) makes it difficult to partition the boundaries of catchments corresponding to each stream reach. Accordingly, the present study proposes a method for creating catchment maps with a high level of details by reducing the NC and using post-processing. During post-processing, the resulting data from drainage line processing and the linear and graphic data from the KRF were overlapped by using the features of ArcGIS, and catchment areas were redefined by investigating the flow direction of the water. Here, a DEM was extracted from the related areas when the intermediate results failed to reflect the linear data of the KRF, and the separate results thus generated were combined into one. Subsequently, a catchment map was constructed by generalizing the boundary lines of the catchment area map generated and modifying the boundaries of catchments based on the boundaries of standard watershed maps. When the catchment map thus constructed was examined, the results corresponded to the boundaries of the five standard watershed maps included in the Gyeong'an Stream watershed, and, thanks to the construction of 74 more subdivided catchment areas, it will be possible to manage water quality in each sub-watershed. In addition, because the catchment map makes possible the spatial search and analysis of polluters that influence each stream reach, it will be possible to manage water quality more quantitatively and systematically. In the future, it will be necessary to conduct research for the development of automation algorithms for the post-processing proposed in the present study and to construct stream reach-based catchment areas in all watersheds.

Keywords : Korean Reach File, Catchment map, DEM, GIS

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Estimating Terrestrial Carbon and Its Outflow to the Ocean for Carbon Monitoring System

Lee, Woo-Kyun* · Kwak, Hanbin** · Cui, Guishan*** ·
Kwak, Doo-Ahn**** · Kim, Moonil***** · Song, Yongho******

Abstract

Recently researches related to carbon balance of ecosystem to climate change has been increased. However, researches which cover interaction between terrestrial ecosystem and ocean are insufficient. The objective of this study is to estimate terrestrial carbon and its outflow to the ocean. To perform this research, 1) carbon balance of terrestrial ecosystem was estimated using Carbon Budget Model of the Canadian Forest Sector 3, (CBM-CFS3), and 2) amount of outflowing Dissolved Organic Carbon (DOC) was estimated from terrestrial ecosystem to the ocean in South Korea using hydrological model, Soil and Water Assessment Tool (SWAT), which contributes to develop a model for simulating moving route of DOC.

First, to estimate carbon balance of South Korea, we tried to use modified CBM-CFS3. The CBM-3 is able to estimate carbon balance in South Korea by simulating biomass of forest, dead organic matter, and soil carbon storage according to various natural disturbance and forest management scenarios. As the result of CBM-3, present carbon budget showed higher carbon budget than actual state because there were no data of natural disturbance and deforestation. Future carbon budget including biomass was predicted to increase continuously during 70 years, however, Dead Organic Matter (DOM) was unchanged in the future. Second, the outflow of DOC which has relation to soil carbon and total runoff was calculated. The total runoff was simulated by SWAT. As a result, high outflow of DOC showed near coastal areas.

Keywords : Carbon Monitoring System, Terrestrial Carbon, CBM-CFS3, SWAT, DOC, Outflow

Acknowledgments

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A study on the provision of User-Centered Geospatial information service Using Public Data

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Abstract

On the basis of a major portal site of domestic and foreign private sector, such as Naver, Daum, Google, to provide useful information service, e.g., transportation, location, life expediency, geospatial information industry in Korea. These circumstances have entered the era of innovation ' Government 3.0'through the spatial information convergence and user custom service. In Korea, many attempts have been made to open the public information to the public only to result in limited extent, where Open API data is being presented by some agencies. Recently, at the national level, the LOD(Linking Open Data) project has built the national DB, initiating the ground on which the linked data will be based for their active availability. Linked data is one approach used to connect government data sets that span multiple organizations. By utilizing data mining and visualization techniques, it is possible to implement an efficient data driven e-government.

In this study, we look at the Initiatives in various fields with the increase of data, have examined from the viewpoint of the importance of data processing in public data, which has been issued recently by the name of Big data. Also show two kinds of geospatial service contents, which is developed using public data for people's convenient life. Firstly, the provision service of customized living information by human life cycle is used information about houses, schools, infant caring facilities, noise, building energy, real estate, housing reverse mortgage, maintenance cost, and so on. Secondly, the provision service of disaster and safety information is used information about weather, crime, land slide, flooding, radioactivity, location of CCTV, shelters, etc.

If various public data produced by different organizations is opened and shared efficiently, it is possible to develop many service contents. Moreover, the use of public databases to be combined with the creativity of the private sector, it has a great potential to be a new business and job creation as well as the use of public duty. After all, various data such as public data and geospatial data can be used effectively for the public, geospatial technology and industry will flourish.

Keywords : Open API, LOD(Linked Open Data), Public data, Big data, Geospatial Service Contents

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The Visualization Module, “Viz-icoN" for the Optimization of Geo-spatial Information Service on the Smart City

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Abstract

The main purpose of the visualization of information is a communication with information using graphic meaning effectively and concisely which must be aesthetic and functional.

As a example of 3D spatial information services, the V World by Ministry of Land, Infrastructure and Transportation is processing the rapid expansion of service with the openAPI. And, in the recent popularization of mobile devices, with the appearance of business using spatial information, the importance of spatial information is increased as the key content in the service industry.

At this point, this study concerns that the visual expression method of information optimizes the interface environment for common people to understand, search and navigate extensive amount of information easily. Also this suggests the viz-icoN as one of way to access to information with using the new interaction technology for delivering the Abstract information intuitionally.

The details of research is as follows:

- The concept of information visualization and the analysis of characteristics of information for the popularization of Geo-spatial information services
- The definition of user behavior patterns and user levels of Geo-spatial information service
- The categorization of the visualization method by the level of Geo-spatial information service
- The concept definition of Geo-spatial information service module, ""Viz-icoN"
- The development of the prototype for Geo-spatial information service

The Viz-icoN is a visualization module which makes common people, also underprivileged groups, able to access easily to related information.

While the existing geo-spatial information visualization studies were focused on the analyzing methods for a precise and fast decision making, regardless size and quantity of information, for experts, this research is about inducing the generalization of the smart life support service in near future to access into the information quickly and easily.

Also, with rapidly increased amount of information, the information visualization in the interface would provide the service which concerns the user's context with proper links on the spatial user information system.

Therefore, this research suggests the visual module to generalize and standardize the visualizing methods which are different by characteristics of information unlike previous research methods. This will be a communication method for displaying the information efficiently and sharing complex information in online within the limited and restricted area by users.

Keyword : Visualization Module, Optimization, Geo-spatial Information Service, Categorization of Visualization Method

Analysis on the interoperability between Apartment House BIM and 3D GIS for urban environment planning

junyoung choi

Abstract

By integrating architectural design map and attribute information, BIM(Building Information Modeling) has a possibility for usage in architectural design as well as urban planning like landscape analysis. In this paper, Institutional and technical considerations were deduced for converting apartment house into 3D GIS by reviewing literatures and projects about LH(Land and Housing Corporation)'s apartment house BIM. In addition, applicability of converted 3D GIS data from BIM was applied for urban environment planning. As a result, it is found that establishing interoperability between apartment house BIM and 3D GIS can be effectively used in the urban spatial analysis such as urban thermal comfort, urban heat island, wind tunnel etc., which is more extensive than the building scale analysis.

Keyword: Apartment House, BIM, GIS, Interoperability, Urban environment planning

Study on Demand Adaptive Bus Route Optimization using GIS in Suwon, Korea

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Abstract

(Around 400 words) In recent years, a variety of methods to enable public transport is being urged . These efforts to reform urban rail extension or bus system is split double rail construction of the astronomical costs and long construction period, there is a problem that takes . Also, once the route was built to change or removal is virtually impossible. In response to demand , while bus routes can be optimized . Optimize the usage of the bus , the bus service adequacy , redundant route issues, an imbalance of supply over demand, and more accurate and effective analysis should precede.

These solutions of the GIS-based activation specifically for the use of public transportation and the efficiency optimization study on the bus route there is a need to provide .

Utilizing the BIS (Bus Information System) data and SCD(Smart Card Data) for the imbalance of supply and demand in the existing routes were studied. In addition, by calculating the rate of congested routes to identify service bottlenecks section to find ways to improve services. Vehicle was developed for efficient service difficulties securing appropriate service interval for estimating the number and the vehicle takes service on the route to provide a reasonable plan.

Transportation routes for traffic demand system to come up with an alternative for affordable transportation planning and traffic through the analysis of supply and demand imbalance considering spatial variation of traffic demand supply adjustment by presenting a more rational way , the efficiency measures in transportation planning and development is to study .

Key words : GIS , SCD and BIS, Demand and Supply, Transit

Volunteered Geographic Information System in Web Environment

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Abstract

This study aims to investigate the development of Volunteered Geographic Information System in Internet environment. Firstly, due to the change of internet envronment such as smartphone communication, GIS has changed from Public Participation GIS to User Centered Volunteered Geographic Information. So Big Geo Data from VGI is main issue in Geographic Information Science. Secondly, Location Based Social Service Model about volunteer network has proposed for social welfare service. Social welfare gis is a suitable Volunteered Geographic Information application.

Keywords : Volunteered Geographic Information, PPGIS, Location Based Social Networking Service

Design of Web GIS System for Water Information Service

Park, Yong Gil* / Kim, Kye Hyun** / Lee, Sung Joo***

Abstract

At present, a more efficient means of the distribution of water information is required for water management considering water shortages due to global climate changes. Water management is urgently needed in South Korea, which is considered as a water-stressed country due to the low level of water consumption per capita owing to the country's high population density and heavy rainfall amount during the summer monsoon season. Therefore, this study mainly focuses on the design of a web GIS system to supply an efficient water information service to various users for better water management.

A smart water grid(SWG) is a high-efficiency next-generation water management system that uses advanced information and communication technologies to overcome the limitations of previous water resource management systems. SWG studies generate a range of water-related data, including data related to water production volume, metering, and sensor information. There are many ways to provide generated data to users; however, it is difficult to understand when the data is provided in a numeric and character form. GIS can solve this problem by overlaying map images and adding location information to water-related data. Users can easy understand contents from fused data.

For a much easier information supply to an enormous number of unspecific users, the system will be designed for a web-based environment. A web system can be accessed from anywhere with a simple web browser, and it can provide information quickly after changes in real time.

As a first step in the design of the system, a user requirement analysis was conducted. As a result, the data collection unit is divided into four different grid scales: mega, macro, meso, and micro. The grid scales represent information at the national level, the large-scale watershed level, the local government level and the water consumer level, respectively. The user group was divided into three different groups: the water manager, producer and consumer groups. The manager's demands focus on water supply and consumption. The producer's demands focus on water quality and leakage. The consumer's demands focus on water quality and price. Depending on the user requirements, system functions were designed for information searches related to water supply, consumption, water facilities, real-time monitoring, and emergency status alarms, for instance. Moreover, each function uses GIS data, including map and location data, to provide information efficiently.

This study was designed as a web GIS system to supply an efficient water information service to various users for better water management. The user groups were separated to supply user-customized information in a more efficient manner. This system will provide users with a better understanding of water information.

Keywords : Water information, GIS, Web, Smart water grid

Acknowledgement : This research was supported by a grant (12-TI-C01) from Advanced Water Management Research Program funded by Ministry of Land, Infrastructure and Transport of Korean government and this work was researched by the supporting project to educate GIS experts.

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Development of Spatial Data Compression based on coordinates for Mobile Spatial Database

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Abstract

In this study, the load on mobile spatial database to reduce the size of the data to compress spatial data is proposed. Relative coordinate-based data compression techniques, and points-based data compression technique is applied to the original data, nearly 38% reduction in the size of the data has been compressed. In addition, the compressed data fetch speed performed on the original data showed a similar speed, spatial search performance without the loss of spatial data to reduce the size of the effect could be obtained.

First, the 'relative coordinate compression' technique from the previous point to the current point to the relative distance of the store is a technique to reduce the size of the data. They have a list of points of spatial data, which is based on the first point from the second point can be expressed as the relative distance between preceding point. In this study, the proposed compression technique based on the relative coordinates of the relative distance to the first point of the technique of storing the same store, another point's coordinates relative to the preceding point and calculate the distance by the 1-2 representation of the data size in bytes can be reduced. Point-based compression techniques, spatial data compression technique based on the relative coordinates of the compressed data is compressed again. This technique, which expresses that x, y values in the data space to store a few bytes is the size of the flag 2 bits to store the information and the actual data is stored together. In the case of 1-byte data, flag 2-bit and 06-bit data stored together, and in the case of 2-byte data, flag 2-bit and 14-bit data is stored and, in the case of the last four bytes of data, flag 2 bits 30-bit data is stored. Thus, depending on the size of the actual storage space to store the coordinates of the size of 1 byte of data values in -32 ~ 31, 2 bytes of data values in -8192 ~ 8191, 4 bytes of the values in -536870912 ~ 536870911 data can be stored .

The process of restoring the spatial data compression, the data is compressed when the process is done in reverse. In other words, the relative coordinate compression techniques when applied to the point-based compression, spatial data to be restored when the point-based compression based on the relative coordinates, and then restore the data by restoring the compressed data is restored to the original data.

Keywords : Compression, Spatial Data, Mobile, Relative Coordinates

Evaluating the usability of web-based statistical map using eye-tracker

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Abstract

The central and local governments of South Korea have made substantial investments on Geographic Information Systems. In Korea, the local governments also established and managed interactive online thematic maps that service their annual statistical reports. But these systems provide different statistic in different structure so people can feel difficulties to find what they want. Therefore, we measured user satisfaction, efficiency and effectiveness with SEE usability metrics and also used eye tracking. With SEE usability metrics, we can collect quantitative data from personal qualitative aspect. To measure effectiveness, it was used three tasks that have different levels of complexities. Two were close-ended questions and related to an attribute or a location. Another one is an open-ended question that required the participant to compare from two different spatial distributions. To measure efficiency, we calculated durations of the tasks. To measure satisfaction, standardized system usability scale (SUS) score was used. By employing the eye tracking, we can get answers about where, when, how long, how often and which order. The open-source eye-tracker was used to this experiment supported by the EyeWriter project. The open-source eye-tracking analysis program was used to this experiment supported by OGAMA project. Thirty people (21 males, 9 females) participated in this study. The mean age was 23 years old (18 to 33), 15 participants were graduated school student in geography and another 15 participants were the first year undergraduates. The experimental group evaluates three differently designed web-based map interfaces that have different levels of item, hierarchy and ordering via some tasks that are especially about thematic maps with population and hydrant. The result shows that participants choose a high satisfaction map even though it was not efficient and effective.

Keywords : Web-based thematic map, Usability, Eye-tracking, User centered interface design

Efficient Aggregation of Spatial Web Objects

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Abstract

This paper describes an efficient aggregation structure and algorithm for spatial web objects. Spatial web objects are the web documents with explicit or implicit location-tags on the Internet. The spatial web objects such as points of interest are being associated with location descriptive texts, gps-tagged photos, or explicit latitude/longitude values. Recent most researches on spatial web objects have focused on keyword query processing and relavant spatial web objects indexing. Researches on aggregation processing of spatial web objects are not heretofore studied. In this paper, we propose aRS-tree for efficient aggregation of spatial web objects. The aRS-tree is aRB-tree like structure with string aggreegation tree in their leaf nodes. Frist, root data sturucture supports aR-tree liked aggregation. In the second step, each leaf node of R-tree connect index about existing document in the leaf node space. Final step, aggregated information about document in node save from leaf node to root node as bottom-up method.

Keywords : Spatial Range Aggregate, Spatial Web Object

Selection Methodology of Building data using Reverse Engineering for Topographic Map Generalization

Park, Woo Jin*, Yu, Ki Yun**

Abstract

Development of map generalization methodology has huge importance in management of the digital topographic map for national mapping agencies and commercial enterprises which are providing location-based services. Among many generalization operators, the selection methodology for the building data in digital topographic map is investigated and evaluated in this study. As the knowledge acquisition for selection, the criteria about the proper number of objects at the target scale level and the relative importance of each building object should be analyzed. By applying reverse engineering, the existing maps with 1:5,000 and 1:25,000 scales are compared and the criteria for selection of the building data are extracted. In reverse engineering, the selection criteria are analyzed by using the Töpfer's radical law and logit model. The building selection model derived from the analysis result is applied to the test data, and the building data of 1:25,000 scale from the digital topographic map of 1:5,000 scale are generated.

Keywords : Map Generalization, Digital Topographic Map, Selection, Building Data, Reverse Engineering

1. Introduction

In Location-Based Services(LBS), to provide more various and stable map services to users, the construction of multi-scale database(MSDB) is indispensible. As one of the solution for the MSDB construction, automated map generalization methodoogy is utilized in many National Mapping Agencies(NMAs) and map producing companies. However, these mapping agencies still have troubles in applying map generalization technology to map production. One of the major reason for the difficulties is that the knowledge acquisition for the map generalization is very complicated and hard to formalize.

Map generalization is composed of various operators and among the operators, the selection process is the most previous step and has big importance in the whole generalization process. For the appropriate implementation of the selection process, acquisition of the cartographic knowledge about the proper number of objects at the target scale level and the relative importance of each building object is a prerequisite

2. Methodology

In this study, the selection process for the building data which are given a great deal

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of the map data is investigated and applied. The knowledge acquisition for the selection is based on the reverse engineering. That is, two map data which has different scales and portraying the same area are compared and the matching object pairs between two data are extracted and analyzed by various statistical analysis. The selection rules are formalized from the results of analysis and applied to the building data for test. The overall methodology of knowledge acquisition and selection for the generalization of building data is as follows.

1. The building data of the two maps in scale of 1:5,000 and 1:25,000 are overlaid.
2. The building objects in two maps are compared and the matching pairs are found out .
3. Using the matching pairs, the building objects of 1:5,000 scale map are classified into the selected group(matched to the building object in 1:25,000 scale map) and eliminated group(no matching object in 1:25,000 map).
4. As the statistical analysis for two groups, Topfer's radical law and the logit model are implemented and the analysis results are formalized into selection rules.
5. The selection rules are applied to the building data of 1:5,000 scale in the test area and the generalized result in 1:25,000 scale is extracted

As the result of the Topfer's radical law, the constant of symbol exaggeration was calculated as 1.282 in the analysis area. The results of the logit analysis was as follows: the regression coefficient for the building area(m2) was 0.032, the regression coefficient for the building height(m) was 0.128, and the regression coefficient for the building class was 2.075. The figures below shows the building data for analysis(1:5,000 and 1:25,000), data for test(1:5,000) and the result of the generalized building data(1:25,000)

3. Conclusion

In this study, the building selection methodology which is based on the knowledge acquisition using reverse engineering was proposed. In knowledge acquisition, the Topfer's radical law and the logit model was used for the analysis. The proposed methodology seems to have a high potentiality in the generalization process of building data.

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Development of Technology for the Standard Services of Street Tree Information Using Open Source

Kim, Moon Joung*·Kim, Eui Myoung**

Abstract

As interest in green space internally and externally increases, interest in street trees that you can easily see in everyday life also does. The street trees have the effect to be able to reduce noise and fine dust generated in roads and heat island in downtown areas. The local governments have systems to manage them and they are also managed in map or table forms without any system because of lack of management manpower. Therefore, this study carried out the study on standard format for standardized services based on the results which investigated cases of street trees arranged by local governments. For location information of street trees as the basic information for their management, the result extracted from the LIDAR data was utilized. A schema for management of street trees was made out in XML form by using the information of their properties including their location, diameter at breast height, width of crown, species of trees, planting dates, management agencies, road names for management of their standardized information. When local governments' reality is considered, it is not easy to develop service programs by putting separate budgets into them. Therefore, the study developed the program which can service street tree information in the three-dimensional state by using Google Earth Plugin which is the open source and C# program language. For this, it produced the image materials and 3D models about species of street trees which are being managed in Korea. And it combined the XML document developed as the standard for services of street tree information with the 3D models and realized the function to be able to provide 3D services for you in Good Earth. The function could tri-dimensionally visualize the roads that street trees were planted based on them. The study suggested the methodology which can easily provide the street tree information for general users. And it could provide the street trees which are arranged by the different ways according to local governments in 3D-based standardized form. It could calculate reduction of carbon dioxide by species of trees by using information of street tree attributes and increase understanding about green space through the 3D service environment.

Keywords : Street Tree, Open Source, 3D, Standard Service, Google Earth

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The Establishment of the Rate of Sunshine Based on Solar Energy Resource Map Using GIS Spatial Analysis - The Case of Gyeongsan City -

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Abstract

Recently due to global warming construction of Social Environment on Cyclic type issues from the perspective of solving and securing of Renewable energy Resources has been proposed. In particular, United Nations Framework Convention on Climate Change implemented the Kyoto Protocol since environmental issues of international heighten the awareness of substitution of fossil fuels and energy conservation is emphasized. The importance of the problem emphasized the purification of fossil fuels, reduction in fossil fuel consumption and energy saving as a result of new renewable energy. As a result, the advanced country developed a strong policy in support for energy sector and started to do research and utilization on the importance of new renewable energy.

Due to this global situation, there is a growing interest about environmental conservation and new renewable energy resources as well as to increase and change the people's awareness about energy. Most of all, the application and maintenance of new renewable energy on the limited use and maintenance control in local areas must be increased.

This situation will increased the public awareness for solar energy utilization demand. In the case of developed countries, the national organization want's to satisfy the citizens interests about solar energy resources such as on fundamental observation data as well as marketability, extended effect, policy programs and so on provided with a wide range of information web services.

In this study, it is expected to build a variety of new renewable energy resources map in the country by utilizing the rate of sunshine efficiently and utilization of energy resources.

Through this the government organization and private sector of solar energy required information from the public about solar energy resources that can provide scientific data for decision support. In addition to improve the use and limitation of energy resources the Korean Institute of Energy Research produce renewable energy information map. Furthermore, foreign developed countries proposed a method to identify and map the efficient used of solar energy resources.

Keywords : Renewable Energy, Solar, Analysis System, Green Growth, Simulation

Acknowledgement

This study was conducted by research support for establishing resource map for new regeneration in the Korea Institute of Energy Research.

Development of Utilizing Techniques of River Survey Data For the Analysis of River Topography Changes

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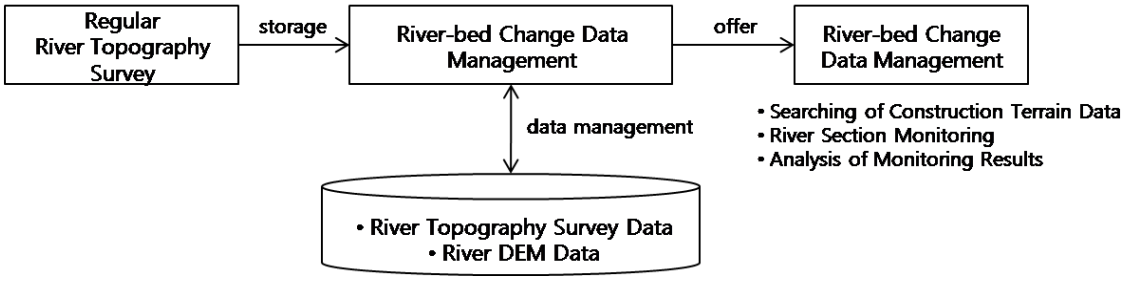
Abstract

Ministry of Land, Infrastructure and Transport has been operating River Information Management Geographical Information System (RIMGIS) from 1999 to the present. In recent years, the research for improving the functionality of the system as the function improvements of RIMGIS and DB Construction (Ministry of Land, Transport and Maritime Affairs, 2012) was performed. In this study, as a part of upgrading RIMGIS a large amount of bathymetry data are managed systematically, utilized efficiently and tried to look for other methods. River measurement results expressed in DEM, develop the ability to quantitative analysis of this research is constantly being done (Lawler, 2008; Jo et al., 2012; Jo et al., 2013). Thus, the development of river-bed change data management program which can be implemented to RIMGIS as one of it's functions.



Database was designed using program to take advantage of various data such as dynamic changes of river data. We used bathymetric data, river center line data and station data in 2012 and 2013. River-bed change data management program consists of 'Status Inquiry', 'River-bed change data management' and 'Monitoring analysis'. Item specific features are as follows.

Items	Description
Status Inquiry	Provide a list of topographic survey data built on program and check the details information such as metadata
River-bed change data management	Provide a cross-sectional view and DEM through monitoring of river longitudinal and transverse.
Monitoring analysis	Provide amount of increase of reduction on river-bed changes by unit of area(m^2).

TodeveloptheInterface and build a test environment for application prior to RIMGIS's sub-item.

To developed river-bed change data management program for a systematic management of dynamic changes in river to integrate with environment river information. This research study expect to provide river maintenance services in conjunction with a variety content through the development of efficient interface technology terrain.

Keywords : Bathymetry Data, River-bed Change, Data Management, DB Construction, RIMGIS

Acknowledgement

This research is supported by the research project of flood defense technology for next generation funded by MLTM (Ministry of Land, Transport and Maritime Affairs) of South Korea.

Training Improvement Using Building Edges for Automatic Building Extraction of Quickbird-2 Image

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Abstract

High resolution satellite images are the most effective data for 3D building modeling and change detection. Because satellite images of specific region are collected periodically at almost the same time. The height of a building as well as position can be obtained from image analysis. It is essential for satellite images to automatize building extraction and description to maximize its availability, compared with other data sources such as database and on-site surveying. However, automatic building extraction is not simple task because the selection of training samples and the delineation of building boundary are influenced by analyst intervention, which means the subjectivity. In this study, edges of buildings and their buffer areas are generated to extract objective training pixels for the maximum likelihood classification. The building areas of classification results are processed with morphological filtering such as gap filling, opening, and closing filter. Then, image segmentation is performed and training segments, which have more accurate boundary than classification results, are determined by overlapping ratio between segments and the classification result of buildings. Finally, building objects are extracted using object-based classification based on training segments and their polygonal shape is generalized. The results show that accuracy of proposed method is as high as supervised object-based classification.

Keywords : Automatic building extraction, Training improvement, High resolution satellite image, Quickbird-2

A Practical Mobile Localization using Signage

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Abstract

Many interesting mobile internet services have been invented along the growth of the penetration rate of smart phones. The enhanced mobile devices and networking speed accelerate this. LBS(Location Based Service) is one of new services and it requires the localizing funtionality. Unfortunately, most of localizing systems are too expensive. So we propose a practical localization system using free mobile AR (Augmented Reality) SDK and signage as reference targets. It doesn't require any expensive equipment and we don't have to make and attach any reference targets. There were some researches to use QR code, markers or scene recognition as methods of image-based localization systems. But a marker based localization system requires cost to install and maintain them. And a scene can be changed often in public. To use signage resolves these issues. We also propose a survey tool as a part of the proposed system. This tool helps to make a reference target table. With this system, many building can provide indoor localization with low cost, and people can use very useful LBSs.

Keywords : LBS, Localization, Indoor, AR

Accuracy Analysis of FKP for Public Surveying and Cadastral Resurvey

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Abstract

NGII(National Geographic Information Institute) has started VRS service as network-based GPS service from March 12th, 2009 and started FKP service newly from November 11th, 2012. VRS service is a two-way communication system so it limits the number of simultaneous connected clients to be less than 1,000. Unlike VRS, FKP service adopted one-way communication system so it has no limitation on the number of clients. So it would be more useful for determining precise position in real time in 'public surveying' and 'cadastral resurvey'. However, not many studies or research have been carried out for the accuracy analysis of FKP service. Therefore, the accuracy analysis of FKP should precede to certain that we could use or apply FKP service for 'public surveying' and 'cadastral resurvey'. In this study, accuracy and reliability analysis of FKP have been performed. The service type (VRS vs FKP) and GNSS satellite use type (GPS and GNSS) were selected for accuracy analysis. When considering both elements independently, 4 combinations have been derived : FKP-GNSS, FKP-GPS, VRS-GNSS and VRS-GPS. For accuracy analysis, total 13 points were observed. Among them, 6 points are collected at the unified control points located in Seoul and 7 points are obtained at the public control points in Hwa-Sung city. To confirm the data quality, observation has been conducted following work provision for public survey and cadastral resurvey. The accuracy of VRS and FKP based position has been evaluated by comparing horizontal and vertical position with published coordinates. At this time, only horizontal position was concerned at the public control point due to lack of vertical information. In addition, the average time to ambiguity fix was compared. As a result, we found that both VRS-GNSS and VRS-GPS satisfied allowance precision, 5cm and 10cm for horizontal and vertical position, at the whole surveying points. On the other hands, FKP based positioning did not fulfill the allowance at 3 points of public control points. Three points showed over 5cm precision for the horizontal due to few number of ambiguity fixed satellites and multipath. Furthermore, average time to ambiguity fix was faster in VRS service than FKP. When checking the effect due to GNSS satellite type, more precise position has been determined in case both GPS and GLONASS satellites were used. It is due to the increased number of available satellites and faster time for ambiguity fixing.

Keywords : FKP, VRS, Public Survey, Cadastral Resurvey Project

Adjustment of Orhtometric Height Level Network in Korea

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Abstract

Orthometric height is determined by either dividing geopotential number(C) by mean gravity between earth surface and geoid or adding orthometric correction to the height difference obtained by differential leveling. If gravities on BMs all over the country could not be available, normal orthometric height was a good substitute of orthometric height. Korea has adopted normal orthometric height since 1910's.

The aim of the study is to set up orthometric height level network, Korea, by adjusting orthometric corrected height difference of level lines measured by differential leveling. In this study, orthometric correction for the height difference between BMs was calculated based on Heiskanen & Moritz (1967). Total 6,136 gravities measured on the BMs with relative gravimeter by NGII were used to calculate the orthometric corrections(NGII, 2011).

Level network in Korea consisted of 1st and 2nd level lines. The level network was adjusted simultaneously by the least squares adjustment of indirect observations(LSA). The mathematical model of the LSA in matrix form becomes v = AX - L (W). In the mathematical model for the LSA, orhhometric height of junction points was used as unknown parameter(X), and height difference of level line corrected by orthometric corrections was used as observations(L). Weight of the observation(W) was defined as the quantity that is inversely proportional to the length of level line.

As a result of the simultaneous least squares adjustment, the variance of unit weight(σ0), the stand deviations in adjusted height of junction points(σp), orthometric height of BMs in level network, Korea, are calculated.

Keywords : Level Network, Orthometric Correction, Least Squares Adjustment. Orthometric Height of BMs

Establishment of local geodetic datum based on time-series analysis of GNSS processing

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Abstract

Local geodetic datum has been an issue for most of the countries even in the globally connected GNSS era. We have performed a long-term GNSS data analysis, especially focused on the seasonal variation of tropospheric delay and the ambiguity resolution rate. A total of 57 stations were processed for more than ten years using Bernese GPS Software V5.0. The analysis reveals that there is an apparent pattern in the tropospheric delay as well as the rate of ambiguity resolution. Since the tropospheric delay is affected by the weather condition, thus these two factors show seasonal behavior. Based on the time-series analysis of GNSS data for the entire Korean peninsula, the local geodetic datum has been established. This local datum is connected to the International Terrestrial Reference Frame (ITRF) using 14 parameters of similarity transformation.

Keywords : GNSS, Time series, Ambiguity resolution, Geodetic datum

Session_4

[AM] GIS application in Smart city, urban planning, transportation, education and etc. (Chairman : Soo-Hee Han)

09:30-11:00 (Room307B)	A-4-1	Bike road modeling for commuting transportation in Seoul	p.43
	A-4-2	A Study on Link Application Possibility of Public Open Database with Community-Mapping Database Using Google Fusion Tables	p.44
	A-4-3	Design of Smart Crime Prevention Map based on Mash-up Service by using NSDI	p.45
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[AM] GIS application in Smart city, urban planning, transportation, education and etc. (Chairman : Yong-Jin Joo)

11:00-12:30 (Room307B)	A-4-5	Estimation of threshold discharge for flood alert system in a watershed using GIS technique	p.47
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[PM] Spatial data modeling and mining (Chairman : Young-Hoon Kim)

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	P-4-2	Fast Detection of Power-Line Points Using a Laser Scanner for Flight Obstacle Avoidance	p.57
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[PM] Spatial data modeling and mining (Chairman : Byong Woon Jun)

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[PM] Natural Resources & Land Management / GIS application in Smart city, urban planning, transportation, education and etc. (Chairman : Min-Ho Kim)

16:40-18:00 (Room307B)	P-4-9	Band selection by Spectral Derivative for vegetation index using CASI-1500 Hyperspectral Imagery	p.64
	P-4-10	Comparison of Slope Measurement Methods to Evaluate the Feasibility of Forest Land Conversion	p.65
	P-4-11	An Implementation Method of the Multi-cross GIS Techniques for the Big Data Activation	p.66
	P-4-12	Noise pollution in Urban Area	p.67

Bike road modeling for commuting transportation in Seoul

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Abstract

This study aims to suggest user centered bike routes for daily commuting purpose in Seoul Korea. Bike commuting, as one of outstanding bike ride activities in everyday life, is expected to present realistic bike use. Since previous literature mostly focused on traffic laws, bike lanes' technical length, and bike riders' stats, most researches have limitations in increasing actual bike use. Believing that user centered bike road is the most important factors in bike ride, this study intends to present optimal bike routes for urban commuting in Seoul. Finding and suggesting appropriate bike routes in transportation networks is composed of two parts. The first is finding population clusters around the age of 20s-30s. Large population clusters represent potentials of large bike commuting population. Second, providing optimal bike routes in the city given several urban demographical needs and infra structures. In the analysis procedure, Analytic Hiearchy Process (AHP) was applied to reflect public needs for bike routes, and Spatial scan statistics was utilized to find population clusters. The result presents that Eunpyeong-gu and Nowon-gu were chosen as population clusters. Consequently, corresponding bike route from population to employment clusters were mainly decided by connectivity to existing bike lanes.

Key words: Bike, Bike routes, Spatial scan statistics, Analytic hierarchy process

A Study on Link Application Possibility of Public Open Database with Community-Mapping Database Using Google Fusion Tables

Joong Ock*, Yoo Jun Hwan Koh**

Abstract

Nowadays, Studies on web-based PPGIS(Public Participation GIS) are steadily progressing with the advent of Web 2.0 emphasizing "Participation and Sharing" on internet space. Recently in Korea, "Community-Mapping", derived from the concept of PPGIS, gets a big attention. Community-mapping, got a big spotlight in the United States due to hurricane "Sandy" event, is to design and create geographical data through public participation on data-making process for using on particular community-based thematic-map and offers map service with data on internet or smartphone. Community-mapping map service on internet and smartphone is easier to create it than before because level of open APIs service is rapidly improving serviced by Google Maps, V-World, etc. And also, Level of community-mapping data quality created by community-mapping process(data, not map service creation) will be better than now gradually because related studies are progressing now. According to recent research, Community-mapping data will can contain sound and video with text(now only use text level). But in contrast, Practical use possibility studies of community-mapping data is not yet progressed so much.

So in this study, I suggested a relation and application method of pre-created public open data(spatially large level) with community-mapping data(spatially narrow level) for further research of practical use method of community-mapping data in various angles. Public open data(spatially pre-created in large level) can roughly cover large level(ex. urban, city, region) information, but not narrow(ex. district, local). Therefore, The concept, I suggested, is relating pre-created public open information with community-mapping information and utilizing it. Each information will be co-operative relations. Also, To study technical implementation possibility, I suggested the concept of web map service utilizing related public open data with community-mapping data using Google Fusion Tables. Google fusion tables, serviced by Google Maps, is a API service that can integrate data with data making reference to latitude and longitude or address information and share, visualization it. Data integration process makes a dataset providing some information and updated on web google map that developer, using Google fusion tables, can edit. For use Google fusion tables, I downloaded public open data as "spreadsheets type(.csv)" from 'Seoul Open Data Plaza(http://data.seoul.go.kr/)' and made same type fake data replacing real community-mapping data because google fusion tables demands '.csv', '.tsv', '.txt', '.kml'. I expect this will a method proving and utilizing information widely for decision-making of government and public in urban field.

Keyword Public Participation GIS, Community Mapping Data, Google Fusion Tables, Public Open Data

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* This work was researched by the supporting project of Ministry of Land, Infrastructure and Transport to educate professionals in spatial information engineering.

** This work was researched by the supporting project of Ministry of Land, Infrastructure and Transport to educate professionals in spatial information engineering.

Design of Smart Crime Prevention Map based on Mash-up Service by using NSDI

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Abstract

As the latest national crime rate has been on the increase, subsequent violent crime tends to surge as well. Therefore, crime prevention for children and women has become a social issue and not only police force but the measure in response to intellectual and diversified crime are indispensible. Vulnerable environment is considered one of the characteristics of the crime, especially the aged single • multi-family housing in the high density area are occurring in a crime. The structure of the paper is as follows: first, this paper will examine the indicators for the prevention of crime regarding residential facilities and environmental safety assessment. Then, I draw quantitative items based on spatial information by calculating weight according to the importance. Lastly, I suggested safety map for crime prevention to analyze the spatial distribution of dangerous area in crime, integrating mash-up service of NSDI (National Spatial Data Infrastructure) combined with web-based contents. The result of this study will be expected to comprehensively grasp the degree of safety and prevention effect from the crime in specific area by Open API considering physical environmental design and voluntary participation of citizen.

Keywords : Mashup , NSDI, Crime Prevention, Open API, Web Service

A Study on Error Verification of air pollutant emissions data in Asia region : Focusing on SOx, NOx, VOC

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Abstract

In this study, we are going to present a plan to generate and use the air pollution emissions data, which is the basic data required for the correct prediction in and around the Korean peninsula. By complementing the limitations of the data that is actually measured, we propose to make use of the estimation data of air pollution emissions in Asia. We evaluated the RMSE(Root Mean Square Error) between the air pollution emissions data of domestic one and three of Asia, TRACE-P, INTEX-B, and REAS.

Estimation of threshold discharge for flood alert system in a watershed using GIS technique

Yang, In Tae*. Park, Keon. Acharya, Tri Dev****

Abstract

Recent extreme weather conditions have led to heavy rainfall in short time. In the past, main stream as well as upper streams has seen significant damage due to flash floods. Early warning of a flood may save lives, livestock and property and will invariably contribute to lessening of the overall impact. The purpose of the study is to analyze the characteristics of watershed and determine the threshold discharge for Flood Alert System using geographic information system(GIS) based geomorphologic instantaneous unit hydrograph(GIUH) technique. At Chilbong basin, the threshold discharge was found to be 37.7$m^3/\sec$ for 0.5m water depth, due to 36.99mm rainfall during 20minutes.

Keywords : GIS, GIUH, Flood Alert System

1. Introduction

In recent years, due to the extreme weather conditions, heavy rainfall has been observed over a short period of time leading to flash floods. Flash floods have caused damage over a wide area. Flash floods are caused mostly in small watersheds (less than 100km^2) and in rivers with steep slopes and narrow stream valleys with higher water velocities. A storm with a heavy rainfall over a short period of time can cause a sudden rise of water level in upstream of the dam causing inundation. This dam induced destruction can also be considered as flash flood. Early warning of a flood may save lives, livestock and property and will invariably contribute to lessening of the overall impact. In order to reduce the damage, Flood Alert Systems (FAS) has been installed in mainstreams across the country. But, in the past, more damage of life and property has been observed in upper streams than main stream.

In 2010, embankment at Goryeong-gun, Gyeongsangbuk-do has been washed away due to heavy rainfall in upper stream. Nakdong River, Bocheong River and their tributaries also experienced flash flooding. Even though these places have already installed FAS, the occurrence of flood was due to incorrect input of threshold discharge. Hence, the necessity to determine threshold discharge for FAS was felt.

In this research, we have tried to determine the threshold discharge for the FAS in a mountainous watershed using Geographic Information System (GIS) supported Geomorhological Instantaneous Unit Hydrograph (GIUH) technique. The study is based on different characteristics of watershed and rainfall-runoff relationship.

2. Topographical characteristics of the watershed analysis using GIS

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The study area selected for the analysis was a watershed at Chilbong, Wonju in Gangwon-do (Fig 1). It is a mountainous area and lacks sufficient hydrological data. The characteristics of the watershed were derived from digital topographic map of scale 1: 50,000 using ArcGIS 9.2.

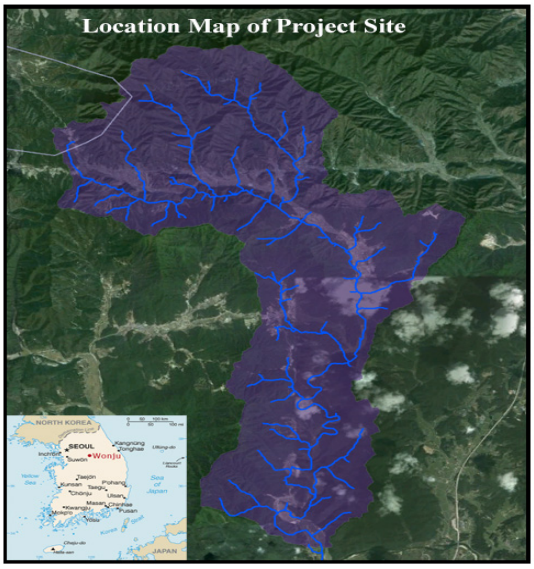

Fig 1: Location Map of Chilbong Basin

First of all a 10m grid Digital Elevation Model (DEM) was generated by using interpolation tool "Topo to Raster" from spot heights and contours extracted from digital maps. The DEM is filled for any left sinks. Hillshade, Slope and Aspect map were derived from filled DEM. Using hydrological tools and filled DEM as a primary input, flow direction was determined, then flow accumulation was calculated. And thus, stream networks and orders were derived. Finally, watershed boundary was also extracted. The derived DEM with streams and slope maps are shown in fig 2 and 3.

From the derived maps, different hydrological characteristics of watershed: area, maximum flow length, average slope, bifurcation ratio, length ratio and area ratio were calculated. As GIUH is suitable for ungauged watershed, this approach was integrated with GIS. Average CN value was used for all types of landuse and hydrological soil groups in the watershed.

The characteristics of Chilbong watershed are shown in tables below:

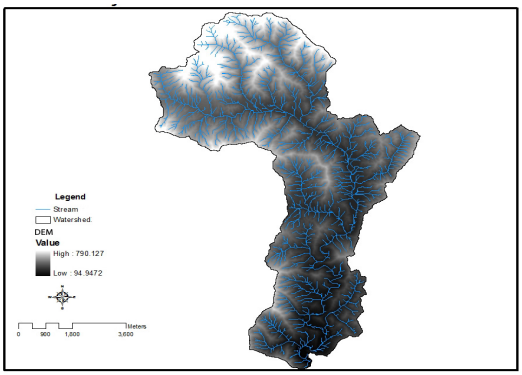

Fig 2: DEM with stream networks

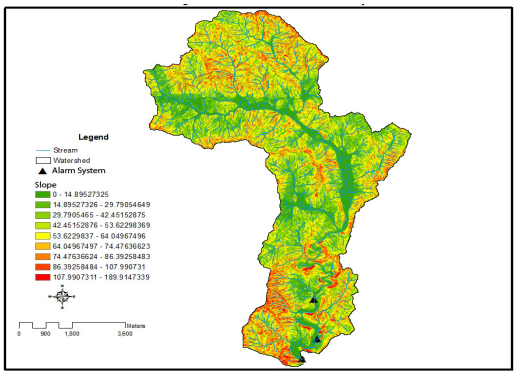

Fig 3: Slope Map

Table 1 Streams of Chilbong watershed

Stream Order	No. of segments	Total Length (Km)	Average length
1	620	156.34	0.252156
2	130	46.72	0.359366
3	25	25.02	1.000906
4	5	12.69	2.538566
5	1	11.70	11.69991

Table 2 Stream Ratio of Chilbong watershed

Bufurcation ratio (R_b)	Length ratio (R-l)	Area ratio (R_a)	Average length (L_o) (km)
4.9923	2.8389	1.0000	19.2751

Table 3 characteristics of Chilbong watershed

Average slope (S_o) (%)	Watershed area (A_o) (km^2)	Roughness Coefficient (n)	The average width B_o (m)	CN
0.0255	46.0316	0.05	45.50	61

3. Alert System Standards

The purpose of FAS is to help people to effectively cope with flooding by maximizing their safety and minimizing their financial and other losses. The threshold for FAS is the discharge created by extreme rainfall during a certain time that can cause a damage life and property in its floodplain. The threshold condition should be as the lowest value so that it caused almost no damage at all, but its exceedance will cause flooding.

In order to minimize the damage, the rainfall duration should be considered for minimum (approx. 10 min.) so that the rainfall does not accumulate to cause flood. Also, if no initial loss is considered, SCS method can be applied for effective estimation of rainfall interception, infiltration, surface storage and thus runoff.

At Chilbong basin, the threshold discharge was found to be 37.7m^3/sec for 0.5m water depth, due to 36.99mm rainfall during 20minutes. Figure 4 and 5 illustrates the rainfall-runoff relationship with time.

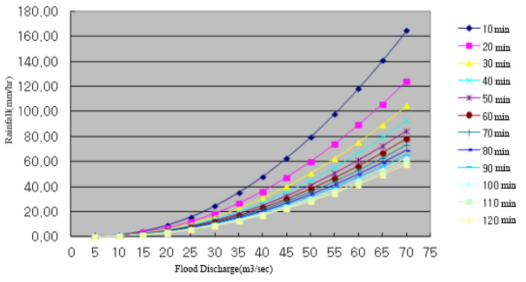

Fig 4: Peak discharge vs. rainfall

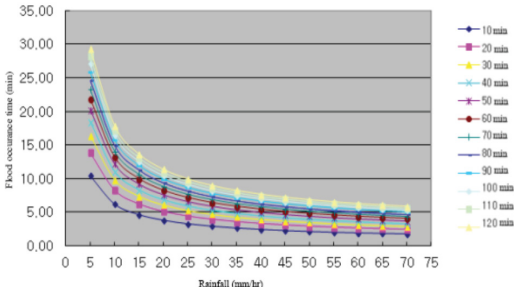

Fig 5: Peak discharge time vs. Rainfall

4. Conclusion

In this study, the topographical and hydrological characteristics of the watershed were extracted by GIS. Similarly, GIUH technique is used to derive rainfall runoff relationship for different durations. Thus, these parameters are used to estimate the threshold discharge for FAS of a mountainous watershed at Chilbong, Wonju.

Also, it observed that for a continuous rainfall, peak discharge decreases as the rainfall duration increases, and vice-versa. The result also shows that the peal flow of Chilnong basin is much higher than a typical plain basin, which may be to the shape factor.

Acknowledgements

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Food Deserts

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Abstract

Since 1996, big-box stores have been emerging in South Korea with its side effects. Due to high cost of rents, the big-box stores suburbanized as well. As a result, people do not have vehicles or cannot drive, as well as live in urban areas (a.k.a., the minorities) are having hard time to get to the box-stores. Furthermore, the gigantic stores are threatening the small enterprises, the minorities have to spend more time and money to purchase food. This phenomenon is called food deserts. In other words, the definition of food deserts is areas where people have hard time to access to food retailers. Under this circumstances, however, studies about food deserts in South Korea are barely exist. Therefore, this study performs GIS analysis and spatial statistics to detect food deserts in Seoul, South Korea. Generally, many other studies adopt measuring Euclidean distance between the minorities to the food retailers. On the other hand, this study uses a GIS based network analysis (a.k.a., Service area analysis), so that the minorities can find their nearest approachable food retailers. That is, the purpose of this study is discovering food deserts. For this study, we utilized North American and European countries' cases to adopt to Seoul, South Korea

Keywords : Food, Desert, Service Area, Network, Analysis, Time Contour Map, SSM, Discount Store, Box Store.

1. Introduction

For the minorities, accessing to food retailers is causing problems to this society. Smoyer-Tomic, Spence, and Amrhein asserted that the minorities usually reside in areas where they cannot easily access to healthy food retailers. Another issue is they spent more money for low quality and high calorie foods. The main reason of this fact is that many people prefer big-box stores to prepare their food ingredients (Jung, Kim, & Sung, 2006). Due to the stores' size, the stores are usually located in suburban areas (Kotler and Armstong, 2010). It drags people to outside of urban for shopping. As a result, it makes the minorities, who do not own cars or have issues to drive to have more troubles to access to good quality food in reasonable price (Westlake 1993). Hence, the areas where the minorities reside can be potential food deserts, according to the definition. This studies, therefore, is performed to detect food deserts in Seoul especially for the minorities. Many researchers tried to detect food deserts using simple or modified buffer algorithm. This research, however, is trying to detect food deserts using a GIS based network analysis, which uses

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real road network and times contour lines.

2. Test

In order to map time contour lines and polygons, it is necessary to obtain pedestrian's walking speed. There were many different standards of pedestrian's walking speed in various academic fields. Yet, we chose the Seoul city hall's report, 0.8 m/s, as the pedestrian's walking speed. The maximum walking-time limit for the minorities are arbitrary set to 10 minutes. Based on road network, time contour lines from each food retailers are drawn. If the minority's residential areas are not inside of the time contour line, which was set to 10 minutes from the food retailers, it was assumed that they are living in the potential food deserts.

3. Conclusion

Using a GIS based network analysis derived more realistic results than using buffer algorithm. Each census tracks median income and census data were applied to select out the minorities and areas where relatively more children and old people locate. These testing setup method concluded that food deserts are somewhat serious in the minorities' residential areas. However, the limit of this study is that not all food retailers locations were extracted from the government and the GIS data clearing house, such as unlicensed snack food bars on the streets. Plus, there were cultural variables in Seoul that lots of people order food and get delivery service if they needed. Also, welfare systems in South Korea offers that a free bus tickets for the elders. These variables were not handled.

Acknowledgements

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Extraction of Crime Risk Areas Using Digital Map 2.0

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Abstract

As interest in social safety has recently increased at the national level, the various activities which can effectively prevent crimes are being carried out. However, the information about safe roads that people can safely walk without being exposed to crimes for peoples is not being provided. As the existing maps related to crimes provide the information about the present condition of crimes by administrative district for users, women and pedestrians who go by night could not actually grasp safe roads in advance. Therefore, this study developed the methodology which can easily extract dangerous areas due to crimes by the digital map 2.0 which were manufactured in Korea and are being utilized in business of local governments. The digital map 2.0 has various 104 layers and used location and attribute information of center-lines of roads and building layers to find dangerous areas of crimes in these layers. Pavement materials and road width which are already built by the attribute information were used in the center-lines of roads. And crossing angles that roads and roads cross each other were additionally extracted and utilized. The road crossing angles were used as the information to be able to examine identification of pedestrians who go at night and strangers who are oncoming. Because identification is secured in horizontal lines according to crossing angles, low dangerous scores were given. Because it is difficult to secure identification in acute angles and obtuse angles, high dangerous scores were given. For pavement materials of roads, low dangerous scores were given to asphalt and asphalt concrete that the traffic of vehicles is smooth and high dangerous scores were done to concrete, block, and unpaved roads that the traffic of pedestrians take priority. For the road width, high dangerous scores were given when it is narrower than wider. The attribute information about building types were input in the building layers of the digital map 2.0. High dangerous scores were given when the building types are buildings without walls, buildings under construction, and temporary buildings. The areas which get out of the threshold values set by totaling up all the dangerous scores when considering pavement materials, road width, crossing angles of road, and building types in the center-lines of roads and road crossing were extracted as the dangerous areas that crimes can occur. The study developed a program based on ArcObjects and C# language to extract these dangerous areas. And verification of the developed program was done by tests. The dangerous areas of crimes could be found by using the digital 2.0, roads, and building layers only through the study. And in the administrative aspect to prevent crimes, additional installation of safety facilities such as street lights and security lights in the identified areas which are vulnerable for crimes is thought to be increase safety of dangerous areas.

Keywords : Crime Risk Areas, Digital Map, Road Centerline, Building, Dangerous Score

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Genetic and Dijkstra algorithm comparison for Optimal Infiltration Route analysis

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Abstract

Optimal route analysis is one of most popular GIS applications. Infiltration route analysis is also a kind of route analysis, but it has some different characteristics with other routing applications. Infiltration route analysis should be processed based on raster data, because there are any defined starting and ending point, and linkage between nodes. This characteristic causes a massive computation and makes hard to apply mainly used routing algorithm, such as Dijkstra algorithm. In this research, we compare genetic algorithm with Dijkstra algorithm for infiltration routing problem in terms of computing efficiency and accuracy. The results show that the performance of genetic algorithm is much better than Dijkstra algorithm.

Keywords : Optimal Infiltration Route Analysis, Genetic Algorithm, Dijkstra algorithm

1. Introduction

Genetic algorithm is very popular heuristic algorithm to apply to many kinds of optimization problems. Shortest path problem is most famous application of genetic algorithm. The network becomes more complex by increasing the number of nodes and links, the more computational complexity increases rapidly and it makes to hard to apply traditional shortest path algorithm such as Dijkstra. The infiltration routing problem is one of most complex shortest path problem. The infiltration routing problem should be analysed with raster data, not network data, because it is hard to define starting or ending nodes and all possible links between nodes are considered. In this research, genetic algorithm were applied to solve the infiltration routing problem, and it's results were compared with the result of Dijkstra algorithm that is most widely used for routing problem.

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2. Detection Probability Map

Detection probability can be calculated the combination of concealment probability and TOD detection probability. Concealment probability is related with the amount of vagetation,

and TOD detection probability is related with the viewshed and the performance of TOD sensor. In this research, VITD and DEM were used to generate detection probability map. VITD is a geospatial information standard containing exhaustive terrain information for military operations. It contains the information about vegitation coverage. The detection probability map was created by merging the concealment probability and the TOD detection probability(Bang et al., 2010). The area of generated detection probability map was 20 km by 13 km, and the total number of pixels was 104,000 (400 × 260).

3. Genetic Algorithm for Infiltration Routing Problem

Genetic algorithms belong to the larger class of evolutionary algorithms (EA), which generate solutions to optimization problems using techniques inspired by natural evolution, such as inheritance, mutation, selection, and crossover(Melanie, 1996).

Genetic algorithm can be simply applied with only fitness and no complex model or differential operator. Because of this reason, genetic algorithm has very variety applications, but it cause a problem that genetic algorithm requires to define genetic representation of the solution domain and fitness function to evaluate the solution space for each application. In this research, the objective of fitness function is to minimize the cumulative detection probability of infiltration route. And we defined two kinds of the representation of solution space. The solution of infiltration routing problem is represented by binary image; 0 is a pixel in the route, and 1 is not. Consequently, 2D binary array is one of possible representation of our solution. Another representation is 2D array. If we assume that moving to backward direction can be ignored, the route can be treated the list of each row, and each row can be expressed the start column and end column.

There are more another parameters such as population, crossover probability, and mutation probability, and the performance of genetic algorithm depends on parameters. We followed the setting of de Jong that has been used most popular and qualified in many research(de Jong et al., 1990). Only the population was modified to 1000 considering the huge size of solution space.

4. Comparison between GA and Dijkstra algorithm

We compared two genetic algorithm with Dijkstra algorithm to evaluate the performance of proposed algorithm. Two genetic algorithm and Dijkstra algorithm were compared in terms of accuracy and processing time. To apply Dijkstra algorithm for raster data, we treated that each pixel as node, and all neighbor pixels are connected with links. Also, all columns in 1st row were tested as starting point. Two genetic algorithm were tested 30 times because GA stochastically find the solution, not always give best solution.

The cumulative detection probability of optimal route in Dijkstra algorithm was 9.933. Two genetic algorithms showed similar accuracy in terms of accuracy. The minimum cumulative detection probability of two genetic algorithms

were 9.942 and 9.954. On the other hand, there are significant differences in processing time. The total processing time is 2556 sec in Dijkstra, 93 sec in 2D binary array genetic algorithm, and 7.2 sec in 2D array genetic algorithm.

5. Conclusion

Two kinds of GA were proposed and compared with Dijkstra algorithm in terms of detection probability and processing time. The result shows that 2D array GA find suboptimal solutions very efficiently. Especially, the processing time was dramatically reduced, but there is small accuracy difference between them.

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Gis-Based Landslide Susceptibility Mapping Using Analytical Hierarchy Process And Ordinary Least Square In Penang Island, Malaysia

Sara Khodadad

Abstract

Penang Island is known as one of the most landslide prone areas in Malaysia. Beside the geological conditions as main factor in landslip happening, human activities and urbanization aggravate the impact of this hazard. Thus, it is required to forecast and specify the area where future land failure is likely to happen.

The purpose of this research was to identify and classify the Penang Island according to the grade of present or potential danger by generating landslide susceptibility zonation map. This work presents Analytical Hierarchy Process (AHP) method to identify the landslide prone areas. Seven factors were considered in this analysis. Sensitivity analysis was performed in detail by varying the factor weights to observe the impact on the results.

In another part of the project, ordinary least square (OLS) technique was used to estimate weights of point parameters then its result compared with AHP technique result. Then, to verify the practicality of susceptibility maps, they were compared with a landslide inventory map. The outcome was that the 75% of occurred land failures fit into the very high and high susceptibility class of AHP map (using seven parameters), while this is 73.8% in the case of AHP with point parameters (using four parameters), and 65.8% for the OLS map. As conclusion, the AHP method yields reasonable results which make it reliable and credible approach in comparison with OLS, especially in the case of using large number of landslide contributing factors.

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Fast Detection of Power-Line Points Using a Laser Scanner for Flight Obstacle Avoidance

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Abstract

An airborne vehicle such as a aircraft must avoid obstacles like antennas, towers, powers, poles, tree branches, and wires strung across the flight path. Especially, Power-line is one of the main causes of the crash of aircraft. Recently, study in detecting a region of power-line is being accelerated using a remote sensing system such as optical camera or laser scanners. LADAR (Laser Detection and Ranging) is widely used for reconnaissance or target detection, being mounted on various moving vehicles in the defense field. The proposed method consists of filtering and classification processes and we check the possibility of real-time detection of power lines.

The first step of the study, we created for the Lidar data of 10 set using simulator. We created target using matlab(2012). We designed the wires of thickness (1~5cm), length(20m) and direction(-45,0,45,90). We use a method presented by kim (2011) which creates LiDAR simulation data using a parameter of simulation. Simulator parameter were flight height(500m), flight speed(40m/s) and look angle(60°). We create the simulator Lidar data of the period 0.1 seconds.

The second step, we use several criteria of perceptual cues to detect the power-line. The first cue is a linear structure and the second one is the location that must be above the ground with a sufficient distance. Filtering is a process of classifying ground points from LiDAR data. We classifies as the ground points and non-ground points by using the filtering. We then calculate the eigenvalues for the covariance matrix from the generated non-ground points and obtain the ratio of eigenvalues. Based on the ratio of eigenvalues, we can extract the points on a linear structure and further filter them using the height above the digital terrain model. In addition, power-line points are considered if the points form horizontally long straight line.

In the final step, we checked the detection time of each data of 10 set. From the experimental result, it is shown that detection time is about 0.2 second. These detection time is expected to be useful for the detection wire of real-time.

Keywords : LiDAR, Power-line, Flight obstacle avoidance, Fast detection

Georeferensing of Indoor Omni-directional Images acquired by Stereo Rotating Line Camera using Linear Features

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Abstract

As internet portal providers successfully provide outdoor panorama services for street-level view increasingly attracting more users, they also have great interests in indoor panorama services that can be effectively utilized for many indoor geospatial applications such as store view, indoor navigation, virtual museum, exhibition guide, etc. Such services require sophisticated user interaction through a user interface based on indoor panorama images. For example, if a user selects a position in the image, the system should compute the three dimensional coordinates of the position in a local coordinate system. Based on these coordinates, the system can search for the information that may be interesting to the user from a geospatial data base and provide them to the user by an augmented display over the panorama images. Hence, the estimation of object points using panorama images is very important for sophisticated indoor panorama services. For the determination of object points, one should know the extrinsic parameters of indoor images which can be determined by a georeferencing process. One of the promising acquisition systems in indoor space is based on stereo rotating line camera system. In this study, we thus propose a georeferencing method of indoor panorama images for the determination of object points. First, we derive geometric relationship between an object point and image points on the panorama images. Second, we define the extrinsic parameters for stereo rotating line camera system and present the adjust model for georeferencing of indoor images. We then acquire stereo panorama images using this system and estimate the extrinsic parameters. Finally, we analyze the effectiveness of the proposed method using the georeferencing results. The experimental results show that the proposed approach is promising. The error of object points are within ±10 cm. With the extrinsic parameters of indoor panorama images determined by the proposed method, we can generate precise indoor 3D models and provide an indoor panorama services equipped with sophisticated user interaction.

Keywords : Stereo Rotating Line Camera, Indoor Panoram Images, Georeferencing

Application of geodemographic methods to classify Seoul City area: data, methods and classifications

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Abstract

This paper aims to develop socio-economic datasets for geodemographics and proposes its regional classification methods for public sectors on the basis of GIS analysis. The data collected for this research are based on 2010 general survey of population and housing, Seoul Statistics surveyed by Seoul City government, and other consolidated statistics. The variables driven from the collected datasets are standardized on 'Dong', the smallest administration spatial unit in Korea, for cluster analysis and then the Dong boundaries are classified with similar socio-economic characteristics and then grouped into 12 geodemographic types. The geodemograhics are also used to explore spatial relationship of crime occurrence and welfare service provision. It shows that high rated crimes are mostly occurred in downtown areas sharing common geographic characteristics of high rate of singles in 20s and 30s age groups, single-household living in a studio apartment, and workers in financial and insurance industry sectors. The spatial relationship between the geodemographics of Seoul areas and the distribution of welfare services are also examined, such as the characteristics of the area where dense with welfare facilities are small apartment complexes mainly occupied on monthly rent base by the residents for basic living security benefit, older people who live alone and those who have lower educational background. In addition, 20% areas with high rate of crime and less number of welfare facilities are determined and classified into socially disadvantageous area for which area-based composite indices are developed. As a result,, the socially deprived areas are found in the southwestern region and old downtown area of Seoul where the geodemograhic characteristics are high rates of 20s and 30s and the typical house types are single-household and studio apartment, single family houses, multi-family houses, and officetel.

Keywords : Geodemographics, regional classification, GIS analysis, public sector, census data

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Analysis the Effect of Information on Inundated Road Using Agent-based Model

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Abstract

Every year, monsoon season causes the flooding of many homes and roads in Korea. In addition, rainfall intensity seems like more higher as it is affected by global climate change and urbanization. But people travel inevitably to work or go to school even heavy rainy days. Therefore, it is necessary to explore evacuation strategies at heavy rain.

I want to know the impact of information delivery in situation that inundated road was had to closed. So, this study tried to developing Agent-Based Model for simulation of traffic time on rainfall. It focused on the individual behaviors that can getting information of the closed road. This model simulates the interactions of autonomous agents and heavy rainy environment that rapidly changed.

Study area is Gangnam-gu, that is often inundated every year. My Agent-based Model is designed in order to apply to our real world. This model can make result by using authentic GIS data right away. I use Korea Transportation Data Base which has Line number, road name, max speed, volume of road and so on.

I found out that the variances of average speed are different according to information acquisition. Information acquisition is assort by each ten percents. It shows the most effective traffic condition when 20~70 percent of drivers are given the information about blocked roads.

A Study on the Exploratory Spatial Data Analysis of the Distribution of Longevity Population and the Scale Effect of Modifiable Areal Unit Problem(MAUP)

Don-Jeong Choi*, Yong-Cheol Suh**

Abstract

Most of the existing domestic studies to identify the distribution of longevity population and influencing factors oriented confirmatory approach. Furthermore, most of the studies in this research topic simply have used their own definition of spatial unit of analysis or employed arbitrary spatial units of analysis according to data availability. These research approaches can not sufficiently reflect the spatial characteristic of longevity phenomenon and exposed to the Modifiable Aerial Unit Problem(MAUP). This research performed the Exploratory Spatial Data Analysis to identify the spatial autocorrelation of the distribution of longevity population. and investigated whether modifiable areal unit problem in the aspect of scale effect using spatial population data in Korea. We used Si-Gun-Gu and Eup-Myeon-Dong as two different spatial units of regional longevity indicators measured. Then, we applied Getis-Ord Gi* to investigate the existence of spatial hot spots and cold spots. The results from our analysis show that there exist statistically significant spatial autocorrelation and spatial hot spots and cold spots of regional longevity at both Si-Gun-Gu and Eup-Myeon-Dong levels. This result implies that modifiable areal unit problem does exist in the studies of spatial patterns of longevity population distribution. The demand for longevity researches would be increased inevitably. In Addition, There were apparent differences for the global spatial autocorrelation and local spatial cluster which calculated different spatial unit such as Si-Gun-Gu and Eup-Myeon-Dong and this can be seen as Scale Effect of MAUP. The findings from our analysis show that any study in this topic can mislead results when modifiable areal unit problem and spatial autocorrelation are not explicitly considered.

KEYWORD : Longevity Population, Spatial Autocorrelation, Getis Ord GI*, Modifiable Areal Unit Problem

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Segmentation of Building Roofs Using Airborne Laser Scanning Data

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Abstract

LiDAR (Light Detection and Ranging) data obtained from ALS (Airborne Laser Scanning) system is one of the major sources for extracting geospatial features and modeling objects. However, LiDAR data processing for object modeling is challenging task because complicated steps are required such as classification, clustering, segmentation, and shape recognition. This study proposes methods of implementing shape descriptors for segmenting various building roofs. The methods should not only be scale and rotation invariant but also handle 3D objects because the objects are arbitrary rotated in the 3D spaces. Man-made structures including buildings consist of planar (e.g., flat and sloped), curved (e.g., hemisphere and half-cylinder) surfaces or combination of several surfaces (e.g., polyhedron). The key of segmentation is to group point clouds on the same surface patches. In this study, Ψ-s curve and chain code - that were originally developed for 2D shape descriptor - were extended to deal with objects in 3D space. For the experiment, simulated airborne LiDAR data sets with various types of building roofs were created, and each method was applied to the data. The results demonstrate that the proposed approaches are effective to segmenting 3D point cloud data. Finally, future works involved with building modeling were presented.

Keywords : LiDAR data, 3D shape descriptor, Segmentation

Acknowledgments

This work was supported by GIS Expert Education Project from Ministry of Land, Transport and Maritime Affaire. The authors would like to thank Dr. Ayman Habib, professor of Dept. of Geomatics Engineering at the University of Calgary, for providing airborne LiDAR data.

Exploring Spatial Dependence and Spatial Non-stationarity in Satellite Imagery Based Population Estimation

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Abstract

This research explores spatial dependence and spatial non-stationarity in a relationship between populations and land use/cover data derived from satellite imagery in a case study area. Geographically weighted regression (GWR) was used to investigate the spatial non-stationarity in the relationship while spatial regression (SR) was used to deal with the spatial dependence. Results show that the relationship between populations and land use/cover data varies significantly over space and suggest that the GWR model is a significant improvement on ordinary least square (OLS) model. Also, the results indicate that the SR model reveals the nature of the spatial autocorrelation in the OLS model residuals and is a robust regression over the OLS model in the study area. The GWR and SR models give a way to improve population estimation using the traditional OLS model.

Keywords : Population Estimation, GWR, SR, GIS

Band selection by Spectral Derivative for vegetation index using CASI-1500 Hyperspectral Imagery

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Abstract

The vegetation indices (VIs) were developed based on the multispectral imagery (MSI) that used two or more spectral bands. The VIs are particularly useful to explain the vigor and stress of vegetation and to utilize various fields. There is no problems band selection in MSI environment that has only 4 to 8 spectral bands. However, it is important to select explanative bands in the hyperspectral imagery (HSI) environment that has 40 to over 200 spectral bands. Furthermore, when applying the VIs, it would be not same spectral bands of HSI in developing environment and your spectral bands of HSI by operation setting. The operation setting derived different spectral and spatial resolution decisively. Many VIs developed various authors and restricted circumstance. Therefore, the VIs used different wavelength to correspond our data as CASI-1500 HSI. This study aimed to confirm which spectral band was good for each forest cover type with low variation by several adjacent bands combination. We set two VIs as normalized difference vegetation index (NDVI) and modified simple ratio index (MSRI). The several adjacent bands are ranged to near infrared (NIR; 794.5nm, 801.7nm, 808.8nm, mean) and visible red (665.9nm, 673.1nm, 680.2nm, mean). These are selected to check the variations in the VIs. We applied the image differencing and the spectral derivative. The result corresponding to Digital Forest Cover Type Map, at the wavelength of 680.2nm and 801.7nm had low variation in red and NIR bands respectively.

Keywords : CASI-1500 Airborne Hyperspectral Imagery, band selection, NDVI, MSRI, Spectral Derivative

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Comparison of Slope Measurement Methods to Evaluate the Feasibility of Forest Land Conversion

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Abstract

The purposes of this research are to examine the problems for evaluating the feasibility of forest land conversion and to compare different methods for measuring average slope of forest lands. Estimating average slope is a critical factor in evaluating the feasibility of forest land conversion. Various methods of characterizing and measuring the average slope of forest lands have been devised, and the problem of defining quantitatively average slope of forest lands has been discussed by a number of researchers. In this study, seven types of methods to measure slope from elevation data sets of forest lands are discussed and compared for each 10X10m grid cell using three different software products, which are 1) an ArcGIS-based software, 2) an AutoCAD-based software, and 3) an independent-operated software. The sample areas are selected to estimate and compare the average slope values of forest lands in Yongin city, Gyeonggi-do, South Korea. The average slope values of forest lands have the relatively large difference over allowable errors between different types of methods. A distance-based approach with a right angle to contour lines had relatively little difference (0.2~0.9 degree) for slope values between methods, and the difference of average slope values in the comparison between 1m and 10m grid cells is only 0.0~0.4 degree with this method. In addition, practical difficulties to review slope values for evaluating the feasibility of forest land conversion exist due to the lack of training system and standard methodologies that can be efficiently applied for the evaluation. In order to minimize the difference of slope values between methods and to have better evaluation, guidelines and proper institutional strategies should be constructed to review and evaluate the feasibility of forest land conversion.

Keywords : Slope, Forest Land, Land Conversion, Feasibility

An Implementation Method of the Multi-cross GIS Techniques for the Big Data Activation

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Abstract

Composed domestic spatial big data have been expending thousands of zatta-bytes due to including image and web data. Big data solutions for the cumulated huge spatial data required service demands from users in Korea, however, have both big data control problems and solution developing limitations because the GIS big data consist broadly of structured, unstructured, and semi-structured data. The spatial data obviously differ from MIS data and statistic data due to a complexity of the structural data systems of he GIS that composed of both graphic and attribute data. In overseas, big data solutions provide to the basic management elements(n) for import, usability, and supplies connect to Hadoop, Autonomy, Vertica, and Enterprise Security. In domestic, big data generate to the open source based solutions, such as R, Hadoop, or Linux. The fulfillment of users using low cost and high performanced IT usability focused to the niche type big data fields rather than complehensive data control systems. A strong activation for the GIS big data solutions can be adapted to the multi-cross techniques that combine and simultaneously operate to the desktop, web, and mobile systems including smart phones and tablet PCs in order to service public and privates when it operates with strong DB compress functions.

Noise Pollution in an Urban Area

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Abstract

Environmental (or community) noise is considered to be a major health-threatening stressor particularly in Europe. Recent studies have shown that road traffic noise is the major source of community noise regardless of the status of economic development. Road traffic noise is known to cause negative psychosocial effects, such as annoyance and sleep disturbance, to elevate physiological risk factors, such as hypertension and myocardial infarction, and to lead to the development of serious health problems such as cardiovascular disease. In this research, the magnitude of road traffic noise in association with psychological impacts on annoyance and sleep disturbance was evaluated for Fulton County, Georgia, United States. This study utilized noise impact indicators such as the percentage of high annoyance (%HA) and the percentage of high sleep disturbance (%HSD) for this purpose. According to this research, many residents of Fulton County were found to be at risk of being highly annoyed at daytime and highly sleep disturbed at nighttime (approximately 110,000 and 20,000, respectively). In addition, there were large variations in HA and HSD people among incorporated cities of study area. For this reason, two noise impact indices of %HA and %HSD would be used to provide valuable information to policy-makers in deciding which areas to prioritize for road traffic noise control efforts.

Key words: Road traffic noise, public health, annoyance, sleep disturbance, percent of high annoyance (%HA), percent of high sleep disturbance (%HSD)

Session_5

[AM] Natural Resources & Land Management (Chairman : Chang-Jae Kim)

09:30-11:00 (Room307C)	A-5-1	A Study on SNS as a Spatial Big data	p.71
	A-5-2	How has RICS advanced their standard in land, property and construction?	p.72
	A-5-3	Generation of DEM based on Korea cadastral resurvey results	p.73
	A-5-4	A Study on Alternative Resolution Method for Marine Spatial Conflicts Using Delimitation of Maritime Boundary	p.74

[AM] Natural Resources & Land Management (Chairman : Mun-Sung Koh)

11:00-12:30 (Room307C)	A-5-5	Comparison of Geometric Calibration Accuracy for X-band SAR Images using various DEM data	p.75
	A-5-6	A Study on Strengthening Map Services through Business Registration System	p.78
	A-5-7	An approach to effective land registration based on the satellite photogrammetry: Case study in Baharly, Ahal Velayat, Turkmenistan	p.79
	A-5-8	A Study on the strategy for developing land registration projects in Caribbean Countries	p.80

[PM] Natural Resources & Land Management (Chairman : Sun-Yurp Park)

14:00-15:20 (Room307C)	P-5-1	The Efficient Method to Precisely Measure Time-series Land Surface Temperature Variations	p.81
	P-5-2	Visualization for public transportation analysis:Mapping of Phoenix light rail corridor	p.82
	P-5-3	A Study on Korean Next-Generation Integrated Cadastral Information System Model Design	p.83
	P-5-4	Landuse Structure, Human Residence and Malaria Incidence in Korea	p.84

[PM] Natural Resources & Land Management (Chairman : Joon-Bhang Kon)

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A Study on SNS as a Spatial Big data

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Abstract

Recently, as the digital economy spreads, the era of "Big data" has come with uncountable information and data.

Big data means a large scaled data which is produced in a short time, the update interval is short and includes various types of data. Through this, we could find new information and utilize effectively in solving many social problems.

Especially, in the field of Geospatial information, the interest in big data is increasing day by day.

In Japan, where 2020 Tokyo olympic will be held, the newly developed traffic prediction system will be added to existing weather disaster prediction system. In order to amend the switching time of signal in road, the system to reduce waiting time of cars is being developed. In order to realize the policy of sustainable urban pattern, with solving urban problems, the big data will be utilized in the concept of compact city in pursuit of economy efficiency and preserving nature.

In Korea, the interest in big data of geospatial information is also high. According to this, in the "Fifth basic plan of National geospatial information policy', the content of Spatial Big Data is included and a model of complex fusion with various factors such as information of administration, SNS and Blog which are based on geospatial information.

Especially in SNS, there are lots of data produced by mobile devices such as smart phone. Therefore, the volume of data is quitle explosive especially in the countries where distribution rate of smart devices are high like in Korea. And most of the SNS includes location information, in the fields such as disaster and safety, the utilization to be used as a spatial big information is really high

Therefore, in this study, SNS utilization method to be used as spatial big data will be researched. For this, definition of big data and spatial big data will be checked and relavant technologies of big data and implication will also be checked. After looking into the meaning of SNS and influence, the application plan of spatial big data will be discussed.

Key Words : SNS, Big Data, Geospatial Information

How has RICS advanced their standard in land, property and construction?

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Abstract

In this study, we examine how the Royal Institution of Chartered Surveyors (RICS) has advanced their standard not only in survey, but also in other related professions. We argue that the path of growth in professions of RICS provides the meaningful implication to apply for surveying industry in South Korea. RICS is a representative of professional group which provides expertise in matters involving land, property and construction in the United Kingdom. While RICS began when the Surveyors Club was formed in 1792, the current modern organization was founded with 49 surveyors who established a professional association, "Institution of Surveyors", in 1868. As it stated, RICS started as an institution to represent surveyors in the beginning period. However, such an industrialized world demanded its rapid expansion not limited to survey, but also other related professions involved with infrastructure, housing, transport and real property industries. These days, RICS has covered significantly diversified areas more than 17 professions such as "Property Professional Groups" (Antiques and Fine Arts, Commercial Property, Dispute Resolution, Facilities Management, Management Consultancy, Residential Property, Valuation), "Land Professional Groups" (Environment, Geomatics, Minerals & Waste, Planning & Development, Rural), and "Built Environment Professional Groups" (Building Control, Building Surveying, Project Management, Quantity Surveying & Construction).

Keywords : RICS, land surveyor, Property Profession, Quantity Surveying

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Generation of DEM based on Korea cadastral resurvey results

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Abstract

Korea is surveying whole territory to improve the position accuracy of Korea cadastral maps. 17 areas were selected as pilot study areas for the cadastral resurvey in 2008. An urban study area out of the 17 areas is selected to create DEM based on the resurvey results and aerial photos. DEM is the indispensable terrain model in most GIS-based research. The Aerial photos provided by GNⅡ and GCPs observed by KCSC in the pilot study areas are the main sources for DEM production. In this study DSM and DEM are created from aerial stereoscopic images by the automated stereo matching with the ERDAS LPS application. The DSM has been generated based on the photogrammetric principles: collinearity equation and aerial triangulation (AT) with 10 substitute GCPs whose horizontal coordinates are measured by the high precision method and vertical coordinates are estimated as the height of the nearest control point. The aim of this study is to verify whether high quality DEM could be generated through aerial photos and the resurvey results and to suggest the high quality DEM generation to KCSC. The statistical results comparing between true values and created DEM values show a positive outcome on DEM generation.

Keywords : DEM, DSM, Korea cadastral resurvey, cadastral maps

A Study on Alternative Resolution Method for Marine Spatial Conflicts Using Delimitation of Maritime Boundary

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Abstract

Since 1980s, the maritime boundary disputes among the local governments increased. Currently, Gunsan, Gimje and Buan are battling over jurisdiction of the Saemangeum; lawsuit over Saemangeum is still pending in the Supreme Court. Because we believe that uncertain maritime boundary is the cause of the problem in marine space, delimitation of maritime boundary is our foremost agenda to resolve conflict. Therefore, the purpose of this study is to state the necessity and to suggest the measures to manage maritime boundary.

Countries such as United States, Australia, and Canada have already been using maritime boundary system; in order to efficiently manage and prevent conflicts, the system is divided into three parts.

Firstly, jurisdictional boundary limit is generally situated 3, 6, 12, and 24 nautical miles from the baseline although they differ in each state. The straight portion across the bay is a closing line used to separate inland water bodies from the open sea and is also used in calculating the offshore boundaries. Tidal Datums vary from state to state.

Secondly, due to the maritime administrative boundary, the state boundary is demarcated with the median line equidistance principle based on geodetic calculations taking into consideration the adjacent situation; administrative boundary is demarcated based on computational software such as CARIS LOT.

Thirdly, using the sea lot boundary, sea-lot and zone boundaries are classed using the UTM coordinate system such as OCS grid block or OPD; the boundaries are given unique serial number as the concept similar to "number of lot" in land.

Divided maritime boundaries are managed by marine cadastre system. Local government boundaries including the sea borders have yet to be perfectly fixed.

The delimitation of Maritime Boundary using foreign system is organized as follows.

Firstly, jurisdictional boundary limit can be divided into three types (local government limit, federal, cooperative management limit, and government limit)

Secondly, The local government that decides maritime boundary baseline has to consider geographical characteristic and the difference between the rise and fall of the tide.

Thirdly, when demarcating the maritime administrative boundary, the most advanced surveying technique has to be used based on median line, equidistance principle.

Fourth, to demarcate Lease blocks boundary and a lot boundary(concepts such as"a lot in land) Universal Transverse Mercator Coordinate System has to be used; an alternative way would be to have a unique serial number.(concepts such as"number of lot"in land)

Lastly, we need to set up marine register such as a land public register to manage economically and we have to seek for the solution to apply to South Korea.

Keywords : Marine Spatial Conflicts, Delimitation of Maritime Boundary, Marine Register

Comparison of Geometric Calibration Accuracy for X-band SAR Images using various DEM data.

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Abstract

The SAR system is a microwave image system which can observe ground information regardless of the weather condition like cloud. SAR imageries are used widely for land management, national defense, disaster monitoring and other numerous applications. The geometric calibration of SAR imagery is a necessary procedure for the effective utilization because SAR imageries has location error affected by orbit information error, sensor accuracy and system external variances. And the result of the geometric calibration is affected accuracy of ground control points and the extraction of ground control points is performed using various kinds of geographic features such as building, bridge and tower. Although an artificial corner reflector have sub-centimeter accuracy, the installation of the artificial corner reflector is not always available. so the ground control points in the SAR imagery are extracted from other reference data such as digital topographic map, SRTM DEM, ASTER GDEM and so on. But the location information of each reference data also have error and it affects geometric calibration accuracy. This research built a geometric calibration model for echo samples datation error and on-board electronic delay correction using the doppler equation and range equation and compared the accuracy of the calibration results using 1:5000 digital topographic map, SRTM DEM, ASTER GDEM. The results shows that the calibration with SRTM DEM has 1.3 pixel of RMSE and the results using ASTER GDEM has 2.8 pixel. Comparing with the result using 1:5000 digital topographic map has 1 pixel, the accuracy of ASTER GDEM is inadequate for geometric calibration of high resolution SAR image.

Keywords : SAR, SRTM DEM, ASTER GDEM, Geometric Calibration, Geometric Location Accuracy.

1. Introduction

The SAR image product quality is important for this utilization but SAR images have geometric and radiometric error. Especially, pixel localization accuracy is affected by system error and system external variances. So this kind of errors need to be corrected with geometric calibration model and ground control points. Artificial corner reflector is ideal ground control point for the calibration but the installation of artificial corner reflector is difficult. Features like buildings that perform a similar role with corner reflectors in a SAR image can be used for geometric calibration and the location of the features is typically extracted from digital topographic map and other data. However, the location information has error due to the accuracy of reference data.

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These paper compares accuracy of the each geometric calibration result with 1:5000 digital topographic map, SRTM DEM and ASTER GDEM.

2. Data

The test site is Daejeon and the SAR image used in this research is TerraSAR-X image which is high resolution of X-band SAR image. The image mode is spotlight mode and the spatial resolution is 0.91m×0.86m.

Elevation informations of ground control point for geometric calibration are obtained from 1:5000 digital topographic map, SRTM DEM and ASTER GDEM. The SRTM DEM was generated by single pass SAR interferometry technique during an 11 day in February of 2000. The ASTER GDEM was generated from stereo pair images. The grid size of SRTM DEM is about 90m×90m and that of ASTER GDEM is about 30m×30m. The horizontal location is extracted from orthophoto which has 50cm×50cm resolution.

3. Experiment and Result

The calibration model for geometric calibration is built to correct echo samples datation error in azimuth direction and on-board electronic delay in slant range direction based on range equation and doppler equation.

25 ground control points in SAR image were extracted and used to the geometric calibration. When comparing elevation information with 1:5000 digital topography map, the differences with the SRTM DEM are from −4.5m to 11.4m and the difference with the ASTER GDEM are from −10.5m to 17.5m.

As the calibration result using digital topography map, RMSE is 1.0 pixel. It is because the horizontal location extracted from orthophoto image has at least 25cm error due to its resolution as well as the error of 1:5000 digital topographic map. and result using SRTM DEM has 1.3 pixel of RMSE and the results using ASTER GDEM has 2.8 pixel.

4. Conclusion

To compare geometric calibration results of 1:5000 digital topographic map, SRTM DEM and ASTER GDEM, we built the geometric calibration model and applied to a TerraSAR-X image with extracted SAR data. As a results, the calibration result using ASTER GDEM is 2.3 pixel and the results of 1:5000 digital topographic map and SRTM are 1.0 pixel and 1.3 pixel. The SRTM DEM is generated by SAR interferometry techniques, so it is affected by vegetation effect. Most of ground control points are collected in flat region, so there is no vegetation effect and the accuracy is low and similar with topography map. The distortion by build of urban region is determined as the main reason of error of calibration using ASTER

GDEM.

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A Study on Strengthening Map Services through Business Registration System

Hyunjin KIM

SUMMARY

In these days, we can easily search and access any locations because of popularized map services. However, the location information could be searched in a range of established database, so the important thing is establishing a wide range of database.

The idea on this paper is about how to economically establish enhanced GIS database with information collected when people apply for a business registration.

1. Current state of map services

It looks like that there are insufficient parts in map services in comparison with their huge users. If some locations need to be registered on maps, there are largely two ways. One of them is to be registered by specialized companies of POI(Point Of Interest) investigation, another is to directly request to map service companies for registration of POI. Therefore, It needs a lot of money and time to register POIs, and has a very long registration cycle(about 2~3years).

In addition, it is very difficult to search locations if there are not certain information of names or addresses. Because the search engine is not subdivided by classification of types of business.

2. Strengthening map services through business registration system

As a plan to strengthen search rate of map services, use of business registration system could not only increase POI registration rate but also shorten registration period of POI.

To start a business, people should apply for business registration at National Tax Service, and there are a lot of useful information on the form like shop name, address, type of business by SIC(Standard Industrial Classification), domain address, and etc. Therefore, the registration rate of POI could be increased using the information.

In addition, types of business are decided by Korean Standard Industrial Classification which National Statistical Office provides. The KSIC was developed to secure the accuracy and comparability of industry-related data, and there are 1,145 kinds of types of business, and then the type of business on business registration form should be decided by one of the business type of KSIC. Therefore, map service users who do not know certain address or shop name can search locations using the classification system.

Key words: Business registration, Map service, SIC(Standard Industrial Classificaton)

An approach to effective land registration based on the satellite photogrammetry: Case study in Baharly, Ahal Velayat, Turkmenistan

Hyunil Yoo

SUMMARY

With the emergence of high-resolution imagery in the satellite photogrammetry within the order of one-meter or less, it has been regarded as a new area of practice to handle mass data in a cost-effective and time-saving way. Accordingly, it has been utilized in many areas, especially in the geo-spatial information industry, e.g., topographic mapping, land use analysis and monitoring, land use planning, and disaster research.

As a matter of fact, while the satellite photogrammetry has remarkably contributed to the geo-spatial information industry, it has slightly played its role for the cadastral mapping purpose. This is because, in terms of positional accuracy, it does not meet with the criteria required by cadastral jurisdictions where there are basically strict standards as a result of protecting land ownership. What is more, a crucial issue is that the identification of the parcel boundary only relies on clearly visible boundary features or corners from the satellite imagery unless otherwise significant follow-up ground surveys are performed to check out every actual legal boundary points; consequently, it could bring in inconsistency with already existing legal boundaries. However, in the case where a wide range of areas are not entirely registered yet or are required to be newly registered for land use information management rather than determining private land ownership with high positional accuracy, the satellite photogrammetry could be an extremely useful tool in this situation. In particular, where a large number of parcels have to be registered, it can be undertaken with lower cost in a less time-consuming than other methods.

In this paper, based upon the pilot project "Land Registration and Cadastre Modernization in Turkmenistan" implemented by Korea Cadastral Survey Corporation as a case study, an approach to newly register land in an effective way and every process using the satellite photogrammetry are represented. Furthermore, the outcomes are evaluated and analyzed by comparing sample points on the same spot obtained by the GPS-RTK and satellite photogrammetric method.

Key words: Satellite Photogrammetry, Land Registration, Turkmenistan

registration projects in Caribbean Countries

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Abstract

Korea became a member of the Development Assistance Committee of the Organization of Economic Corporation and Development (OECD DAC) in 2009 that Korea has become an advanced donor country by all measures. Thus, Korea is required to take an active part in international land registration projects provided that Korean land registration system has made a contribution to rapid economic development while most of the under-developed countries are not benefiting from the current land registration systems. In an effort to improve their system by raising land registration rate in Caribbean Countries, Korea has been participating in land registration projects in Jamaica and Haiti since 2010. The purpose of this research is to suggest alternate plan to improve low land registration rate in Caribbean countries by comparison studies between land registration systems, and propose a strategy to develop land registration projects.

Keyword: Land Registration, Cadastral Surveying, Land Administration

The Efficient Method to Precisely Measure Time-series Land Surface Temperature Variations

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Abstract

Remotely sensed thermal infrared (TIR) images have been successfully used to measure land surface temperature (LST) that is one of dynamical effects of land surface processes. The images enables to provide physical information over dangerous and high-temperature areas such as volcanic eruptions and forest fires, with low-cost and no-risk through the LST estimated. However, emissivity and atmospheric and topographic effects make precise measurements of LST variations difficult. In this study, we propose an efficient method to precisely measure time-series LST variations. This method is named as the land surface temperature difference (LSTD) algorithm, which measures the LST difference between reference and target points within vegetation area to minimize the atmospheric effect and the difficulty of emissivity determination. It is reported that the method enables to estimate the surface temperature difference between two regions with the accuracy of less than 0.5K. The method is based on the assumptions that 1) atmospheric effects are same over an image and 2) the emissivity of vegetation region is 0.99 for Landsat TM and ETM TIR band images. To estimate time-series temperature variations, the following steps are needed: 1) atmospheric effect corrections; it could be performed by using the cosine approximation (COST) atmospheric effect correction model, 2) vegetation region extraction; it is carried out by the normalized difference vegetation index (NDVI) algorithm, 3) LST calculation at reference point; it could be performed by the single-channel algorithm, 4) LSTD map generation; it is generated by the LSTD algorithm, and 5) surface temperature lapse rate correction; it is performed by estimating and correcting the surface temperature lapse rate that means surface temperature change with respect to topographic height. The performance of this method is tested using Landsat TM and ETM+ images over Mt. Virunga, Congo and Mt. Karymsky, Russia. When there are no volcanic activities, the LSTD variations are distributed from -1K to 1 K, while the LSTD variations of more than 1 K are presented during the volcanic activity. The result demonstrates that the proposed method enable to measure time-series temperature variations. The method can be applied to monitor volcanic activities, forest fires, etc.

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Keywords : Landsat, Time-series, Land surface temperature, Land surface temperatur difference

Visualization for public transportation analysis: Mapping of Phoenix light rail corridor

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Abstract

This study aims to examine a light rail corridor with maps created through GIS tools to understand transportation effects. The case for this study is Phoenix light rail system in Arizona, US. Phoenix has grown at a faster pace than other regions at Arizona since 1990's. However, the growth in Phoenix resembles sprawl since the development of the greater Phoenix has extended its area depending on automobile-dependent transportation and has showed low density with single land uses. While this allows people to move around the community faster and further, and opens up larger areas for development, the result is the need for people to drive everywhere and to park their cars once they reach their destinations. The introduction of the phoenix light rail has been expected to enhance the public ridership and the efficient land use of phoenix downtown by lessening demand of automobile use and traffic jam in downtown.

This study provides several maps for density and land use in the Phoenix downtown area to analyze the light-rail ridership. Specifically, the study seeks to address, firstly, ridership numbers in each station in downtown Phoenix; secondly, whether the stations with the highest number of the right-rail passengers correspond to the neighborhoods with the highest population densities; and finally, whether the stations with park-and-ride facilities, commercials, or/and multi-family housings have more the light-rail passengers.

Overall, the centrality of downtown Phoenix has higher numbers of passengers than other stations. Interestingly, the stations with park-and-ride facilities are not likely to have more the light-rail passengers than other stations. That is, among stations with park-and-ride facility, while the stations such as Montebello/19thstationand19th/CamelbackhaverelativelyhighridershipthestationslikeCentral/CamelbackstationandVanBuren/1ststationshowtherelativelylowridership.Thus,whenthestationswithhighpopulationdensityhavepark-and-ridefacility,theridershipismorelikelytoincrease.However,thestationswithhighpopulationdensityhavepark-and-ridefacilitylocatedattheCentralBusinessDistrict(CBD)haveloweffectinattractingridersoflightrail. This study finds that the Park-and-Ride facilities in residential areas are more likely to increase the light-rail ridership, since passengers want to use the Park-and-Ride facility that closest to home.

A Study on Korean Next-Generation Integrated Cadastral Information System Model Design

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Abstract

Korean cadastral management system has been transferred and developed from analog cadastral management system based on analog maps to digital cadastral management system based on digital data. Due to the transfer to digital management system, in the cadastral field, various application systems have been developed and operating for cadastral terrier cadastral book, cadastral map information, and real estate information service. Especially, new information systems are being developed recently, resulting from the implementation of cadastral resurvey project. Although cadastral information systems that are currently established and operated are used through independent construction considering the characteristics of tasks and integrated use, the inefficiency of operation such as data discrepancy and compatibility issues between systems has been incurred. In order to resolve the problems, this study suggests the next-generation integrated cadastral information system model design that efficiently integrates and operates cadastral information-related systems.

Keywords: Cadastral information system, Digital cadastral management system, cadastral map, Cadastral resurvey project

Landuse Structure, Human Residence and Malaria Incidence in Korea

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Abstract

The number of malaria cases has been undulating since the reemergence of malaria in early 1990's in Korea. Considering the spatial variations of malaria incidence across the northmost border areas near the demilitarized zone (DMZ), the occurrence of the disease seems to be influenced by the natural and human environment in the region. Malaria is an infectious disease that is transmitted to humans by the bites of vector-mosquitoes that carry malaria parasites, and it depends on specific climatic and sociodemographic factors. Malaria transmission is highly climate-sensitive, and temperature is the most important component. In addition, human contacts with vector-mosquitoes and distance between human residence and mosquito habitats are crucial conditions determining malaria incidence rates. This study found that the spatial characteristics of malaria incidence have varied depending on relative proportions of mosquito habitats, distance between mosquito habitats and human residence, and local topography using satellite-based land use data, demographic data, and digital elevation model.

Keywords : malaria, vector, habitat, landuse

Calibration and accuracy verification of land surface temperature derived from satellite image based on in-situ measurement considering Multi-temporal

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Abstract

Recently, many cities are facing serious urban heat island (UHI) phenomena caused by large volumes of artificial materials and high-rise buildings, as well as reduced green spaces(Oke, 1987; Eliasson, 1996). To mitigate UHI phenomena, land surface temperature (LST) derived from satellite images have been widely used(Voogt and Oke, 2003). So the purpose of this study is developing correction methods and verifying accuracy of LST derived from satellite image using in-situ measurement data considering multi-temporal. The study sites are 8 different land-use types distributed in Changwon-si, South Korea, and LST from ASTER satellite image scanned at daytime (28/07/2012, 23/09/2012, 29/06/2013, 09/08/2013) and nighttime (21/09/2012, 28/09/2012, 14/08/2013) were used and corresponding in-situ measurements of temperature were also collected in 366 point each periods. Comparisons showed that ASTER derived temperatures were generally about 4 ~ 6 ℃ lower than temperatures collected by in-situ measurement during the daytime, except on cloudy days. But ASTER temperatures were higher by about 2 ℃ on during the nighttime. Temperature differences between a city park and a paved area were insignificant. Differences are caused by a various factors those are emissivity values and complex spatial characteristics of urban areas. Results of linear regression about LST between ASTER image and in-situ measurement are that explanatory of calibration model were high to R-square at daytime 0.693 and nighttime 0.959. Therefore, LST derived from satellite image should be used through calibration model based in-situ measurement data

Keyword : Surface temperature, ASTER satellite image, Urban heat island

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Estimation of ground-level air temperature based on surface temperature derived from satellite image

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Abstract

Urban heat island (UHI) is defined as the air temperature difference in urban and rural areas (Oke, 1987). In recent studies, surface temperature derived from satellite image is highly correlated with air temperature and can be used to linearly estimate distribution of air temperature (Benali et al., 2012; Kloog and Chudnovsky, 2012). The purpose of this study is to estimate of ground-level air temperature based on surface temperature derived from satellite image. For analysis, surface temperature derived from ASTER satellite images (02:21 P.M. UTC+9 at 29/06/2013, 02:20 P.M UTC+9 at 09/08/2013, 01:33 A.M at 14/08/2013) were used and field data such as air temperature, humidity, and radiation, and so on were collected by mobile measurement when scanning satellite image. And mean surface temperature from ASTER image in buffer 100m areas of mobile measurement points and field data were compared. Air temperature measured in field is about 30 °C at 29/06/2013, 36 °C at 09/08/2013, and 29 °C at 14/08/2013. Surface temperature from ASTER images is between 30 °C to 57 °C at 29/06/2013, 40 °C to 59 °C at 09/08/2013, 28 °C to 31 °C at 14/08/2013. Results of linear regression analysis are that R-square of models is 0.508. When compared with previous studies, explanatory of models is similar or higher than 0.2~0.3 of Schwarz et al.(2012) and 0.6 of Li et al.(2008). The relationship between surface temperature from ASTER image and air temperature of field measurement is low because air temperature in the region is affected weather conditions such as wind patterns, humidity, and surface energy balance. Therefore, to estimate air temperature using surface temperature derived from satellite image, additional analyses such as an relationship with air and surface temperature, surface energy balance, and around weather conditions will be investigated.

Keyword: Surface temperature, ASTER satellite image, Urban heat island, Air temperature, Surface energy balance

Acknowledgement

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Measuring surface water availability using Landsat and computerer simulation

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Abstract

The Prairie Pothole Region (PPR) of North America has millions of seasonal or permanent potholes and lakes and they are dramtically changing with seasonal variation. Therefore, hydrologic variability is one of the key issues in the region in terms of ecology and economics. Interestingly, the availability of water in PPR proposed by Zhang and Schwartz (2009) provides a unique insight how the wetland surface water need to be managed because it follows the power-law theroy. In this study, the seasonal characteristics of this region in water availability by Zhang and Schartz (2009) was verified using computer simulation using fractal surface generation. This simulation result showed that the slope of the power-law was determined by the dimension of fractal and the lake distribution always had the similar pattern regardless of seasonal variations as was pointed out by Zhang and Schwartz (2009). This means that the patches of water covers and seasonal changes of lake volume can be computed using the power-law theory with remote sensing images. Also, the distribution density of lake was controlled by rainfall, typically in PPR, and can be an element determining the abundance (or availability) of surface water.

Keywords : lake distribution, simulation, Landsat, power-law

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Compensation of the temporal gaps of remote sensing images in assessing the spatiotemporal variations of chlorophyll-a in Paldang of Korea

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Abstract

Water bodies such as lakes, impoundments, and rivers are being changed according to the condition of pollutant loading discharged from the surface water runoff or groundwater discharge. Especially, nutrients from agricultural land and waste water or chemicals by human activities pollute water resources and significantly impact on the aquatic ecosystem. To protect water resources from the pollution, periodical water sampling or monitoring are being conducted. However, the sampling approach is not appropriate for the representative quality of a whole water body and does not provide enough information for the spatial distribution of contamination. Therefore, we proposed the remote sensing approach to understand the spatiotemporal variations of chlorophyll as an indicator of nutrient loading into Lake Paldang located in South Korea. The remote sensing data require water sampling data obtained at the same time of the remote sensing image to extract the spatial distribution of chlorophyll. However, it is difficult to collect the datasets at the same time so we employed a modeling technique to resolve this problem. First, the sampling dataset at the same time of the Landsat data collection were used as input for modeling (GEMSS) to derive appropriate Chl-a concentrations and water temperatures at that time in the North and South branches of the Han River, and the Gyungahn stream. Then, the modeling results were used to calculate Landsat-derived Chl-a concentrations and temperatures using the Landsat imagery and statistical approach. We found that the Lake Paldang system with three tributaries, the North and South Han River and the Gyungahn Stream, had different temporal characteristics each season in the distribution of Chl-a and temperature, and the Gyungahn Stream, the most contaminated tributary, significantly influenced to the Lake Paldang system degrading the water quality typically in summer.

Keywords : chlorophyll-a, remote sensing, spatiotemporal variation, spatial distribution, modeling, Landsat

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A transfer learning approach to the integration of spectral information with temporal contextual information from an existing land-cover map for land-cover classification

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Abstract

Land-cover classification has been regarded as one of important applications of remote sensing. Both the development of advanced data processing algorithms and proper incorporation of auxiliary information into spectral information can improve the quality of the land-cover classification results. In this paper, a transfer learning-based integration framework for land-cover classification is presented that can incorporate spectral information from remote sensing imagery into temporal contextual information from an existing land-cover map. First, initial classification is implemented by using objects extracted from both the exiting land-cover map and spectral information from remote sensing imagery. From this initial classification result, both changed and non-changed areas can be extracted and used as inputs for the next transfer learning stage. The transfer learning procedure is then applied by using new training data extracted from non-changed areas. This procedure is iteratively repeated until the predefined convergence criterion is satisfied. Unlike other supervised classification approaches, the presented framework does not require a large number of training samples for the initial classification procedure, because training data are newly generated from non-changed areas. As the whole classification procedures are based on object-oriented classification and the existing land-cover map, the final classification result can be used for updating of the existing land-cover map. From an experiment with RapidEye imagery and the ME land-cover map, the presented methodology showed a significant improvement of classification accuracy, compared with the classification purely based on spectral information. Therefore, the transfer learning-based classification is expected to be an effective land-cover classification methodology.

Keywords : Land-cover, Transfer learning, Classification, Remote sensing

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Effects of Building Generalization on Hazard Assessment for Urban Inundation using Dual-drainage Model

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Abstract

Urban inundation is becoming more frequent as a consequence of several factors including continued watershed development with impervious surfaces, population growth, climate change, sea level rise, and decaying infrastructure. In order to assess inundation hazard, the V X D (Velocity X Depth) method is commonly used for vulnerability mapping. The vulnerability map is the basic essentials, which is combined with the property for hazard assessment. Although the vulnerability based on the geographical information is quite dependent with grid resolution or building shape, there are few researches on sensitivity analysis of building shape to the vulnerability assessment. This study aims to investigate the effects of building generalization on hazard assessment for urban inundation using dual-drainage model. The building generalization scheme used here are elimination, simplification and aggregation which is supported by ESRI Corporation. The resolution of building generalization is determined to coincide with the simulation grid. As a result, the vulnerability area with generalization is drastically enlarged in the case of 6m or more resolution. Furthermore, the location of vulnerable areas were quiet different with 1m resolution when the resolution of building generalization was bigger than 6m. Especially, the inundation pathway along roads or building gaps showed significant difference.

Keywords : Inundation, Hazard, Building generalization, LiDAR, Dual-drainage

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Estimation of Velocity Pressure Exposure Coefficients Using the Digital Topographic Map

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Abstract

In modern times, high-rise buildings are increasing to express national and urban landmarks, and the exterior of buildings is being designed to be suitable for landscapes of cities. This rapid expansion of cities and highly-densed industrial facilities have lots of effect on the changes of geographic features in the city and especially, high-rise buildings are getting tangled up more with low-rise buildings such as the existing house. In other words, there are buildings with different heights in one area, and this confuses a designer to estimate velocity pressure exposure coefficients that are important for calculation of design wind speed of buildings. When surface roughnesses are mixed in one area to estimate velocity pressure exposure coefficients, a designer chooses the surface roughness, based on his or her subjective judgment, and this is a big problem for rationality of building design.

In order to settle this problem and to estimate rational velocity pressure exposure coefficients, therefore, this research proposed a velocity pressure exposure coefficient estimation method using the digital topographic map. For this purpose, building DTM was created using the node of building outline, height information and elevation point within the target range, and surface roughnesses were divided, on the basis of height information of building DTM to estimate the distribution ratio of each surface roughness. After velocity pressure exposure coefficients of individual surface roughnesses were estimated, the distribution ratios of surface roughnesses were applied as weighted values and they were aggregated to minimize designer's subjective judgment. The 1:5,000 digital topographic map was employed.

The method suggested by this research is to estimate velocity pressure exposure coefficients in proportion to the distribution ratio of surface roughness and thus is a rational way to minimize designer's subjective judgment by applying the distribution ratio of surface roughness as a weighted value, based on height information of buildings within the target range of the city where more than two surface roughnesses are mixed.

Keywords : Wind velocity, Velocity pressure exposure coefficients, Surface roughness, GIS

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Investigating Periodic Properties of Major Urban Plants on the Light Reflectance for Vegetation Type Mapping

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Abstract

Spectral perspectives for satellite imagery are widely used for estimating vegetation vigor and productivity. Several instruments measuring spectral perspectives were invented to be applied in the field measurement. Using this kind of things, like a spectro-radiometer and a spectro-photometer, can allow us to identify the relationship between leaf reflectance and an absorbance by chlorophyll in a vegetation leaf. The results from this idea can be applied to the part of remote sensing technology. The objective of this study was to investigate spectral perspectives derived from the leaf reflectance, which can be related to the contents of chlorophyll in urban forest leaves and can finally estimate the condition of each vegetation species in an urban forest. For investigating the vegetation species and its condition in the growing season, hand-held instruments with spectro-radiometer and spectro-photometer. The study area was 15 urban forests in Daegu Metropolitan City, and 6 major species were selected and sampled to relate their spectral reflectance and absorbance in the growing season, from April to June in 2011. During this period, five pieces of leaves for each target tree were sampled twice a week in 15 forests and the reflectance was checked in GER 3700 (Spectra Vista Corporation, USA), and the chlorophyll was extracted by using 99.5% of acetone solution and used to check the optical density in UVD-3200 (Lavomed, Inc., USA) for estimating the content of chlorophyll a and b. The spectral reflectance was quite well related to the chlorophyll content, and especially combination of NIR (near infrared) and red band explained the chlorophyll content in a leaf.

Keywords: Leaf reflectance, Vegetation index, Spectroradiometer, Leaf absorbance

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Session_6

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Texture mapping of 3D objects using depth camera and multiple images

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Abstract

This paper describes how to generate a 3D mesh model of a real world object and mapped with texture map made with multiple intensity images using a depth camera. Now, A method of 3D object generation is almost computer graphic object not real object. There are some method for generate real 3D object such as that generate 3D mesh model after acquiring depth information using 3D scanner and generate 3D mesh model reconstructing depth information through 2D multiple images. TOF(Time-of-flight) depth camera measures range information of objects using Infra-Red(IR) signal in real time and acquired 2.5 dimensional low depth information image with intensity image. The depth image was separated into an depth information of object and background. The depth information of object region was converted a Point Cloud. Next, The Point Cloud was required to correct noise due to transmission noise of the depth image. It was reduced by removal outlier filtering. 3D mesh model was created by the corrected Point Cloud and mapped with texture map made with intensity image. A method of texture mapping used relation of one-to-one correspondence between The Point Cloud and the intensity image. The result showed 3D object model reconstructed in one direction was very similar to the shape and texture of a real object. In addition, We studied a research on alignment of two Point Cloud using 3D transformation. When applying this technique to texture mapping using multiple images extracted in all direction, we can generate 3D object of real world.

Rectification method of Image Sequence for Free Moving Multi-Camera System

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Abstract

Although various camera effects being used in 2D contents are limited in 3D contents, its production is generally required more working time and cost than the 2D contents. It is due to filming method based on a camera rig. The method is demanded fixed position and attitude of cameras to minimize vertical disparity. For that reason, the specific camera effects shown in the 2D contents are relying on computer graphic. Therefore, we propose a novel rectification method for free moving cameras as its solution.

The most important point for image sequence rectification is that same model space should be established for every frame images. If not, the rectification will bring about serious fluctuation in image transformation. Existing methods using the camera rig could be applied to every frame images with same extrinsic parameters acquired through priori calibration. However, in the case of free moving camera system, the same approach cannot be adopted because extrinsic parameters are changed for each frame. To solve this problem, we first analyze several possible geometric motions of cameras, and then establish effective rectification strategy. The evaluation of proposed method is carried out using test dataset produced personally. Performance comparison with other existing method is done to enhance confidence of the evaluation result.

Through the proposed method, it is predicted that exciting camera direction can be done and that contribution to revitalization of 3D market suffering from a lack of contents may be possible.

Automated 3D Information Generation from Smartphone Images

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Abstract

3D information is closely related to the real world and the importance of 3D information is gradually increasing. These days, those have been lots of 3D applications developing, such as; v-world made by Ministry of Land, Infrastructure and Transport of South Korea, shows the 3D model of some cities and buildings in the country, 3D printed application using 3D printer, and so on. However, expensive and complex equipment such as laser scanners and depth cameras were needed for generating detailed 3D information. Thus, this research proposes a method for generating 3D information using multiple view images from a smartphone camera to obtain high quality images. These days, the CCD size and the resolution of the smartphone camera are increasing accordingly. This method was done in several steps. First, the inner orientation parameters of the smartphone camera were calculated by GML camera calibration toolbox. Second, the inner orientation completed, the multiple images of the texture object were taken. Third, in order to automatically extract the feature points of each images, SIFT algorithm were used. Fourth, the feature point matching algorithm and coplanarity condition were performed for relative orientation of the first image and the second image. The coordinates of the first image are reference coordinates. 3D tie points of the matching points through relationship between the stereo images can be gained. Fifth, the third image uses 3D tie points of the first and the second image as GCPs for calculating relative position and rotation of third image. This process will gradually continue from image to image. In each step, with comparing each two images, the 3D tie points needed for the next images were calculated. Finally, depth map including 3D information was generated through the image matching. The previous GCPs were used for the image matching as initial points. There were failed matching points in the non-texture area of the object. It is necessary to develop the image matching algorithm more precisely.

GNSS.asia Project and Future Plans

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Ziinconsulting Inc. {CEO, Junior Researcher}, Electronic Technology Research Institute

Abstract

The GNSS.asia project will support the European Commission in developing and implementing a GNSS strategy for the G5 region. The project has concentrated on the five core regions of the Asian economy: Japan, Korea, China, Taiwan as well as India. The goal was to implement concrete actions early within the project span, which would pave the way for permanent engagement and industrial relations in the future. The Consortium was well qualified, building on own past project experience in the region, combining GNSS and industrial cooperation expertise in a highly complementary consortium. The Consortium, which is composed of key European and Asian organisations, is committed to make the project a sustainable success. Project Priorities are composed of five priorities. First one is to define a strategy for the industrial cooperation between EU and the G5 countries on GNSS downstream sector (applications and receivers essentially). To ensure valorisation of the Galileo programme with an emphasis on "exportable" produces mainly in the users segment: receivers and applications is the second one. Thirdly, we emphasized on supporting information flow from Galileo to relevant stakeholders in the G5 Region. Additionally, we recommended and started GNSS-related industrial cooperation. Finally, our project has support piloting and implementation of these activities.

This research was funded by European Union, FP7 project GNSS. ASIA.

Korean Meteorological Satellite Education Programmes for College Students

Eunmi Chang, Byungki Kang, Yongjae Park, Sunah Moon,

Ziinconsulting Inc. {CEO, Institute Director, Senior Researcher, Junior Researcher}

Abstract

Korea is one of countries to have geostationary satellites and polar orbit satellites together. Continuous investments need to outreach programme beyond advertisement or professional research works. Korean Meteorological Satellite Centre belongs to Korea Meteorological Administration and is in charge of planning, operating, receiving, processing, and propagating satellite-derived data. In academic programmes for atmospheric science only 6 universities are running with the lack of hands-on image processing curriculum. Therefore, KMSC prepared a partner program for expanding the capacity to understand meteorological satellite imagery. We have operated intensive course three times from 2011 to 2013. This was intended a complementary course for academic ones, but additional effects were proved to be great. The processes of preparing, implementing, teaching, and other visiting activities were analysed year by year, major by major etc. The implication of the program will be a good stepping stone and guidelines to expand GIS and the other specific technologies. NASA, JAXA and USGS educational programs are also compared with our program. Finally we made a mid-term plans for expanding Meteorological Satellite Education for the public, as an outreach purpose.

This research was funded by Korean Meterological Satellite Center in the name of Training System Implementation for Competency Enhancement of Meteorological Satellite-Derived. Information Application.

Generation of Tunnel Cross Section Using Mobile Mapping Systems

Park, Jin Yi*·Kim, Eui Myoung**·Yu, Jin-Young***

Abstract

Tunnel displacement was observed by utilizing electrical sensor and optical measurement equipment. However, optical measurement equipment like Total Station has the disadvantage that it need a lot of time and manpower for high definition measurement. As mobile mapping systems (MMS) that ground laser scanner is installed has recently been introduced, more efficient and economical measurement got to be possible. This study tries to suggest a method which extract tunnel cross section by using the mobile mapping system as the pre-stage for measurement of tunnel displacement. The methodology which produces tunnel cross section was arranged by the procedure which extracted center-lines of roads first and then produced cross section. 3D coordinates and RGB values of ground laser scanner data which was installed in MMS were used to extract center-lines of tunnel roads. The center-lines of roads were extracted through combination of hypothesis that there is the small change in color information and 3D height values of the center-lines of roads in tunnel. The extracted center-lines in the tunnels pass the laser scanner points and were produced through the spline interpolation method which interpolates 3D curves by using polynomial expressions. As the center-lines of roads consist of 3D curves, the spline form, panel points by section were produced after producing smaller sections that the curved center-lines of roads consist of the straight form to increase accuracy of cross section in the curved sections because it was judged that exact extract of cross section in the curved sections cannot be done when producing it by utilizing the original data of laser scanners. Vertical virtual points were produced by producing the straight lines which lies at right angles to the short straight lines which are divided into the smaller sections and nodal points which consist of them and putting buffers at regular distance from the straight lines which are at right angles to each nodal point. Application of plane equations about each nodal point and virtual points makes the laser scanner data which are the original data be searched when the most optimal plane by section is produced. a cross section by smaller section was produced by re-extracting the original laser scanner data assuming that the ground laser scanner data in the planes by section are the points which consist of cross section if they are included. The study extracted the center-lines of tunnel roads by using the RGB values and 3D coordinates of the ground laser scanner data obtained through MMS and drew the methodology which produced tunnel cross section by utilizing the spline interpolation method and plane expressions. The tunnel cross section is thought to be utilized as the basic data for measurement of displacement in tunnels and 3D management of tunnels.

Keywords : Mobile Mapping Systems, Tunnel Cross Section, Laser Scanner, Spline, Road Centerline

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Spectral Mixture Analysis Using Modified IEA Algorithm for Forest Classification

Song, Ah Ram*, Han You Kyung**, Kim Young Hyun***, Kim Yong Il****

Abstract

Fractional values resulted from the spectral mixture analysis could be used to classify forest cover in more detailed spatial scale. For the successful classification using spectral mixture analysis, extraction of correct endmember is prerequisite process. However, It is difficult to decide the number of endmembers without auxiliary information and there are a lot of possibilities to extract duplicate endmembers if the materials which have similar spectral patterns exist on images. In this study, modified Iterative Error Analysis (IEA) algorithm is used to extract optimal endmembers for spectral mixture analysis. This method measures Spectral Information Divergence (SID) values between the extracted endmembers to remove endmembers extracted from same materials. Spectral unmixing technique using modified IEA algorithm was applied to separate forest area into more than two types of trees from Airborne hyperspectral imagery.

Keywords : Spectral Mixture Anslysis, Classification, Endmember, IEA, SID.

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A Study on Automatic Co-registration of Cloud-covered Multi-temporal KOMPSAT-2 Imagery

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Abstract

High-resolution multi-temporal images have to be co-registered in order to use the images into the various remote sensing applications. Generally the high-resolution images have their coordinates, but the locations are locally different according to the pose of sensor at the acquisition time and relief displacement of terrain. Therefore, image registration have to be applied to use the multi-temporal images together. However, image registration is interrupted especially when images include the cloud-covered regions because of the difficulties of extracting matching points and lots of false-matched points. This paper proposes an automatic co-registration method for the cloud-covered high-resolution images. A scale-invariant feature transform (SIFT), which is one of the representative feature-based matching method, is used. Only features of the target (cloud-covered) images within a circular buffer from each feature of reference image are used for the candidate of the matching process. Study sites composed of multi-temporal KOMPSAT-2 images including cloud-covered regions were employed to apply the proposed algorithm. The result showed that the proposed method presented a higher correct-match rate than original SIFT method, and acceptable registration accuracies in all sites.

Keywords : Automatic image registration, Cloud-covered region, High-resolution multi-temporal images, KOMPSAT-2

Current State and Research Topics to Infer Home Location of Twitter Messages

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Abstract

As people can communicate with each other using SNS(Social network services), the importance of SNS data analysis is increasing like tweet data analysis. Especially, because Twitter offers the datum of user's status(text), tweet time and location and so on, researcher are regarding a tweet as a sensory value.[1] But there are several difficulties in inferring the location of social signals. First, the percentage of tweets which have geo-referenced information is comparatively small. Less than 1% of tweets are geo-tagged and information available from the location field in users' profiles is unreliable at best. [2] Second, even if there are many tweets involving geo-referenced information, people might doubt of the correlation between the number of tweets from place and number. For example, correlation between the number of tweets from a place and the number of Native Americans present in that place does not imply that Native Americans are more likely to tweet. [3]

Therefore, researchers have been concerned about the geographical scope of online contents for the last decade.[4] Prior work relevant to this research can be categorized roughly into two groups based on the techniques used in geo-locating[5] : content analysis with terms in a gazetteer or with probabilistic language models[2, 4, 6, 7, 8] , and inference via social relations. [9, 10, 11, 12] But these researches are applicable to tweets written in English within bounds of U.S.A. And there is no study on location sparsity of tweets written in Korean especially within South Korea.

Therefore, the object of this study is to find the geo-location models to solve the problem of location sparsity within tweets produced in Korean boundary. To do this, we will diagnose the problem of location sparsity within tweets produced in Korean boundary. And we will apply the two methods (contents analysis methods and the methods of social tie) to tweets collecting within the Korean boundary. After that, we will compare with the results of the two methods and make choice the method to show the better reliability in the scale of Sigungu level. This research will be first outcome to infer the location of tweets produced in Korea where people have the sentiments to hide their information and will be utilized in pre-processing of tweets to seek area breaking out the social signals.

Key Words: Twitter data, Inferring Location, Home Location, Home Sparsity, Spatial Big Data

A Study on Automatic Coastline Extraction using Landsat Images

Kim, Mi-Kyeong* Sohn, Hong-Gyoo Jang, Hyo-Seon*** Cho, Hyoung-Sig****

Abstract

It is apparent fact that natural disasters have been increased in recent decades. On the other hand, global climate change has gained global attentions increasingly since it is considered as one reason of those disasters. Sea level rise caused by global warming is one of the effects and it is significant phenomena. Direct effect of sea level rising in human condition is coastline change. Thus, identifying the coastal changes quantitatively can be used as an meaningful indicator. In order to analyze coastline changes, a series of image processing techniques was applied to Landsat imagery converted to MNDWI(Modified Normalized Difference Water Index) for coastline extraction. Using extracted coastlines can be analyzed utilizing buffering-based approach. Since we use entire Landsat images, coastlines over a wide area can be extracted in a relatively short space of time even without reference data.

Keywords : Landsat, MNDWI, coastline extraction, climate change, global warming

1. Introduction

It is impossible to ignore the association between global climate change and increasing natural disasters. Global warming is one of the most main factors increasing disaster risk. Global warming not only increases disaster risk but also affects the whole ecosystem including human condition. Sea level rise due to global warming is one of the effects and is accompanied by considerable decadal variability. For the period 1993 to 2003, the rate of sea level rise is estimated at about 3.1 mm/year, significantly higher than the average rate, 1.8mm/year of 1961 to 2003(IPCC, 2007).

As sea level continues to rise, the risk of inundation in coastal lowlands is increasing and it is axiomatic that accompanying coastline changes. In addition to sea level rise, coastline can be changed by artificial activities for land development with improvement in technology. Depending on the dominant factor of coastline changes, determining the changes quantitatively can be used as indicator of global warming or used to check the development in coastal areas.

A common method about coastline change detection has been used traditional ground survey techniques. But, this method is difficult,

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time-consuming, and sometimes impossible for a huge region such as an entire country or continent (Ouma and Tateishi, 2006).
Therefore, this study aims to acquire coastlines automatically by applying a series of image processing techniques and analyze the changes of coastline extracted automatically.

2. Main Results

Our idea starts from the fact that quality of the image sources is important factor for coastline extraction and depends on considerable contrast between water and land. So using water index, we can maximize the contrast of water/land. Before processing and analysing the image data, various pre-processing routines must be applied to the imagery. The data used in this study were acquired from Landsat TM/ETM+. After reducing various radiometric through pre-processing reflectance can be calculated from original DN values. With reflectance calculated for each band, we can calculate water indices. We decide use MNDWI instead of NDWI because MNDWI images have more contrast for distinguishing between water and land. First, MNDWI image is converted into binary image with the threshold value from Otsu method. In that converted images, many islands or inland water bodies still exist as all noises. To remove these, fill function was applied. Detected inland water and islands using fill function are removed from binary image. Finally, canny edge detector was applied to noise-removed image to extract coastline. The final product was stored in the geotiff formats that have same coordinate system with original Landsat TM/ETM+ images. Extracted coastlines automatically through above process were analysed using buffering based approach proposed by Heo et al.(2009) to detect the changes of coastline.

3. Conclusion

In this study, a series of image processing techniques was applied to satellite images in order to acquire water feature automatically. Using extracted coastlines can be analyzed utilizing buffering-based approach.
The quality of remote sensing images is important because the quality dominated by cloud cover or weather condition decides whether to make use of that. To enhance quality of images with respect to maximizing the contrast of water/land, MNDWI images that are reflected characteristic of geographic and water features was utilized before the image processing. Since we use entire Landsat images, coastlines over a wide area can be extracted in a relatively short space of time. Without reference data, errors cannot be determined. So, if we can get ground truth data, errors can be minimized and assessed. And if the accuracy of this could be investigated in further study, this study can be more advanced.

Acknowledgements

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Tactile map for blind people in Korea

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Abstract

This study reviews status of tactile maps for blind and visually impaired

people in korea and explore future of tactile maps. Tactile maps are images that use raised surfaces so that a visually impaired person can feel them. Tactile maps are consist of braille and cartographic componenet such as geogprahic symobles, graphs and diagrams. Tactile maps help to improve the cognitive abilities of blind people. Most Tactile maps in Korea is 'orientation' map of the place. But future of tactile map are not only 'orientation' but also 'portable way finding' map based on GIS and ICT technology such as smart phone and personal navigation systems. Features of new Tactile map are as follows: Personalised map, Three dimensional Tactile map and Haptic Navigation Aids.

Key words : Tactile map, Blind people, portable way finding' map, Haptic, Navigation Aids

The Influence of Neighborhood Open Space on Physical Activity and Health

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Abstract

Urban open space is an important infrastructure that provides residents with opportunities to participate in physical activity and promotes health. Because of the rapid urbanization, neighborhood park which play a important role in physical activity places have regional disparities. Recently, people use open spaces such as parks, playground, schoolyard for physical activity. Therefore, this study examined an association between the characteristics of built environment on using open space and physical activity, health, obesity. Geographic information system(GIS) was used to construct spatial data regarding access to open space and the built environments across Changwon-si. A questionnaire survey was conducted to obtain information about frequency of visiting open space for physical activity, level of health, body mass index and perceptions of neighborhood attributes. Lineal regression models was used to examine the relationship between the characteristics of built environments and physical activity, health, obesity. In individual variables, significant associations with physical activity were apparent for shortest distance to open space, number of open space entrance(200m). Ratio of residential area and night temperature were positively associated with open space-based physical activity, while high ratio of industrial area decreased likelihood of visiting open space for physical activity. Those who perceived there are many free facilities for exercise and leisure in neighborhood was likely to visit open space for physical activity($p<0.05$). Regarding level of health, number of open space(200m, 400m, 600m, 800m), size and type of open space, positive perception on sidewalk and crosswalk were significant predictor. Significant association with BMI were apparent for number of open space and park(400m). Those who perceived their neighborhood as safe pedestrian environment were likely to have lower BMI($p<0.1$). The Linear regression model was developed to explain the influence of individual level, built environment level.

Keywords : Physical Activity, Open space, Built environment, Health, GIS

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Spatial Analysis of CCTV locations for crime prevents in Ansan

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Abstract

Crimes occur frequently in many places which lack sufficient surveillance systems. It has increased fear for crimes. Consequently, local governments are installing more CCTVs(Closed-Circuit Television) as a way to form safe city environment. Despite increasing the number of CCTVs, CCTV's location analysis has not been considered in literature. Therefore, this study based on the location of CCTVs in Ansan analyzed major factors deciding CCTV installation. Ultimately the purpose of this study is to suggest optimal location based on the settled population and the floating population for new CCTVs in Ansan. This study applied multi-level analysis using spatial data in administrative areas and MCLP(Maximal Covering Location Problem) under constraints which the number of CCTVs are restricted. The result shows that CCTV's spatial distribution is affected by communities attributes. And the result of the site selection for new CCTVs presents differently depending on potential demand.

Key words: safe city, CCTV(Closed-Circuit Television), multi-level analysis, MCLP(Maximal Covering Location Problem)

The Effect of the neighborhood environment on park usage for physical activity

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Abstract

Neighborhood parks and green spaces are valuable community assets that can play an important role in promoting physical activity for health. The purpose of this study examined an effect of the neighborhood-based physical environments on park usage for physical activity. Geographic information system(GIS) was used to construct spatial data regarding the physical environments across Changwon City, Gyeongsangnam-do. A questionnaire survey was conducted to obtain information about physical activity in the neighborhood parks. Binary logistic regression models was used to examine the relationship between the characteristics of physical environments and physical activity in the urban parks. The individual variables, such as mixed land use, ratio of road, sidewalk, pedestrian crossing, intersections density, number of park and park entrance and network and the shortest distances to park were associated with odds of park-based physical activity. The binary logistic regression model was developed to explain the influence of four factors, accessibility and availability of park, convenience of walking route to park, and abundance of park area derived with factor analysis on park usage for physical activity.

Keywords : Physical environment, Walking, GIS, Neighborhood, Urban park

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Impacts of the neighborhood environment on walking for transportation or recreation purposes

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Abstract

Walking can play an important role in promoting health. It is also a popular recreational activity and a feasible travel mode. Associations exist between walking and the physical environment, but knowledge is lacking about specific environmental conditions associated with different purposes of walking such as commute, attending school, shopping, and exercise. Geographic information system(GIS) was used to construct spatial data regarding the physical environments across Changwon City, Gyeongsangnam-do. This study used objective neighborhood-based environmental measures using GIS. A questionnaire survey of 396 adults was conducted to obtain information about walking for transportation or recreation purposes in the neighborhood. Binary logit models estimated the odds of walking for recreation or transportation purposes. The individual variables, such as the ratio of residental area, park and green spaces, number of facilities for welfare, religion, culture and service were positively associated with odds of neighborhood-based walking for commute and attending school. The ratio of multi-unit home and number of facilities for education, welfare, religion were positively odds of walking for shopping and public transportation. Lastly, walking for exercise was correlated with the ratio of park, green spaces and commercial area

Keywords : Built environment, Walkability, GIS, Physical activity, Health

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A Strategic Plan for Application of Creative Education Based on Geospatial Technology

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Abstract

Geospatial technology shows another possibility of change in the field of education.[1, 2, 3, 4] The organizations in the world that initiate geoweb service and possess large scale of spatial data already provide various services so that the geospatial technology can be easily utilized in the field of education.[5, 6, 7] In case of Korea, Ministry of Land, Infrastructure and Transport provides the environment that more users can use the three dimensional spatial data and geoweb services as it commences the service of geospatial information open platform, so called v-World.[8] In addition, public organizations such as Seoul Metropolitan Government and the Ministry of Security and Public Administration provide public data to the people through Seoul Open Data Portal (data.seoul.go.kr) and Open Data Portal (data.go.kr), respectively. In this way, as one can easily access and utilize the geoweb and public data, the possibility that one can use the geospatial information in the field of education has been expanded dramatically.

On the other hand, education field is experiencing dramatic change as facing knowledge and information society. In this 21stcentury, the creative education and the inquiry learning have been emphasized. Ministry of Education encourages field experienced learning in the 7th Revised Curriculum in 2009. In addtion, a guideline of digital textbook has been established and distributed so that digital textbook will be used in elementary, middle and high school in 2014. Geospatial technology can be important instrument which enables an inquiry learning, field experienced learning and creative education.[9]

In this study we propose the strategic plan for creative education based on geospatial technology. This study is classified into three folds: First, we analyze the education websites based on geospatial technology and education environments in Korea. Second, we establish a strategy for creative education based on geospatial technology. The strategy is divided into four parts; a strategy for construction and provision of lesson plans, a strategy for database construction for learning, a strategy for platforms for construction and management of lesson plans, and a strategy for supporting service provision for the creative education. Finally, we propose yearly plan, expense budgets, performing organization, and consultative committee as an execution strategy.

Key Words : Creative Education, Geospatial Technology, Strategic Plan, Geoweb

Next Generation Satellite for GIS Application in KOREA

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Abstract

The KOMPSAT (Korea Multi-Purpose Satellite) program was developed based on the Mid- and Long-Term Plan for Korea's Space Development. According to the Plan, KOMPSAT-3 was developed from 2005 and launched in 2012. Main mission of KOMPSAT-3 is to continue satellite earth observation after KOMPSAT-1 and KOMPSAT-2 in order to meet national need. For achieving the mission, KOMPSAT-3 has large optical camera and provides 0.7 m panchromatic and 2.8 m multi-spectral resolution images. The satellite images are used in various applications such as land cover and change detection, engineering and construction, and geographic information system (GIS). But, KOMPSAT-3 was not dedicated to GIS application. It was developed for general global earth observation. As a result, it has limitation in the point of GIS application. Recently ministry of land, infrastructure and transport has been interested in a satellite as an infrastructure for constructing a national spatial data. In this paper, next generation satellite system for GIS application in KOREA is described under investigation. The system consists of satellite, ground station and application system. In addition, system function and operation which are necessary for GIS application in KOREA is described in this paper. Though all function and operation can not be applied to a medium-sized satellite, the description will be helpful for understanding the next generation satellite system and preparing GIS application.

Keywords : Satellite, Application, Mission, GIS

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Analysis of impact on the safety of walk to physical environment of surrounding elementary school - Focused on elementary school in changwon city -

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Abstract

The purpose of this study is to analyze the impact of the physical environment around the 20 elementary school to the safety of children walking. Geographic Information System(GIS) techniques were used to analyze the land patterns around the school. In addition, a field surveys were conducted to evaluate the level of the street-level objective and subjective pedestrian environments. And pedestrian safety and traffic accident risk that related to the data was collected through garde 5 to 6 students attending 18 elementary school by questionnaire survey. one-by-one regression analysis showed that traffic accidents or pedestrian safety and risk were associated with exclusive residential and co-residential area ratio, sidewalk obstructions, building height, traffic lights. this study will be a useful data that constructs safe routes to elementary school.

Keywords : Elementary school, Safety, Physical environment, Walking, Commute, GIS

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Discriminate between green roof and small green spaces using Airborne Hyperspectral Imagery

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Abstract

Urban green space has many powerful functions as an infrastructure that provides physical activity for improving the life quality of resident, reduce the Heat Island Effect, and offer opportunities to recreate and relax. It needs systematic management even small or private green spaces. Because the small or private green spaces have key part of Green Networks connect to street trees as a node for all creatures including human. The general management of green spaces has two good approaches such as Geographic Information System (GIS) and Remote Sensing (RS). Especially RS provide basic dataset for GIS, also thematic mapping. However, existing airborne RS of panchromatic or multispectral sensors may be confusing green roof as green spaces with vegetation. The airborne hyperspectral imagery (A-HSI) has narrow continuous many spectral bands, can be distinguishing surface material with spectral characteristics. Therefore in this study, we performed discriminate between green roof and small green spaces using A-HSI in order to total management (called as 'total amount of greenery') include small or private green spaces. We used two approaches to discriminate small green space that supervised and unsupervised classification quantified and categorized impervious, suspected green space, and vegetation green spaces. The training (or reference) dataset used Digital Map and spectral Endmember for spectral angle mapper (SAM) as supervised classification. The unsupervised classification methods were modified chlorophyll absorption in reflectance index (MCARI) and iterative self-organizing data analysis (ISODATA). Additional we compared supervised classification and unsupervised classification. The SAM could be more efficiently distinguished the confusions than MCARI and ISODATA. In the error matrix for two SAMs, one is referenced Digital Map (SAMDigitalMap) and other is referenced Endmember (SAMEndmember), the kappa coefficient was 0.9086. But SAMDigitalMap was more sensitive to discriminate than SAMEndmember relatively by omission error and commission error.

Keywords : Airborne Hyperspectral Imagery, urban small green space, green roof, Spectral Angle Mapper

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Exploring spatial augmented reality for SMART Education

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Abstract

This paper focuses on spatial augmented realities(AR) for learning and teaching that utilize AR techniques, which enable school pupils and teachers to interact with digital spatial information embedded within the physical environments. To explicit this research objective, at first, we reinterpret the spatial AR to explore educational perspectives and present the visual materials produced by QR code techniques. Secondly, the utilization of virtual globe and its teaching directions are proposed, easily connected with various thematic maps and enhancing its 3-D visualization effects in geography teaching and learning. Finally, educational potentials that the AR textbooks are produced as a supplementary digital content are discussed, which make the teaching and learning spatial relationship more positive and make possible to contain data connections with animation and simulation materials that are restricted in conventional textbooks. In conclusion, this paper strives to present several benefits of spatial AR techniques in education practices, which can offer visualization, immediacy, and simultaneity in cyber geographies. As pedagogical approach, this paper finds that spatial AR is primarily aligned with constructive teaching and learning theory as it positioned the school pupils within a real-world physical and social context while guiding and facilitating self-motivated learning processes such as authentic inquiry, active observation, and reciprocal teaching and learning in geographical problem solving and decision-making processes.

Keywords : Spatial Augmented Reality, Virtual Globe, Digital textbook content, SMART education

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Session_7

[AM] Spatial data modeling and mining (Chairman : Jin-Mu Choi)

[AM] Spatial data modeling and mining (Chairman : Min-Soo Kim)

Estimation of Near Surface Air Temperature with MODIS Land Surface Temperature Data Using Geostatistics*

HyuSeok Shin** · Eunmi Chang*** · Sungwook Hong****

Abstract

Near surface air temperature data which is one of the essential factor in hydrology, meteorology and climatology, have a great attention from various academic domains and societies. Meteorological observations, however, have high spatio-temporal constraints with the limits in number and distribution over the earth surface. As an alternative to overcome this, many researches have been performed to estimate the near surface temperature from the satellite image data for a regional scale or for a continental scale with a simple regression method. We applied various kriging methods such as ordinary kriging, universal Kriging, cokriging, regression kriging in order to find the optimal estimation method based on near surface air temperature data observed on AWS(automatic weather station) throughout 2010 (365days) in the South Korea, and MODIS land surface temperature(LST data: MOD11A1, 365 images. Due to high spatial heterogeneity, auxiliary data has been additionally analyzed such as land cover, DEM (digital elevation model) that can affect near surface air temperature. As the preceding analysis before estimation, we calculated RMSE (Root Mean Square Error) value about difference with whole (365 day) LST data and AWS data by season, and by landcover. The results show that the coefficient of variation (CV) of RMSE value by season is 0.86, but the value of CV by landcover is 0.00746. Seasonal differences between LST data and AWS data were greater than that by landcover. Seasonal RMSE value was found to be the lowest in winter (3.72). The results of linear regression analysis of between AWS data and LST data with auxiliary data show that the R Squared value is the highest in winter (0.818) in the case of summer is the lowest (0.078). Seasonal differences, therefore, were shown to very significantly. Based on these results, various kriging techniques were performed to estimate the surface temperature. And the results of cross-validation that can judge the accuracy of each kriging method show that value of universal kriging and ordinary kriging is 1.71, and the value of cokriging and regression kriging is 1.848, 1.630 respectively. Estimation by regression kriging method proved to have the highest accuracy among the kriging methods.

keywords : near surface air temperature, AWS(Automatic Weather Station), land surface temperature(LST) Moderate Resolution Imaging Spectroradiometer (MODIS) land surface

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A study on development of indoor space data model

Yunji Kim*

Abstract

Recently, studies for three dimensional data construction and application have performed focusing on outdoor space. However, interest in application service for indoor spatial information has been increased with development of the various and complex large building. In addition, people spend most time in indoor spaces, so indoor is also important part in the spatial information services as outdoor. Therefore, to provide spatial information service which can recognize indoor space and outdoor space as seamlessly continuous space, it is necessary to research on data construction and representation for indoor space. In this study, we propose 3D indoor space data model to represent geometric information of large building and to support location based service with the topology.

key words: three dimensional data, spatial information, indoor space data model

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Comparison of Volcanic Eruption Reports and Mapping

Eunkyung Kim* · Eunmi Chang* · Minhee Chung* · Kyeong Park*

Abstract

Earthquakes and volcanic eruptions are characterized by happening urgently in contrast with typhoons and flood by expected phenomena. Experts in volcanologists are very limited in several universities and institutions. We aim to understand the ways to share volcanic events in history and current situation. Spatial –temporal mapping techniques are essential for the volcanism, as the spot for the events are limited and have series of eruption. We reviewed the site for the volcanic experts' activities and found how our efforts could be differentiated from the previous sites. Database for the volcanic events are serviced by online communities and are printed out as a book. We compared the sites in the various aspects such as purposes, correspondence, depth, records, openness, accessibility, credibility. On the other hand, thematic map for volcanic disaster mapping technologies are also reviewed in the different purposes. Different organizations which do not have cartographers have followed general rules in cartography. Volcanic ash diffusion model and remotely sensed data are combined in various ways. Theoretical and Practical approaches were designed for the better portrayal and quick and clear decision support. In conclusion, volcanic eruption database and mapping process are tightly related but the different combination technologies should be taken for each purpose: a general education purpose, a disaster response purpose, an academic purpose,

Keywords : Volcanic Eruption Reports and Mapping

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Searching Temporal Changes in Time-series Polygon Data

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Abstract

This paper tried to extract temporal changes in time-series polygon data such as land use and political boundary. The new method requires three steps. First, overlay operation is used to merge all polygon layers. In the result data, each polygon has a time series attribute columns that is a temporal sequence of the attribute of the polygon. Second, similarities of sequences are measured using Sequence Alignment Method (SAM). Then, sequences are grouped using Ward clustering algorithm based on the similarity. The results of this novel change detection method can show the locations of a specified sequence queried. Therefore, the new change detection method in this study can be used for detecting various types of spatio-temporal processes.

Keywords : Overlay, Change detection, SAM, Clustering

Spatial Distribution Characteristics of Influentials by Categories in Location Based Social Network Services

Lee, Youngmin*, Park Woojin, Yu, Kiyun*****

Abstract

Microblogging services such as Twitter have garnered a great deal of attention all over the world. In particular, with the development of mobile devices and location positioning technology, people can share their status with geographic location. Accordingly, it is possible to understand how people are thinking about a certain topic in a given time and place. In this work, we aim to extract influentials about various social issues and compare spatial distribution characteristics of them via geotagged Twitter data. To this end, we have collected geotagged tweets in Seoul for a month. Moreover, we established 4 categories about the tweets and assigned 3 hot keywords issued during data collection period. Finally, we calculated exposure index to determine the influentials by categories and then selected the administrative dongs with top 5 percent of the exposure index per man. Afterward overlapped areas are extracted in each category. As a result, the spatial distribution patterns of influentials are similar in each category and dissimilar between categories.

Keywords : Spatial Distribution, Influentials, Location Based Social Network Service, Twitter

1. Introduction

With the development of mobile devices and location positioning technology, people are able to share their status along with current geographic location using location based social network services such as Twitter. Accordingly, it is possible to understand how people are thinking about a certain topic in a given time and place.

In the light of traditional geographical information systems, this trend of location based social networks promises an uncharted and profitable realm where we explore several sophisticated socio-geographical phenomena(Lee and Sumiya, 2010).

In this work, we aim to extract influentials about various social issues and compare spatial distribution characteristics of them via geotagged Twitter massages(called tweets).

2. Experiments and Results

We have collected 168,040 geotagged tweets in Seoul city for a month(2013.08.05 ~ 2013.09.05) using Twitter's open API. Unit of analysis is 423 administrative dongs of Seoul. Moreover, we established 4 categories about the tweets which are politics, economy, IT, and entertainment with reference to existing classification system of newsmedia. Then we assigned 3 hot keywords issued during

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data collection period to each category(Table 1).

Table 43. Hot Keywords by Categories

Politics	Economy	IT	Entertainment
NIS	Tax	Iphone	Exo
Park Geun-hye	Four Major River	Twitter	Idol Star Track and Field Championships
Democratic Party	Electric Power Shortage	Facebook	Snowpiercer

We calculated the exposure index(EI) to determine the influential people by categories using the Eq. (1).

EI = user's number of followers + retweet user's number of followers + tweet's number of bookmarks (1)

One important thing to notice is that the index is easily influenced by number of population. Consequently, we summed the EI and divided by number of population in administrative dongs.

Finally, we selected the administrative dongs with top 5 percent of EI per man. Then overlapped areas are extracted in each category(Table 2 ~ 5).

Table 44. Extracted Areas in Politics Field

Gu	Administrative Dong	EI per man
Jung-gu	Sogong-dong	913.131868
Jung-gu	Myeong-dong	629.772455
Yongsan-gu	Namyeong-dong	212.89104
Yangcheon-gu	Sinjeong 4-dong	138.698949

Table 45. Extracted Areas in Economy Field

Gu	Administrative Dong	EI per man
Eunpyeong-gu	Eungam 1-dong	1080.755351
Yeongdeungpo-gu	Yeoui-dong	367.658643
Seocho-gu	Seocho 3-dong	249.183303
Jongno-gu	Sungin 1-dong	65.224778
Dongjak-g	Heukseok-dong	55.439973
Seongbuk-gu	Jeongneung 4-dong	53.599122

Table 46. Extracted Areas in IT Field

Gu	Administrative Dong	EI per man
Jongno-gu	Sajik-dong	5.441389

Table 47. Extracted Areas in Entertainment Field

Gu	Administrative Dong	EI per man
Seodaemun-gu	Sinchon-dong	3.497542

As a result, the spatial distribution patterns of influentials are similar in each category and dissimilar between categories.

3. Conclusion

In this paper, we focus on comparing the spatial distribution of influentials by categories. Resultingly, spatial distribution characteristics are similar in each category and dissimilar between categories.

We will further explore the factors affecting spatial distribution pattern using regression analysis.

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Related Place Recommendation for Pedestrian Location based services Using Laplacian Embedding

Cho, Saerim* · Huh, Yong · Yu, Kiyun*****

Abstract

In this paper, we propose a related place recommendation method for pedestrian in an unfamiliar area. We applied a Laplacian embedding by combining the elements of the spatial distances of visited places and visiting history of users in the garosugil, sinsadong, gangnamgu, seoul. As a result, we gave the embedded coordinates to 268 places. To evaluate a proposed method, we used visiting history of top 23 people who have high visiting frequency. We compared the number to become an actual visit in terms of proposed method and foursquare method for 10 target places. We verified excellence of the proposed method with a t-test result(0.028 p-value, 95% significance level).

Keywords : Related places recommendation, Laplacian embedding

1. Introduction

Location-based services such as Foursquare provide place recommendation service by using visiting history of user(Mao Ye et al, 2010). However, since the recommendation used the friend relationship of the user, it is not suitable when visiting histories of friends are not enough in an unfamiliar area such as travel sites. Also, it is possible for people to know famous places through website or tourguide book.

Therefore, it may be more meaningful for pedestrian to recommend related places of target place. Accordingly, we propose a method to recommend places for pedestrian related with target place in an unfamiliar area.

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There is a relation between places that users visit in a high frequency. Also, there are limitations of mobility for pedestrian. So, we considered the distance between places for an proposed method.

2. recommendation method

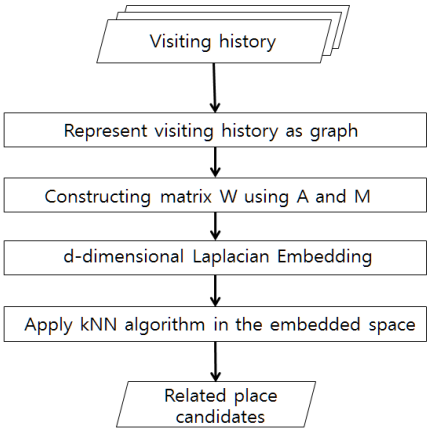

Fig 37. Process of searching for related place candidates

The process of searching for related place candidates is shown in Figure 1. Firstly, we represent visiting history of who visited anywhere as a graph structure. The user set and visited places set become nodes of the graph and number of visits is the weight of the

edges in the graph. Then, we get the adjacency matrix A for this graph and the distance matrix M obtained by measuring the Manhattan distance between visited places to construct the matrix W by combining them(eq 1).

$$W=\begin{bmatrix} 0 & A \\ A^T & M \end{bmatrix} \quad (1)$$

we implemented Laplacian embedding by finding f to satisfy eq 2 (Huh, Yong, 2011). It can embed close places that similar users visit frequently nearby in the embedded space.

$$\min_f (f(v_i)-f(v_j))^2 w_{ij} \quad (f: R^N \rightarrow R^d) \quad (2)$$

(Here, v_i, v_j are nodes corresponding the places of ith and jth of the matrix W. f is a function converting N-dimension to d-dimension)

After implementing Laplacian embedding, each place has d-dimensional embedded coordinates. So, it is possible to search for nearest places related with target place by applying kNN algorithm.

3. Result and Conclusion

We used 884 visiting histories of 437 LBS users in garosugil, sinsadong, gangnamgu, seoul. We gave the embedded coordinates to 268 places.

To evaluate the result, we searched for 9 related place candidates for 10 target places using proposed method. Then, we compared proposed method and Foursquare in terms of the number of actual visiting of top 23 people who have high visiting frequency(table 1). We verified excellence of proposed method with a result of t-test(0.028 p-value, 95% significance level)

Meanwhile, if we can find the relationship between spatial distance and visiting history in the future work, it is expected to obtain more improved recommendation results.

Acknowledgements

This research was supported by a grant(11 High-Tech Urban G10) from Architecture & Urban Development Research Program funded by Ministry of Land, Infrastructure and Transport of Korean government.

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Table 1. Number of actual visiting of proposed method and Foursquare of top 23 people.

POI_Name	가로수길	TONE studio	STAR BUCKS1	STAR BUCKS2	오빠닭	시골밥상	Dal	블랙스미스 신사역점	Beans Bins2	TOM N TOMS COFFEE1
Proposed mathod	15	14	15	4	6	18	6	6	11	8
Foursquare	18	0	6	6	0	5	3	1	0	8

A Study on Extraction of Pedestrian Landmarks using Building Attribute Data

Kim, Jinhyeong*, Kim, Jiyoung, Lee, Sang-Il***, Yu, Kiyun****

Abstract

Recently, due to the development of Internet and smart phone, interest in pedestrian navigation is being increased as various spatial information services are provided. Landmarks are important in pedestrian navigation and the researches on extracting landmark have been progressed. However, preceding researches, which assumed that the quality of landmark's characteristics are relative, have a limit defining the landmark as the most salient building in the neighborhood. Also, they used car navigation network instead of pedestrian network to extract landmarks for pedestrian. To overcome this limit, this paper considers not only relative attributes but also inherent attributes and uses pedestrian network. This paper proposes extracting landmarks method using PCA. The results confirm that appropriate landmarks for pedestrian navigation can be extracted using proposed method.

Keywords : Landmark, Pedestrian, Navigation, PCA(Principal Component Analyysis), Network Voronoi Diagram

1. Introduction

Landmarks play an important role in the process of way finding and route direction, because pedestrian uses landmarks when they are recognizing space or communicating about routes. Landmarks can present an anchor for understanding local spatial relations and help pedestrian to organize space and orientation(Sorrows and Hirtle, 1999).

Preceding researches on extracting pedestrian landmarks have been progressed. Raubal et al(2002). defined saliency using visual, semantic and structural attributes and extracted landmarks by statistical tests. Elias(2003) proposed method of extracting landmarks from building data using ID3 and cobweb. Rho et al(2011). defined relative and absolute attributes and extracted landmarks using k-means clustering.

However, these papers have a limit that they defined landmark as the most salient building in the neighborhood, because pedestrian recognizes buildings not only in the real space but also in a digital map in electric devices. Also, these researches did not use pedestrian network so that extracted landmarks are not enough to give a direction to pedestrians. Therefore, it is needed to consider inherent attributes of buildings to attract more visual attention in the electric devices and to use pedestrian network. In this respect, this research defines local variables and inherent variables and extracts landmarks using pedestrian network.

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2. Methodology

In this research, the process of extracting landmarks consists of choice point extraction, landmark candidate group selection, calculation of attribute values, dimension reduction, and analysis and extraction of landmarks. We apply this process to KAIS building data of the part of Gwanak-gu, seoul with pedestrian network.

Choice point is defined as a node linked to more than 3 links(Rho et al., 2009). Additionally, in the intersection of pedestrian networks, a node linked to more than 2 links can also be a choice point.

Landmark candidate group is selected using isovist polygon and network voronoi diagram(NVD). A single isovist is the volume of space visible from a given point in space. NVD is a generalized planar voronoi diagram by replacing the plane with network space and the Euclidean distance with distances defined on a network(Okabe, 2008).

This paper defines local and inherent variables. Inherent variables are defines as inherent attributes of a building. Local variables are defined as the difference of the inherent attribute of building and the median of landmark candidate group.

Using PCA, the dimension is reduced to PC1 and PC2. PC1 represents a composite of inherent variables and PC2 represents a composite of local variables.

Landmarks are extracted based on the PCA results. We define landmarks as the building with the biggest sum of PC1 and PC2 in the candidate group(shown in Figure 1).

Figure 1. Extracted Landmarks(Black)

3. Conclusion

The results confirm that appropriate landmarks for pedestrian navigation can be extracted using proposed method. Further research should be conducted for landmark-based route direction.

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Session_8

[AM] NSDI Policy and Planning of 7 Countries

08:30-14:00 (Room327C)	A-8-1	Cambodia NSDI Policy and Planning	Chharom Chin,Narith Ro	Cambodia
	A-8-2	MongoliaNSDIPolicyandPlanning	Chimeddorj Byambasuren, Bayarmaa Enkhtur	Mongolia
	A-8-3	Kyrgyzstan NSDI Policy and Planning	Vyacheslav Savin, Evgenii Shibkov	Kyrgyzstan
	A-8-4	Kazakhstan NSDI Policy and Planning	Kuat Sagadiyev, Dana Meirzhan	Kazakhstan
	A-8-5	Uzbekistan NSDI Policy and Planning	AlisherYakubov,InaraAbdurakhmanova	Uzbekistan
	A-8-6	Philippines NSDI Policy and Planning	John S.F. Fabic, Arlene B. Brillantes	Philippines
	A-8-7	Sri Lanka NSDI Policy and Planning	Pushpa Gamage Panagamuwa Gamage, Wasantha Ranasinghe Hewa Walimunige	Sri Lanka

POSTER I

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	p-2	A Route Guide System Using State Information of POIs	p.134
	p-3	The Design of Dynamic ENC Viewer	p.135
	p-4	Geocoding Methods and Estimations of Hedonic Price Model	p.136
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Automatic change detection between digital maps using the divide and conquer technique

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Abstract

This study proposes a change detection method between digital maps based on a network division technique. The proposed method generates polygons surrounded by links of the original network dataset, and detects corresponding polygon group pairs using a intersection-based graph clustering. Then corresponding matching pairs are obtained from the polygon group pairs. To perform the geometric correction between them, the Iterative Closest Points algorithm is applied to the nodes of each corresponding polygons in sub-matching pair. After that, the similarity measure analysis is applied to detect changes between corresponding objects in the obtained matching pairs. Finally, we apply the proposed method to the real dataset and assess their feasibility. I

Keywords : Change detection, Digital maps, Intersection-based graph clustering, Iterative Closest Point

Acknowledgements

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A Route Guide System Using State Information of POIs

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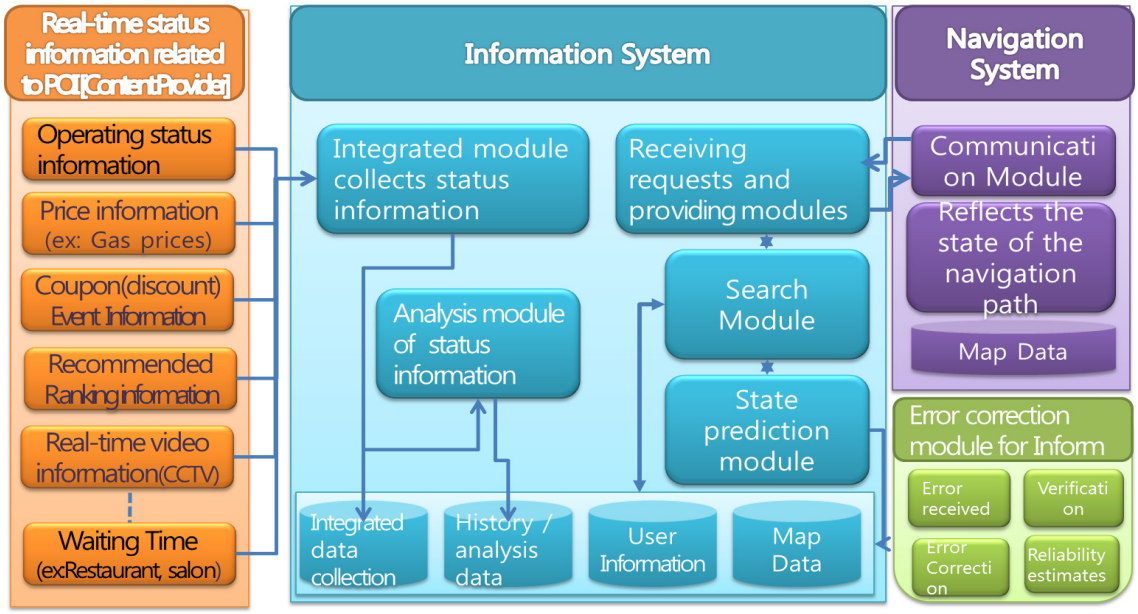
Abstract

As well known in the art, with recent advances in mobile communication technologies, there are widely used a route guide system providing navigation services for estimating an optimal route and/or the shortest route from a current position at which a vehicle is located to a desired destination or point of interest (POI), and for providing the estimated route to a user in a form of an image and voice. However, the above-mentioned POI tracking in the route guide system does not consider dynamic state information of the POI. For example, when a user searches for a POI such as a hospital while on holiday and/or late at night, the user desires to search for a hospital capable of providing clinical and diagnostic services even on holiday and/or late at night. It provides only a name and a location of the POI, which is static information of the POI. Therefore, the route guide system cannot provide information of the POI useful to the user.

In the paper, we devised a navigation device, which includes, a map data database for storing map data, a route searching unit for applying state information of one or more candidate POIs to the map data in the map data database to produce routes to the respective POIs; and output unit for visually providing the routes to guide along the routes.

Through the evaluation, the result showed that our system has satisfied requirements in user friendliness

KEY WORDS: Navigation, POI, Mobile



Acknowledgements

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The Design of Dynamic ENC Viewer

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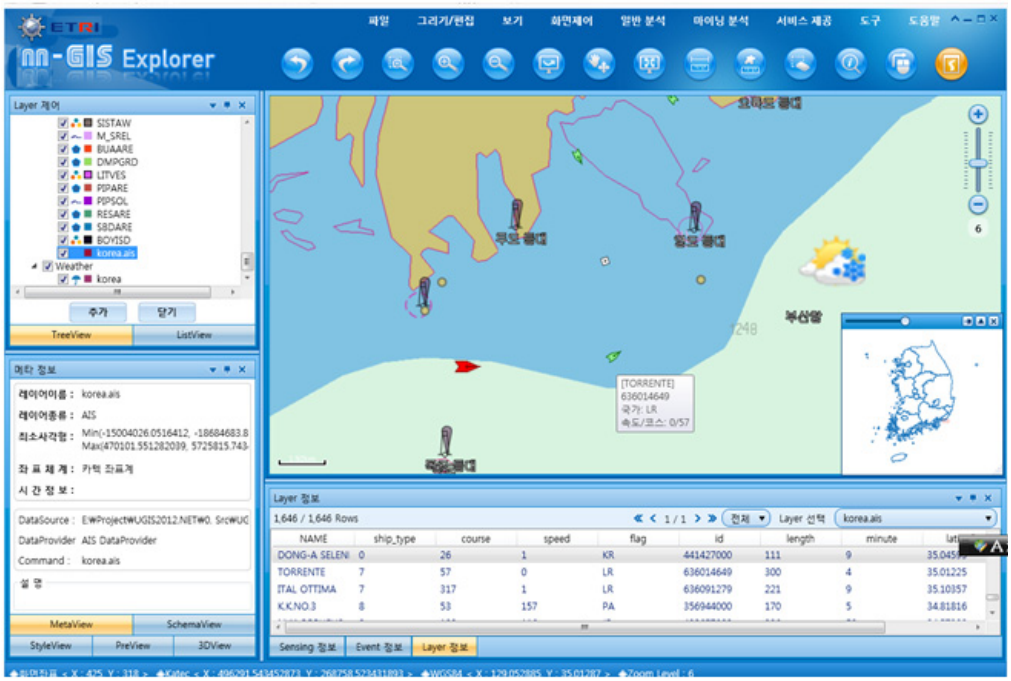
Abstract

The importance of navigation in sea is highlighted by the International Maritime Organization (IMO) in the "Safety Of Life at Sea"(SOLAS) regulation. Electronic Navigational Chart (ENC) is an electronic chart which includes all kinds of information related with nautical chart for Navigation. Various organizations are collecting similar information and storing data in different formats.

In this paper, we suggest a Dynamic ENC Viewer System. It should be able to integrate and manage various kinds of maritime data such as ENC (Electronic Nautical Chart) data, AIS (Automatic Identification System) data, maritime weather forecast, and so on

KEY WORDS: ENC, ECDIS, IMO, AIS, Weather



Acknowledgements

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Geocoding Methods and Estimations of Hedonic Price Model

Jihyun kim[1)] · Chul sohn[2)]

Abstract

Major portal sites such as Naver (www.naver.com), Daum (www.daum.net), and Google (www.google.com) provide internet map services which show the location of major POIs. Also, Korean GIS companies such as BizMap Pro and Openmate (www.openmate.co.kr) provide Geocoding services. In this study, we used the geographical or projected coordinates information obtained from these portal sites and companies to represents the locations of apartment complexes in the Guro-Gu of Seoul and measured location variables for estimating hedonic price models. Then we estimated hedonic price models to see whether we can observe the similar estimation results for the coefficients of non-location variables and location variables measured based on the location information from five different sources. The results showed that the sizes of estimated coefficients are basically similar when the location variables are measured in continuous manner. However, the results also showed that the sizes of the estimated coefficients can be differentiated if the location variables are included as discrete manner such as using dummy variables for representing distance bands from amenity or disamenity sources. These results imply that although the location information from these five sources is similar, small location differences reflected in the size of estimated coefficients can be exaggerated according to the way how the distance variables are defined.

Basic Research for Introduction of National Grid Framework in the Republic of Korea

Park, Ho Joon* · Kim, Jae Myeong** · Jeong, In Hun*** · Choi, Yun Soo****

Abstract

Generated grid data in many fields of environment, weather, disaster, hydrography, safety management, etc. that utilize in various analytic works in Korea. But national standard is absence, in management and production of grid data, so the effectiveness of data application is decline that not to connection between data which produced in many institutions. To solve these constraints fundamentally, in this research, we have to define national grid framework to arrange standard of grid data which produced our country. And we suggest standard of national grid framework by grid size, division methods through the in-depth interview for domestic experts and foreign country's present situation. Also we define attribute information, depending on grid size which suggested national grid framework, based on various constructed national geospatial data and suggest future development direction to production·management·distribution and application the national grid data for introduction of national grid framework.

Keywords : Grid data, National Grid Framework, Standard

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A Design Proposal for Economical Autopiloted UAVs for Acquiring Geospatial Information(I)

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Abstract

It is known that geo-spatial data obtained by using RC UAVs are difficult to utilize in a variety of ways, due to difficulties in recruiting skilled pilots, takeoff and landing restrictions, stability issues, and high research and development costs. However, recent advances in wireless networks and microelectromechanical systems have led to the vigorous development of low-cost, auto piloted UAVs. This study will investigate the features and trends in the development of UAVs, and discuss the considerations that should be made when designing autopiloted UAVs to collect geo-spatial data.

Keywords : Autopilot system, UAV, Microelectromechanical system, Geo-spatial data

1. Introduction

The type of UAV investigated in this study is micro UAVs that have a payload less than 5 kg [2]. Ultimately, autopiloted UAVs must meet the following three conditions to acquire geospatial information successfully: 1) real-time monitoring, 2) point click pre-plan, 3) waypoint route 4) auto takeoff 5) low cost

This study attempts to examine the characteristics of different autopiloted UAVs that are actively being developed, and address some of the points to consider when designing autopiloted UAVs for acquiring geospatial information.

2. Platform

There are many types of UAVs. In the past, the most popular fixed wing aircraft were propeller planes, while the most commonly used rotors used to be helicopters. Nowadays, Fixed delta-type wing aircraft and multicopters with more than 4 propellers are mainly being used. The specifications of the most popular aircraft are demonstrated as Table 1.

The most popular fixed wing aircraft are Delta's fixed-wing aircraft, as they are less expensive than the conventional models and easier to takeoff and land. Moreover, instead of helicopters, multicopters, a type of rotorcraft, are being developed and used more widely now, since they have overcome the problems of vertical vibration and limited payload capacity. Their payload capacity is determined by
the number of rotors (4 to 8) and the size of propellers. One drawback with this type of rotorcraft is that their flight time is relatively short (between 10 to 20 minutes), as they use recharge batteries instead of an engine.

Table 1 Classifications and Specifications of UAVs examples

	Fixed wing		Rotor			
Name	Fixed wing	Delta wing	Helicopter	Quadrocopter	Hexacopter	Octocopter
Model	YT-International	AggieAir	Yahama RMAX	XAircraft X650	R&D Tech.	Cinestar 8
Time		15min	60min	14min	12-22min	15min
Payload	N/A	450g	30kg	1.6kg	1.3kg	5-8kg

3. Auto pilot system

One of the reasons UAVs have not been widely used for acquiring geospatial information is that they are not easy to control. However, with the development of UAV navigation and control technology, there are many autopilot hardware and software

on the market. A typical automatic navigation and control system basically has a GPS and INS in it, and should be a mechatronics system that is fully integrated with an altimeter, accelerometer, path adjustment sensor, and propulsion sensor. Figure 1 illustrates the architecture of an autopilot system [1].

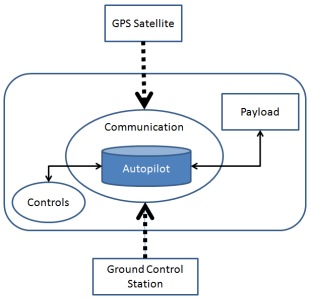


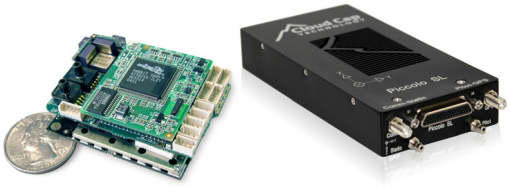
Figure 1 UAV structure

There are three problems with developing a mini UAV-system integration, planning waypoints and image registration. To solve these problems, it is essential to select appropriate hardware, and develop software suitable for the chosen hardware. The hardware and software that are required to develop an autopiloted UAV are as follows:

Table 2 HW and SW for autopiloted UAV

Hardware	Software
• GPS receiver • Rate gyro • Accelerometer • Magnetometer • Pressure censor • Ultrasonic sensor • Image sensor	• Pitch attitude • Altitude • Speed • takeoff and landing • Roll-angle • Turn coordination • Heading

Powerful autopilot software can help create a flawless fully automatic flight system. Most commercial and research autopilot systems favor GPS-based waypoints navigation [3]. However, the path-following flying can be separated into different layers. The inner loop controls attitudes in roll and pitch, while the outer loop control flight paths and waypoints tracking in heading and altitude [3]. The most recently used autopilot systems include Procerus Kestrel, Piccolo LT autopilot, and All_ppz_autopilots_Booz. Figure 2 below demonstrates the configuration of an autopiloted UAV. This autopiloted UAV is comprised of a ground data link, image link and safety link, and they communicate through a 900MHz modem, 2.4GHz Wifi, and 75MHz RC, respectively.



(a)Procerus Kestrel (b)Piccolo LT

Figure 2 Autopilot for UAV

4. Conclusion

This study has investigated the characteristics of different UAVs and recent trends in the development of autopiloted UAVs. As hardware are becoming smaller and their prices are expected to fall, UAVs will be more widely used. Delta wing UAVs will be more effective in developing an economical, low or medium-resolution UAV, whilst hexacopters or octacopters are more recommendable for acquiring high-resolution images, since they have a heavier payload capacity. In particular, in order to replace a high-end autopilot system, instead of cheap circuits, robust software should be developed carefully.

Acknowledgement

The present research has been supported by a 2013 Overseas research grant of the Kongju National University.

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Analyzing Spatio-Temporal Activity Patterns of Summer Season Beach Tourists in the Gangneung Region using Time Geography Framework and GIS

Chul Sohn · Sunjun Kim · Jihyun Kim · Minho Kim

Abstract

In the summer of 2013, a trip dairy survey for beach tourists who visited the city of Gangneung was conducted to analyze their spatio-temporal activity patterns. In the survey, respondent' time and space use pattern was recorded during his/her stay in the Gangneung. The Gangneung is famous for her scenic beauty of the famous Gyoungpo beach and her coastal line. Also the Gangneung will host 2018 Winter Olympic Game. Most of the 2018 Winter Olympic ice games will be held in the Gangneung and most of snow games will be held in the county of Pyoungchang, which is the host city for 2018 Winter Olympic Game. Because the regional economy of the Gangneung predominantly depends on the revenues from the summer time tourists who visit the famous beach, it is very important to know which tourist attractions are relatively frequently visited and when the tourist attractions are approached by beach tourists. All the information about the tourists' spatio-temporal activities can be used to design more attractive and convenient tourist services by tourism industry and local government. We analyzed the spatio-temporal activity database of tourists constructed from the survey using "Extended Time-Geographic Framework Tools Extension for ArcGIS 10.0, http://web.utk.edu/~sshaw/NSF-Project-Website/download.htm" to investigate the tourist activity pattern in time geography framework. We paid special attention to differences in spatio-temporal activity patterns among different age groups.

Keywords : Tourist Activity Analysis, Space-Time Path, GIS, 3D Geovisualization

Acknowledgement

This research was supported by the 2013 Gang Won Sea Grant program of the Ministry of Oceans and Fisheries in Korea.

Evaluation of air monitoring stations based on Comprehensive Air-quality Index and Spatial statistical method

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Abstract

As an urbanization is in progress, there is a growing need for air quality management with the increasing air pollutant emission. Air quality monitoring stations are operated and managed in the country to this, but existing stations which couldn't be considered topography and meteorological characteristics have a problem on the arrangement. For additional installation, the arrangement using better scientific methods is needed. In this study, the propriety of arrangement on stations was evaluated after air pollution concentration maps are made by comprehensive air-quality index which reflect effects on the body and pollution level which person feel about 5 air pollutants(SO2, CO, NO2, O3, PM10) and air pollution emission map made by the emission data using kriging interpolation method. As a result, after evaluation and putting together, appropriate locations are selected for additional assignment on the basis of yearly, seasonal and daily data. The selection of more correct location would be possible if natural environmental condition is considered.

Keyword : Air quality monitoring station, CAI(Comprehensive Air-quality Index), Kriging

Acknowledgement

This work was researched by the supporting project to educate GIS experts

Building Geospatial Social Service Platform and Implementation for Spatially Enabled Societies*

Won Wook Choi, Sang Ki Hong, Jong Wook Ahn

Abstract

This research consists of four phases to build geospatial social service platform (GSSP) and implementation strategies for spatially enabled societies. The research investigates and formulates geospatial social service framework to use a reference model for GSSP. The research developed three use cases to demonstrate enable geospatial social service applications for participation and collaboration among public, private, and citizens. The research goal is to build geospatial social service platform(GSSP) for public-private sector's participation and collaboration to increase recency, catalyze variety, and discover usefulness of geospatial data based on Korean NSDI and public open data(Kim 2011). The research objective is to make framework for GSSP, build use case for GSSP to support participation and collaboration among public, private, and citizens, and make GSSP implementation plan for Korean geospatial industry. To make interface framework and system architecture framework of GSSP, evolution of web interface frameworks are investigated. To take into consideration the function of credibility, which is important in VGI and UGC application, 9C Framework is applied for interface elements of GSSP. Each interface element of 9C framework is reinterpreted and customized for GSSP(Cerbova 2012). System architecture of GSSP is broken down into several categories to distribute workload efficiently between the server and the client. The system architecture is consists of 3 tier: data tier, logical tier (also called middle tier), and presentation tier(Fu 2011). Each tier has its own role for geospatial web service interface of GSSP. The formulated framework is used to take into account an integrated view between interface elements of 9C framework and components of system architecture. Design strategies are formulated by the framework for application development of three use cases on GSSP: geospatial web services for rough map maker, geospatial web service for citizen participation in urban planning, and geospatial web service for citizen participation in indoor rough map. Following is the summary of the service description for the three use cases. The geospatial web service for rough map maker provides non-professional citizen with self-authoring tool to produce 3D rough map on 3D WMS. The rough map citizens produce can be easily distributed to their e-community through social media. With geospatial web service for citizen participation in urban planning, public agency for urban development can provide citizen with development information and 3D model of urban planning alternative on GSSP. The service helps citizens to contribute to create or customize and publish their own 3D alternatives for urban planning participation. With self-authoring tool for 3D indoor rough mapping service, non-professional citizens can produce 3D indoor rough map of their building on GSSP. With the service, the citizens can help visitors to navigate indoor environment by rapid access of QR code and social media.

Acknowledgement

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Method for Extracting Large-scale Residential Area in Urban Area from Satellite Image

Kangsan LEE

Department of Geography, Kyung Hee University

Abstract

In this research poster, method for extracting large-scale residential building, especially apartment, from satellite image is presented. Using the Landsat, KOMPSET and Airborne image, this research analyses Nowon-gu residential area. Verifying the result, extracted by Feature Analysis from ArcGIS, with the numerical map and it can compare large-scale building like apartment among the different kind of data. Also, Almost of urban residential area of South Korea is composed of apartment that is living place of a large proportion of the citizen. It will be expected that result of this research poster can be used in basic approaches for the further research that estimating population distribution without census data.

KEY WORDS : Building extraction, laser scanning, residential area

A Study on the administration improvement of Performance Test in Public Survey

Lee, Ki Sung* · Yoon, Ha Soo** · Yun, Hye won*** · Choi, Yun Soo****

Abstract

In this research, we analyze the general status for derive reasonable administration improvement planning of performance evaluation system of the public survey and according to result, we suggest reasonable plans. we induce expansion of service and simplify the performance evaluation task of public survey through the improvement of detail points like an evaluation period, evaluation system about administration to performance evaluation of public survey. For this proposal, we classify general status of performance evaluation of public survey which operated currently, and check the need to reinforcement of functions which performance evaluation of public survey through conversion type about the number of evaluation, the cost of evaluation. Also we suggest reasonable administration improvement plan for performance evaluation task of public survey and establish the plans to improve rationalization and efficiency of performance evaluation task of public survey.

Keywords : administration improvement, Public Survey

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This work was researched by the supporting project to educate GIS experts

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Cloud service in a tablet environment: 3D geo-based image blending

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Abstract

Recently, a variety of mobile smart devices has become a key element of industrial development. Interest on mobile cloud service, which means the combination of mobile platform and cloud computing technologies, is growing. However, cloud-based geospatial mobile application service development is internationally in the early stages of research and technology development still. In Korea, cloud computing platforms are provided by communication companies such as SKT or KT. As the cloud IaaS (Infrastructure as a Service), U Cloud biz of KT was used in this study. The aim of the study is to develop a test case of Tablet mobile cloud service supporting capabilities of three-dimensional visualization and fusion analysis with the geo-spatial data from multiple sources and in various formats. Technically, blending algorithm of the HTML5 WebGL was applied. In testing service of implementation product, KOMPSAT-2 and DUBAISAT-1, such as optical satellite image data, and ALOS PALSAR as SAR image were used with gridded data sets obtained from radioactivity measurement data of the Korea Institute of Nuclear Safety (KINS) and real-time air quality measurements of Air Korea managed by Korea Environment Corporation. It is expected that this work contributes to development of new applications in the geo-spatial field.

Design and Implementation of Sensor Sharing System based on SWE and NoSQL Technology

Chung-ho Lee · In Sung Jang · Min Soo Kim · Sung Woong Shin

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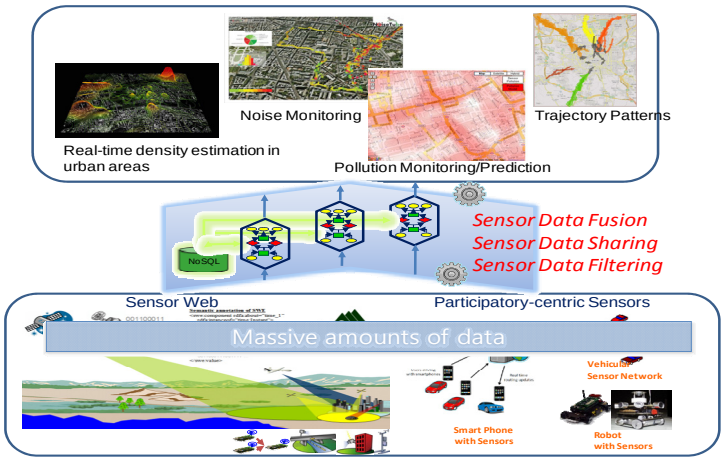
Abstract

In recent years, sensor networks are becoming increasingly pervasive. Ranging from camera or weather sensors to report live weather conditions to loop-sensor networks to monitor traffic on highways, these sensors generate large volumes of sensor data. These heterogeneous and tremendous volumes of sensor data can be source of useful information by filtering, grouping, and fusion of them. The SANY's SensorSA, OGC's SWE, GNU's GSN, and Microsoft Inc.'s SenseWeb are sensor sharing platform proposed to provide integrate large-scale sensor networks. And these systems need for efficient measurement data storage and retrieval.

In this paper we design and implement new sensor sharing system, called GeosensorBase, based on SWE and NoSQL technology. Our system provides scalable infrastructure for integrating heterogeneous sensor networks. And it provides sensor fusion service which generates useful information. Additionally it satisfies the requirement of flexible storage with a NoSQL database as a backend.



Keywords : SWE, Sensor Sharing, NoSQL

Acknowledgements

This research was supported by a grant (13도시건축A02) from Spatial Information Open Platform Infra Technology Development Research Project funded by Ministry of Land, Infrastructure and Transport government.

Analysis of the Optimal Installation Site of the Fuel-Cut Driving Section for Low-Carbon Green Road

Joo, Seung Min* · Choi, Jin Ho** · Um, Jung Sup***

Abstract

Recently, the mileage of vehicles is coming to the fore as an important issue, due to high price of oil and environmental regulations. From this point of view, a lot of automobile makers are studying plans to improve the mileage by improving combustion systems, developing light-weight vehicles and reducing power losses including friction. Physically, improving the fuel efficiency of the internal combustion engine requires high additional expenses mostly, and brings an unsatisfactory effect. The mileage of vehicles depends on driving habits of drivers and in recent days, eco-driving movement is being activated using this characteristic. The effect of eco-driving has already been proved by many researches. When driver stops using an accelerator pedal at over a certain level of rpm, fuel cut is generated, and this time, it is possible to drive without supplying fuel to the engine. Especially, this effect is maximized during inertial exercise on a gradient. This study set the optimal fuel-cut driving section on the actual road, by extracting road environment variables to maximize fuel-cut driving, and using GIS.

Keywords : Fuel cut, Eco Driving, Road grade, Mileage, Inertial exercise, GIS

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Using Hydrology Model to Estimate Carbon Outflow from Forest Ecosystem to the Ocean

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Kwak, Doo-Ahn**** · Kim, Moonil***** · Song, Yongho******

Abstract

According to IPCC 3rd Assessment Report, amount of carbon which outflows from terrestrial ecosystem to the ocean shows its importance in terms of global equilibrium. In order to identify long-term relationship between terrestrial carbon and ocean carbon, model-based carbon circulation should be studied. For the first step, our research was performed to find out watershed-based outflowing from terrestrial carbon to the ocean using hydrology model. As the methodology, 1) small-scale watersheds are created using Digital Elevation Model (DEM) in South Korea, 2) total runoff was calculated from precipitation data, and 3) outflowing Dissolved Organic Carbon (DOC) was calculated using the relationship between total runoff and Soil Carbon Storage (SCS).

Climate data from 1999 to 2008 was utilized to simulate runoff using SWAT model. Surface runoff, lateral flow, ground water, Potential evapotranspiration (PET), Actual evapotranspiration (ET) and total runoff were calculated. As a result, amount of surface runoff occupied the most part of outflow. Temporally, 2003 and 2007 showed the most high precipitation and outflow. Using these outflow data, Dissolved Organic Carbon (DOC) can be estimated with SCS which is simulated by ecosystem model because there is strong relationship between SCS and outflow. Finally, annual DOC outflow was calculated.

Based on our researches, we are going to develop dynamic model for tracing the moving route of DOC in the further research.

Keywords : Carbon Monitoring System, SWAT, DOC, Outflow, Moving route of DOC.

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POSTER II

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Monitoring of Soil Erosion in Spanish Coast Using MODIS Images

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Abstract

The importance of the Gulf of Cadiz continental margin(SW Spain) lies in its proximity to the Strait of Gibraltar it is the place where the Atlantic Ocean and the Mediterranean Sea interchange their water masses. Also, continental shelves located in Gulf of Cádiz are considered as the transition zone between continents and open ocean. Thanks to its geographic advantage, Gulf of Cádiz can be supplied large amounts of the organic matter and nutrients from river systems. In this study, images of MODIS(Moderate Resolution Imaging Spectroradiometer) loaded on NASA's Aqua satellite and Terra satellite NASA were used to monitor the soil erosion about geographic important point. Images on November 12 and 13, 2012 were acquired by NASA when the soil erosion was occurred. And the shape of sediment was detected and the sediment area was calculated. Area calculation was used by ENVI that is satellite image processing program and image classification was used by maximum likelihood method. As a result of image classification, it was able to detect the shape change and time series area change about soil erosion. Henceforth, it would be able to analyze the soil erosion of the coast in detail if continuous monitoring is performed.

Keywords : Soil erosion, Image classification, MODIS image

The improvement of connecting structure for spatial object identification(SOID) system

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Abstract

The purpose of this study is to improve the system to manage the Spatial Object IDentification(SOID). SOID can be used to identify all of spatial objects uniquely and link one system with another system to use the connected spatial information on database in each system.

The system of SOID was introduced five years ago in Korean has the function to give the unique identification on a spatial object automatically. The system to manage SOID is currently developed for building objects and linked with spatial information systems installed on five institutions in public sector.

But the system doesn't connect with those systems which have to be linked well and they didn't use SOID in their system. It is due to the SOID system that has not typical structure to link with other system and connected with those systems on a case by case basis.

Therefore, in this research, we suggest the improved connecting structure for SOID system making link with other system typically and smoothly. In order to achieve the purpose, we classified the standardized structure accessing to SOID system for analyzing the contact type to SOID system from outer system.

The structure can make SOID system link with various systems in pre-designed method. And it may enhance the usability of SOID and can make renewal update of the object identification automatically.

Key words : Spatial object identification, SOID, Spatial information system

Estimation of Topographic Factors Using the Digital Topographic Map

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Abstract

Over 70% of the land in Korea consist of mountainous areas, and with the expansion of cities, a lot of buildings have been constructed in mountainous areas. Also, they are situated in big and small mountains, and hills in cities, because many of cities were formed in basins. Wind velocity increases in the ridge or top of mountain, hill, slope and cliff, due to local topography, and this phenomenon has been proved by actual measurements and experiments. Especially, it is known that wind velocity in the top of mountain, hill and slope increases 1.5~2.0 times bigger than in the plain.

For estimation of design wind speed of buildings, KBC 2009 demands to consider the increase of wind velocity affected by topography using topographic factors. As a proportion of wind speed in the mountain, hill or slope to wind speed in the plane, topographic factor is multiplied by basic wind speed for estimation of design wind speed. For topographic factors, irrational design wind speed could be estimated owing to designer's subjective setting of peak height which is a crucial variable used for estimation, when there are more than two mountains around the building, or there is no clear boundary of earth surface.

Therefore, this study presented how to estimate topographic factors rationally using the digital topographic map. It was possible to estimate rational topographic factors, even though there were more than two complex mountainous areas, or there were buildings on the hill, and it improved the irrational estimation caused by designer's subjective setting. Moreover, using the digital topographic map for estimation of topographic factors reduced time and expense required for it, compared to the conventional method which requires modeling and wind tunnel test. In conclusion, it is expected that the digital topographic map-based topographic factor estimation developed by this study would be used for rational wind-resistant design of buildings in future.

Keywords : Wind velocity, Land surface, Toprographic factor, GIS

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Following are results of a study on the "Leaders in Industry-university Cooperation" Project, supported by the Ministry of Education, Science & Technology(MEST)

Evaluation of Road's Horizontal Alignment Using the Digital Topographic Map

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Abstract

Currently, highways and national roads in Korea are being systematically managed, according to the road ledger or road management ledger, whereas local roads, city roads and county roads are not and especially, it isn't easy to see whether or not they meet the geometric structure criteria. Besides, many country roads and local roads are raised to local roads and national roads, respectively, and it is even common that they don't satisfy the geometric structure criteria of road. Also, it is demanded to obtain relatively accurate location information along the centerline of road and to estimate road's horizontal alignment design elements from this observational data, in order to get road's alignment design information in a broad area.

Accordingly, this research suggested an evaluation method of road's horizontal alignment using the digital topographic map, for managing roads systematically, preventing accidents and providing drivers with a pleasant driving environment. In this study, the centerline of road was extracted from the 1:5,000 digital topographic map with a relatively high location accuracy, and the horizontal curve radius was calculated using the extracted centerline.

As above, this study devised a method to calculate the horizontal curve radius using the 1:5,000 digital topographic map and to evaluate if the horizontal curve radius meets design speed. Using the devised method, an example analysis was performed in the Line 918 local road of Youngduk-gun, Gyeongbuk Province. As a result, 31 out of 47 curved sections(66%) violated the minimum curve radius, 130m which accorded with design speed, and 13 of them(28%) had a lower horizontal curve radius than 70m. Therefore, it was analyzed that the majority of the sections in the Line 918 local road didn't satisfy the minimum curve radius specified in the road structure and facility standard. It is anticipated that this research finding would be useful to manage roads systematically, since it helps to easily evaluate if the road satisfies the horizontal alignment standard using the digital topographic map.

Keywords : Road. Horizontal alignment, Horizontal curve radius, GIS

Acknowledgement

This work was researched by the supporting project to educate GIS experts

A Comparison of atmospheric CO2 from GOSAT and Ground Station in Republic of Korea

Choi, Jin Ho* • Joo, Seung Min** • Um, Jung Sup***

Abstract

The CO2 column concentrations observed by the GOSAT(Greenhouse Gases Observing Satellite) and ground stations at Anmeyondo(36.53°N, 126.32°E) in Republic of Korea. The data covered time periods from June 2009 to November 2011 for GOSAT and from June 2009 to November 2011 for the ground stations. The GOSAT monthly mean data tend to be generally smaller than those of the ground measurements by average 11.83 ppm. The spatial and temporal variations of the atmospheric XCO2 (dry air, column averaged, molar fraction of CO2) concentrations, especially in the regions of Republic of Korea, are analysed by using the GOSAT monthly mean data. The satellite data show significant seasonal variations, with maximum in April and March and minimum in December and October. Average CO2 mole fraction for the GOSAT data version V01.10~V01.30 are by 12.01 ppm less than the corresponding values obtained from ground-based measurements on the same date. For the GOSAT data version V01.31~V01.50 the average difference is 12.23 ppm. This shows that ground station near Anmeyon-do could agree with GOSAT satellite data.

Keywords : CO2, GOSAT, Ground Staions, Satellite Data

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Construction Site Environment Investigation and Management using USN

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Abstract

The convergence of computers and communications at the construction site by a variety of applications, thanks to technological advances in geospatial information convergence developed advanced technology is going to continue. Early computers relied on the performance of the processing in step three-dimensional spatial, how to build an image database via the mobile communication terminal in association with the development permit biochemical information on the movement of the spatial is very fast and efficient manner and lifestyle-related industries different spatial location information in the information service, the service is becoming very diverse. The visual implementation of 3-dimensional national environment is focused by the requirement and importance in the fields such as construction engineering, spatial city development, safety and disaster prevention engineering. UbiConsEye a "construction site automatic control system" as a more convenient and construction of the surrounding terrain and varied spatial object features and locations to investigate and measure the actual construction work on site is in progress the field situation, the desired time and field installation of terrain and facilities in place of the status information that can be configured in real time based on time-based ubiquitous system of management is to develop a construction site. Information on the status of the construction area is connected to a GPS location information with digital images and photos by sensor nodes that point, the analogy of temperature, humidity, and light intensity, wind direction and obtain the necessary information in real time by linking up by the transfer, if necessary smart mobile phone for this configuration to enable the joint is the real time unification of the vector via digital image mapping and raster via exactness evaluation is transformed to make it possible to trace the model of generated 3-dimensional downtown building with long distance for 3D tract model generation.

KEYWORDS: Spatial Image, DEM, 3D, Road Network Analysis, UbiConsEye, Ubiquitous, Sensor Network, GPS

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1. Introduction

Construction of the situation to know exactly which to analyze the design to reflect the traditional paper maps and digital map Planar analysis relies on a precise topography of the analysis is very uncomfortable and a lot of making mistakes, so the current real-time information to get into space by modifying the 3-D terrain you can easily visualize and analyze images based on the ubiquitous mobile systems will be developed and applied to one. Every year

thousands of construction projects underway throughout the country, which Surveying and design and construction stage of the development of this product in development is completed as planned, if the construction progress at the construction site often because you can see by identifying more precise and more concrete and realistic Reasonable progress of construction is expected to be able to reviews. A simple three-dimensional imaging system based on smart mobile crime scene photos and GPS location information in an integrated manner can be used to develop additional systems and construction Climbing mobile space will contain video content based on the construction of a new ubiquitous use of the active site to the terminal management .In this paper, the evolving wireless communication technology capable of USN and graphics-based programming can be applied to a microprocessor (LM3S8962) and by construction of interfaces for wireless communications; sensor information acquired from the environment and represent the information fusion technology on the PC implemented. Sensors capable of wireless communication in the construction of a single sink sensor node, depending on the environment (Sink Sensor Node) and the measurements of multiple sensor nodes (Measuring Node) is composed from these measurements information on each of the wireless sensor nodes communication is possible through the USN through microprocessor-based programmable graphics automatically be converted at compile C Program is to obtain information. The results from the sensor data measured TCP / IP (Transmission Control Protocol and Internet Protocol) is processed in accordance with the method TinyOS-based PC (Windows) on the screen as an image by indicating the change of environment information, situational awareness and the progress of the construction site is feedback of design changes and can be used, etc.. In addition, a simple mobile system based on three-dimensional imaging based on construction site , along with photos and GPS location-based ubiquitous integrated management of the construction site can take advantage of the new construction market is essential in the field of survey and management for construction sites can provide an important content of will be. The three-dimensional spatial, a variety of image contents by constructing a new site to reconstruct the information into the role of imaging devices known to me. Construction sites needs construction stages from the planning stages, and completed by more than 3-5 years because of the long-term progression of early and accurate Geospatial Information Acquisition and the dozens of changes in progress in the field of spatial data related to ongoing. If you can go to manage cost savings as well as how to choose the correct decision using 'UbiConsEye'. The development of a new mobile smart phones can make a breakthrough in excellent instrument is expected to remote control and management of construction projets.

2. Procedure and DEM Generation and USN data collection

After preparation of images and data, which is suitable for the purpose of this study, we've got to find the precise geographic coordinate of target district on the images. For this reason, we carried out Geometric Correction using to make three images, which are different from each other in resolution, fit into Geographic Coordinate and after that, carried out Close Ortho Correction using TM Coordinate, a geographic coordinate especially used for the current construction design. The basic map projection method for Ortho Correction Image Mapping is TM E002 Projection. And that is the map projection method being used by National geographic institute (NGI) for mapping. For data Input, The primary satellite image used in this study is the images from Arirang-2 (hereinafter KOMPSAT)and aerial photos by NGI. Prepare HDF formatted Panchromatic Band 1 captured by EOC sensor and calculate the orbit information of the moving satellite. And then, for DEM Creation, the Convert DXF formatted file of 1/5,000 Topographic Map to GIS formatted file.

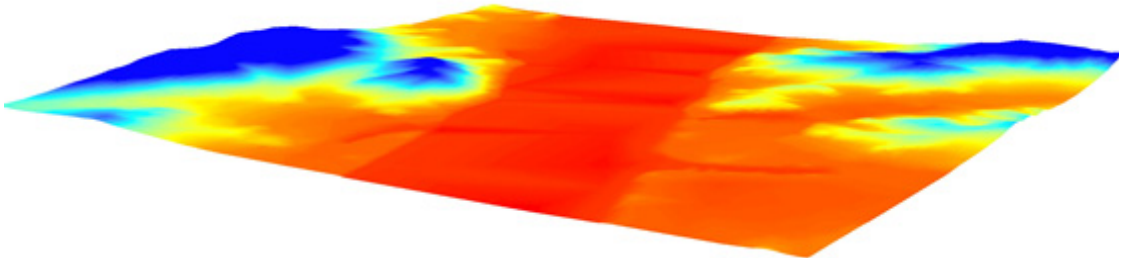

Fig.1. DEM of RGB expression

For ortho Correction Image Mapping, we processed of Collecting GCP To get precise ortho-correction image, we collected coordinate values of GCP corresponding to specific points of satellite image using files of 1/5,000 Topographic Map and DEM files. In this study, once we found the location of a fixed construction such as a building roof, end point of a bridge and a corner of road, we could get TM coordinate and the altitude of the construction on digital map.

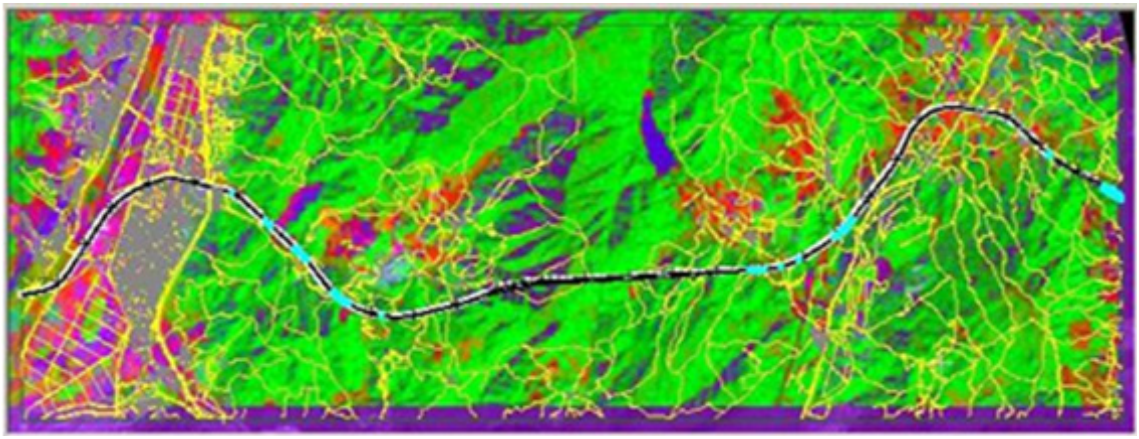

Fig. 2. Road network overlaid on correction image

First experimental construction site to collect images of the digital maps and photos, and able to match the basic geospatial field around the edited video of the three-dimensional space to create the database. Ubiquitous sensor network (USN) based on the construction site and surrounding area prior to a survey by the various space image data directly at the crime scene and the International Table, John qualified Zigbee module to transfer data while re-editing a new category makes the location information based on the automatic matching. This system is specially created three-dimensional space, the scene of the latest development of the spatial information in real time by the attached system should be set in a mobile environment. In other words, construction technology, Edition 3-D spatial information using mobile phones and related site information a variety of sensors that can be used on a construction site by site investigation and construction management for the management to take advantage of the system from anywhere. 1) The destination sele cted and the USN configuration, 2)The region's existing digital maps and spatial image information using the three-dimensional Building construction, 3)The data collected from the sensor board temperature, humidity and illumination of the real-time database design and development proceeds in the order

of was. Figure 1 is capable of wireless communication and microprocessor Ad-Hoc USN (LM3S8962) shows the system to interface with USN 3 capable of wireless communication from one measurement sensors measured temperature, humidity and light intensity data on the environmental information through the sink sensor node UART.

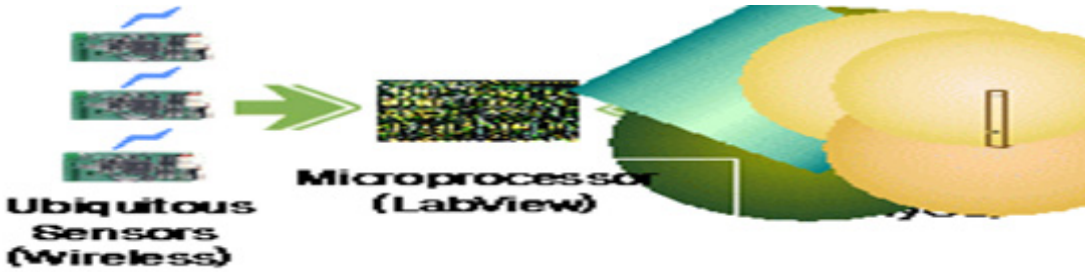

Fig. 3. Interface with USN and Microprocessor System

3. 3D Roads Sensor Network Mapping on the DEM and Images

For Perspective Image Mapping, we used the image creation techniques based on Projection View Method. As preliminaries to Perspective Image Mapping, it prepared information like table1. and set up fusion-image mode to express textures of terrain softly.

Table 1. Image data of perspective map

Item	Images of channel
RGB images	Image Composite Channels of Kompsat and Aerial photos
DEM images	DEM Image channel for generate from contour of digital maps
VECTOR layer	Roads planning layers of digital maps

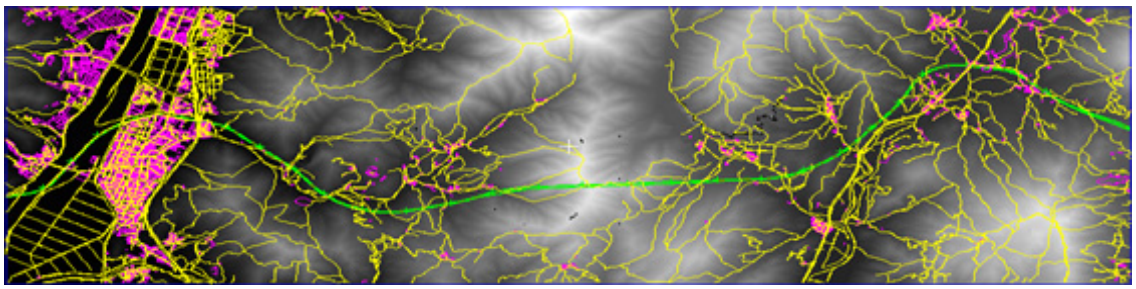

Fig.4. DEM + vector roads

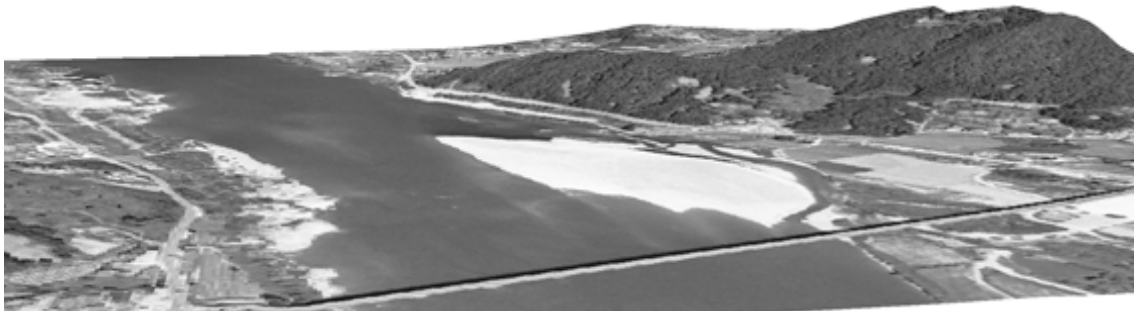

Fig.5. Perspective road view from the aerial Photos

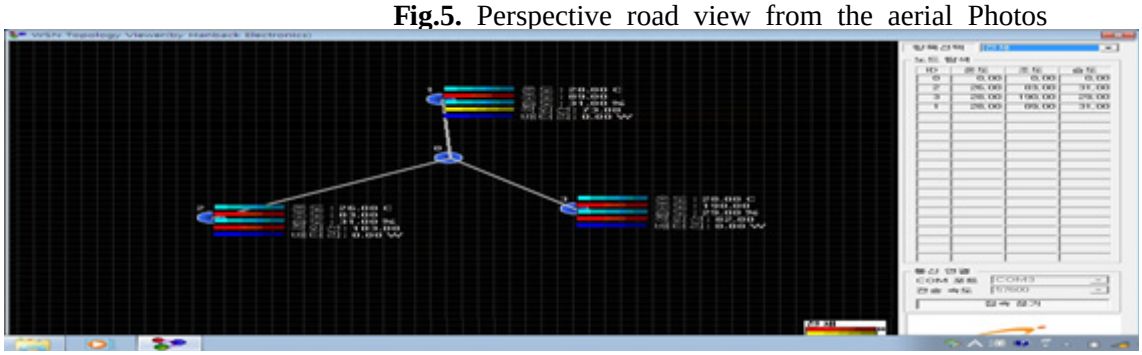

Fig.6 The result of USN gateway

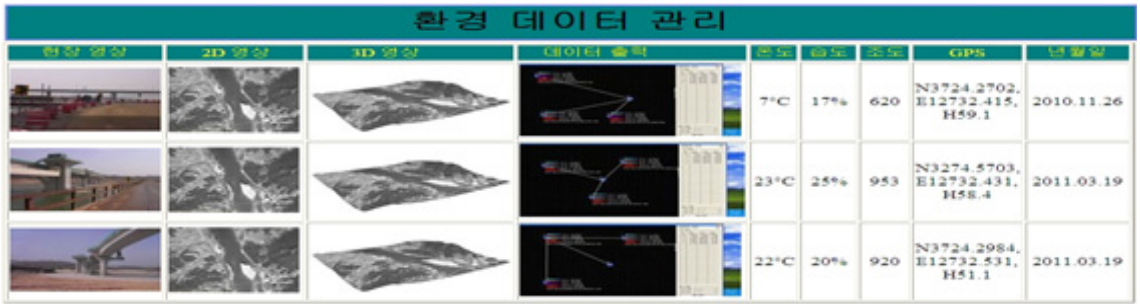

Fig.7 The result of USN Construction Sites

4. Results and Prospect

This study has been accomplished as a experimental study for 3D Perspective Image Map analysis of terrain along the 10km long section. Therefore, on the construction-planning phase, 3D analysis based on the results of this study can be simulated with various geographical features and facility conditions. 3D Perspective Image Map to carry out stereo terrain spatial analysis in the four cardinal directions can be considered as a great solution for a new construction planning technique and for the most reasonable optimum route selection. Lately, as various sensors of satellite and aircraft made collecting of spatial information easier and we can easily get spatial information with high resolution, and more than 3D spatial analysis techniques and time-spatial analysis techniques are being developed Ubiquitous sensor networks for wireless communications, micro-processor system is configured as a graphics based programming technique by using the convenience and ease of programming can be of advantage. Not only that sensor node for wireless communications in Ad-Hoc network configuration by using the existing AP (Access Point) Infra-Structure by a measure of the network more convenient ways you can tell. USN wireless communications

technology and graphics processing based on fusion of the benefits and convenience of a micro-processor system, the city construction sites to identify and change the course of providing the information necessary for the peak of construction information can be de-backs may be allowed to goals. Ubiquitous sensor network (USN) based on the construction site and surrounding area prior to a survey by the various space image data directly at the crime scene. Zigbee module to transfer data while re-editing a new category makes the location information based on the automatic matching However, in the construction of 3-D geospatial information is accurate, if not most of the lots cannot be difficult to configure the actual 3-D space, so a separate survey of the terrain will be required by the operation's progress. In recent years, land information management and intelligent u-City as the country promoted by national projects such as high density land use area and narrow national composition of the 3-D spatial and its utilization is expected to go largely developed. These are required for the realization of UbiConsEye the USN configuration, and sensor board the latest technology development, ortho-rectified image data collected by space situ editing and 3-dimensional space, enabling technology, 3D terrain generation and construction of the space around the series of change detection and analysis techniques, with a smart mobile phones and car navigation device and an optional information exchange condition setting process through application of the tests confirmed the experiment to be able to adapt in the field can expect a large effect.

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Research of 3D cadastre Spatial Information standardized DB structure

Ha, Byeong Po · Kang, In Joon · Jang, Yong Gu · Kim, Byung Woo

Abstract

In this research, the constructions are selected based on the necessary information in actual, UFID foundation and ID system were used together to obtain the three-dimensional information standardized DB. Not only 3D cadastre information system, solutions of plane cadastral's boundaries are proposed in order to get space information DB on the ground and underground.

Keywords : UFID, 3D cadastre, Three-dimensional,

1. Introduction

With the rapid growth of the construction technology in 21st century, Human's living space is not only the surface, also the ground and underground. So the necessity of managing the ground and underground space has been put out. However, the state organs who operate and manage the cadastral system is just using the tow-dimensional spatial cadastral information system only in the use of land surface boundary so that there are many inconsistent places between Cadastral maps and reality. Otherwise, since the management scope of constructions in underground space cannot be represented in cadastral map. So the need for three-dimensional land area is growing to record the underaround space cadastral.

2. 3D directly DB selection and building plan

The area of Seo-myeon station which has over ground thick high-rise buildings and developed underground facilities such as underground businesses and underground parking lot has been chosen as the model area.

The DB of each office's underground information, underground utility's information and underground

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installation's information of different depth is illustrated by the following figure 1.

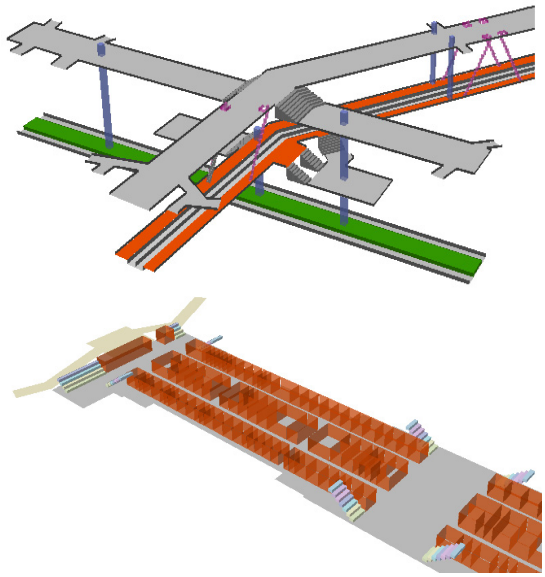

Figure 1. Example, three-dimensional model

3. Conclusion

This research provides DB building plan of 3d geospatial Information standardization. Select recordable facility and building based on the actual need record content and put ID system which gets from UFID method as the basis information of 3d geospatial Information.

Acknowledgements

This research was supported by Basic Science Research Program(NRF-2013R1A1A2006185) through the National Research Foundation of Korea(NRF) funded by the Ministry of Education.

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A Preliminary Study on Civil-BIM Database Construction based on GIS

Park, Dong Hyun · Kang, In Joon · Jang, Yong Gu

Abstract

Recently, BIM proliferates at high speeds so that BIM planning is trying to be used in various kinds of engineering. However, when using different software during design phase and construction phase, the problem of mutual compatibility is coming out. Even the BIM technology has been used or the practical applicability has been made into result, it would be fair to say that BIM has limitations in the visual level. In this research, it is meaningless to obtain the BIM result as the primary purpose. As the usefulness of it is judged incomplete, we committed to master the trend and problems of terrain spatial information systems and BIM. Furthermore, the plan of building the BIM in the civil field, especially the civil-BIM based on the technology ofterrain spatial information has been presented. It can be judged through this research that the high-capacity DB of BIM occurred during the whole process may cause poor performance of the following stage the structure system which connects the terrain spatial information and civil-BIM. In order to manage the optimal full cycle, the spatial analysis technology of the stages after choosing the DB has been narrated.

Keywords : Geo-Spatial Information Technique, Civil-BIM, Data base, Life Cycle

1. Introduction

Since BIM (Building Information Modeling) is a technology can be used to manage all the information from design stage to maintenance control stage and raise the understanding of non-professionals by big percentages. BIM is seemed as the core technology to improve quality of the construction industry and production efficiency in developed country which scope is expanding to all over the world. In our country BIM is used in the more than 500 billion won construction project designed by turnkey from 2012. Since 2016, all indent of public building should consider about BIM which shows the importance of BIM Application is increasing.

2. Civil-BIM DB Construction based on GIS

After DB which occurs in each stage of BIM built, it would have side effects resulting in a decline in performance because of the high capacity. So the range of DB building could be changed according to different purpose. In this research, GIS technology for every stage while selecting the appropriate civil buildings has been analyzed for Civil-BIM Construction of Harbor structure based on Geo-Spatial Information Technique (Min,Byung Keun

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et al,2012). The construction scope of DB for connection between terrain space information system and BIM has been selected based on the case of design background of figure 1.

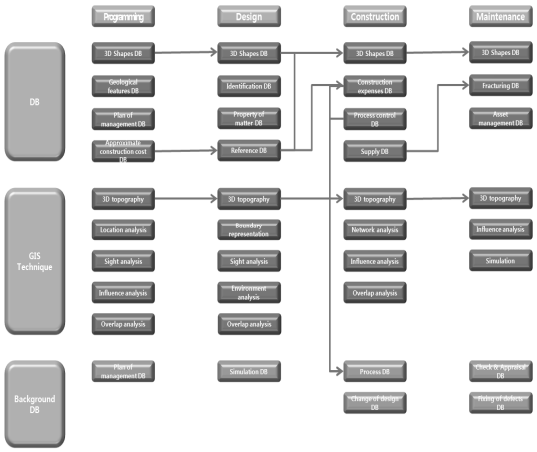

Figure 1. DB Flow Chart

3. Conclusion

In this research, civil BIM construction plan based on terrain space information system has been studied and the result came out. Firstly, First, before the obligation of BIM in the year of 2016, many indents are made through BIM. The results we have got now are only superficial results. Especially the BIM usage of civil field is incomplete compared with architecture field. To solve this problem, the relation of terrain space information and BIM has been considered. Secondly, since the scope and capacity of DB in each stage of BIM is huge, due to slow performance can be expected. We can define the GIS space analytical method and the construction range of DB for build the relation of terrain space information and BIM. Third, to solve the mutual applied problem, as the reliability of IFC neutral model decreases, OGC and XML pattern should be used to reciprocate data. The rationalization of the relationship between OGC and IFC pattern through LOD Method has been concerned.

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This research was supported by Basic Science Research Program(NRF-2013R1A1A2006185) through the National Research Foundation of Korea(NRF) funded by the Ministry of Education.

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Building Small River DB for Flood Forecasting and Warning System

Kim, Gi Hong* Mo, Se Hwan Ko, Suk Min*** Kim, Dong Min****

Abstract

Recently flood disasters have frequently occurred in small river than national river because of climate change in Korea. In case of national river, information and documents have been recorded in DB through business by Ministry of Land, Transport and Maritime Affairs and Water Resources Corporation. But small river information is not recorded in DB and there are many problems in creating small river flood forecasting and warning system. So for flood disaster analysis, monitoring, forecasting and warning, standardized small river DB is required. In this study, we have built standardized small river DB about Nakdong River, Han River, Geum River, Youngsan River area. We think that this DB is base data and is very useful in application of flood forecasting and warning system and mitigation of flood damage in small river area.

Keywords : Small River, Standardized DB, Flood Forecasting and Warning, Small River Network

1. Introduction

Recently natural disaster frequency and scale is growing by climate change and unusual weather. Most of damage by flood has occurred in small and medium river. To mitigate flood damage in small river, national effort and research for prevention of flood damage are needed(Park et al., 2013). Considering status of small river DB, there are incompletion in building DB and mapping of small river because of it is not river that is managed by Flood Control Office and Water Resources Corporation. Also, there is technical vulnerability in connecting information of national river and small river. There are problems in DB, because some code of data is duplicated and different each other in small river management plan report. DB standardization is not done in small river. To build useful small river DB, data standardization is continuously done in various documents such as small river basic plan report, cross section information and watershed information. Update and edit of standardized DB about small river information are also required.

In this study, we have built standardized small river DB about Nakdong River, Han River, Geum River, Youngsan River area. It will be used to creating flood forecasting and warning system in small river.

2. Building small river standardized DB

Information described in small river management plan report is recorded by 'xls' format according to data standardization. It is converted to 'csv' or 'txt' format and recorded into DB. Small river standardized DB is consist of 16 tables, 164 detail attribute data.

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Each table is designed to classify with basic, condition, property, longitudinal and cross section, facility, etc(Table 1). We developed auto script and applied it to extract data that is urban/rural classification and curvature. Also script based on Windows Powershell is used in automatic creation of DB fields and inspection of DB. DB is built as separately 4 regions which is consist in Nakdong River, Han River, Geum River, and Youngsan River area. And it is combined and supplemented finally.

Table 1. standardized DB Table

No.	Table Name	Field
1	Basic information	4
2	Province code(si,gun,gu)	2
3	Outlook information	30
4	Characteristics	10
5	Plan specification	15
6	2D cross infomation	7
7	Water use information(reservoir)	5
8	Facility	5
9	Bridge	10
10	Weir and drop structure	9
11	Photo information	10
12	Longitudinal section	5
13	Cross section	5
14	Disaster history	12
15	Maintenance record	19
16	society of humanity	16

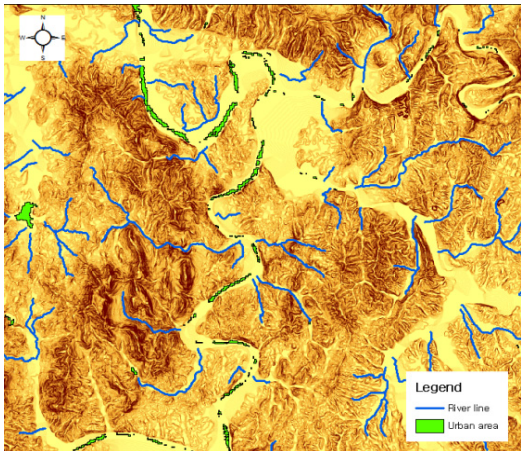

Figure 1. GIS analysis of small river

3. Conclusion

In this study, we built standardized DB of small river to manage information of it. Standardized DB of small river can be used in creating system for small river information management and river redevelopment projects. We think that this DB is base data and is very useful in application of flood forecasting and warning system and mitigation of flood damage in small river area.

Acknowledgements

This research was supported by a grant 'Small and Medum Stream GIS DB Construction' (NEMA-Nature-2011-45) from the Natural Hazard Mitigation Research Group, National Emergency Management Agency of Korea.

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The development of forest biomass estimation method and design a monitoring system for management of forest resources

Ru Ji Ho(Paper Presenter)*, Lee Hyun Jik, Koo Dae Soung***, Lee Jung Bin******

Abstract

Currently, while different methods concerning calculation of forest biomass using a variety of Geo-spatial information is under development, there is lack of adequate management systems and applications, due to the absence of a definite basis on which such measures can be established. Therefore, using LiDAR satellite image, this research designed a system that is capable of calculation, management and continuous monitoring of regional forest biomass and carbon dioxide absorption rate.

Keywords : forest biomas, monitoring system, high resolution satellite images, LiDAR data

1. Introduction

Today, the world faces abnormal climate changes and their side effects, such as frequent hurricanes, sea level rise and animal extinction. As of 2005, the countries that had signed up for the binding targets of carbon dioxide emission cuts in the Kyoto Protocol have to reduce their emission down 5% on average. South Korea, considered as a developing nation during the announcement of the Kyoto Protocol in 1997, was a Non-Annex I country without any obligations for carbon dioxide emissions in the first commitment period of 2008-2012, but as it is most likely to be designated with obligations during the second commitment period of 2013-2017, the government is also pacing up its researches and enterprises regarding low-carbon greed growth model.

This research aims to estimate the optimal method concerning standardized forest biomass in a large area and to design a monitoring system, thereby ultimately benefiting the reduction of regional carbon dioxide emissions while performing urban planning executed by regional authorities, public organizations and the nation as a whole.

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2. Calculation of Forest Biomass

To calculate forest biomass, classification and volume estimation of the vegetation in an area is crucial. This research extracted information concerning forest floor using object-based classification method derived from high-resolution satellite image and ground coverage classification. Heights and numbers of timber objects in each of the classified forest floors were extracted from aerial LiDAR data. Using forest information extracted via high-resolution satellite data and LiDAR data, forest biomass was estimated; the calculated biomass was then compared with the on-site survey data to analyze the adequacy regarding the application of this study. The target area for this study was GangWonDo HoengSungGun region with the area of approximately 6.25km², which accounts for one partition in a1:5,000 digital map.

Figure 1 explains the method concerning the extraction of forest information using high-resolution satellite image and LiDAR data; Chart 1 assesses the accuracy of the results which compares forest biomass and carbon dioxide absorption calculated with the on-site survey data.

Assessment on the accuracy of the

calculation method introduced in this research was executed, which resulted in an average of 86.5% accuracy compared to the on-site survey data and no considerable difference between each forest floors was shown. Improvements of the accuracy of parameters utilized in the estimation will likely to bring about more accurate extraction of forest biomass of an area.

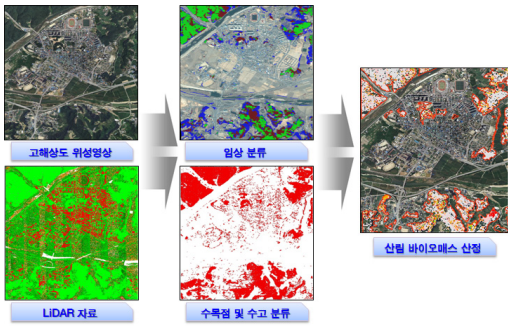

Figure 1 Computation process of forest biomass

3. Designing forest biomass application system

The established forest biomass database and distribution map calculated by the method demonstrated in this research is considered to be more efficient and effective when managed by government authorities and applied into various uses, rather than to be kept only as a database. Therefore, the research suggested a web-based forest biomass application system which enhances the efficiency of managing and distributing the database.

The forest biomass application system consists of two main parts, the application service system and management system.

The application service system is constructed to search the information regarding current amount, the amount of changes and change histories of forest biomass. Also, the system was designed to manage carbon dioxide emissions and urban development in a balanced manner.

The forest biomass management service system provides inspecting and managing abilities to the updated forest biomass database and is capable of managing data requests from regional authorities.

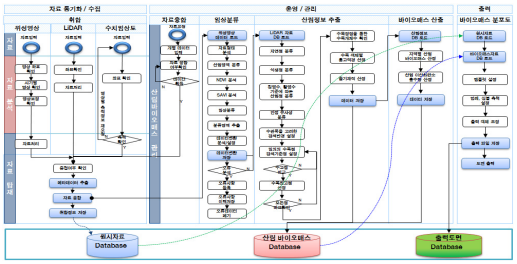

Figure 2 Process of forest biomass application system

4. Conclusion

First of all, estimation of forest biomass and carbon dioxide absorption of an area was possible through forest floor information classified with high-resolution satellite image and LiDAR data; more than 85% of the result coincided with on-site survey results.

Second, the forest biomass calculation method of this research is expected to enable the biomass calculation over large area.

Third, through this study, designing of the system capable of data gathering, processing, analyzing and distributing forest biomass was made possible.

Fourth, the system designed through this research not only produces data but also assesses and distributes external data produced from elsewhere, thereby facilitating the establishment of forest biomass system and its application in various sectors.

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Generating update history record for efficient methods of updating building data

Park, Seula*, Park, Woojin, Yu, Kiyun*****

Abstract

Since the shape and purpose of buildings in real world are changing over time, building data on a map need to be updated. In this research, classification algorithm for updating building data is developed and update history record is generated by the proposed algorithm. Target database is Multi-scale database from Seoul National University(MSDB) and input database is Korea Adress Information System database(KAIS DB). Building objects from target database are divided into 12 cases and new attribute field of code number of update history is assigned to each case. The code number of update history includes information of updating method, consistency of attributes and matching ratio between target data and input data. The test of the proposed methodology was conducted in Sillim-dong, Gwanak-gu, Seoul.

Keywords : building data update, history of update, matching, classification algorithm

1. Introduction

As buildings in real world are created and destroyed over time, efficient management of building data on a map has become more imperative than ever(Yang, Sungchul, 2009). The history of data, which is a record that describes how and what process have the data went through, is important to manage building information changes (Korea Research Institute of Human Settlements, 1997).

In this research, all buildings are classified by cases, that is based on changes of the shapes and attributes. Then, update history record are created by assigning different code numbers for each case. These update history record can be utilized to track how building have changed. Also, efficiency of updating building data is increased, since updating needed building objects are able to be differentiated during the classification of building data.

Target database, which needs to be updated, is MSDB based on digital topographic map and road name address map, the last modification was conducted in September 2012(Park et al., 2013). Input database(KAIS DB), which is road name address map, is adopted to update the target database and the last update was in September 2013.

2. Methodology

In this research, all cases are classified into six cases depending on updating method type, for assigning the code number to track the update history record.

table 1. Explanation of each cases

CASE	Explanation

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No.	
1	Change the shape of building objects in target database.
2	Change the attributes of building objects in target database.
3	Change both of shape and attributes of building objects(over 90% of matching ratio) in target database.
4	Add building objects(under 50% of matching ratio) from input database after deleting it in target database.
5	Delete only building objects in target database
6	Add only new building objects from input database

These cases are subdivided into 12 cases based on matching ratio and consistency of attributes from each dataset. The code numbers, which is composed of three digit numbers, are assigned for each case. First number means update method type, second number represents consistency of attributes, third number shows matching ratio between MSDB and KAIS DB.

Using proposed classification algorithm, test was conducted in Sillim-dong, Gwanak-gu, Seoul, to evaluate the suitability of the classification algorithm.

Table 2. update ratio of each cases

Case	Update Ratio	Case	Update Ratio
1	12.78%	4	4.85%
2	no objects	5	0.21%
3	0.22%	6	65 objects

81.85% of total building objects in MSDB did not need to be updated, because they had identical shape and attributes.

Figure1. Before(left) and After(right) updating

3. Conclusion

The result represents that most updated buildings kept their attributes and changed its shapes(Case 1). It is verified that efficiency of the updating process became higher, because only 18.15% of total objects was updated. Building data that were updated by each case created new attribute field called 'update history code number'. This will be used to manage the update history records of building data changes.

Further research should be conducted not only for building objects, but also, for parks, pastures, and roads.

Acknowledgements

This research was supported by a grant (11 High-Tech Urban G10) from Architecture & Urban Development Research Program funded by Ministry of Land, Infrastructure and Transport of Korean government.

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A study on BIM and PLM Application Consideration for the Railway industry

***Kang, Tae Wook Lee, Woo Sik Yoon, Jun Hee Hong, Chang Hee**

Abstract

The purpose of this study is to suggest the consideration of BIM (Building Information Modeling)-based PLM (Product Life-cycle Management) technology application in the railway industry. The BIM is similar to PLM which was used in the mechanical domain such as vehicle industry. Because of that, the PLM technology is applying to BIM and PLM software venders released the BIM software based on PLM. To use these technologies in the railway industry effectively, we need to arrange the consideration with the difference, the use-case, the advantage between BIM and PLM. To do this, we conduct the expert interview and suggest the consideration when BIM-based PLM is used in the railway industry.

Keywords : Railway, BIM, PLM, Consideration

1. Introduction

Recently, many BIM-based infrastructure projects such as Qutar Redline project, UK Crossrail project etc were executed as the viewpoint of the railway industry. Because owners want to receive the results with BIM to use the information on the maintenance and operation phase, they request them the BIM execution plan at the project delivery stage.

The BIM is similar to PLM which was used in the mechanical domain such as vehicle industry. Because of that, the PLM technology is applying to BIM and PLM software venders released the BIM software based on PLM such as the Lean Construction of Dassaults Systemes [1].

The purpose of this study is to suggest the consideration of BIM and PLM technology application in the railway industry.

The research flow is like below.

1. BIM-based PLM application consideration deduction with the expert interview
2. Conclusion

2. BIM-based PLM Technology Survey through the expert interview

we need to arrange the consideration with the difference, the use-case, the advantage between BIM and PLM. To do this, we conducted the expert interview to take the consideration to use BIM-based PLM in the railway industry.

The questions are like below.

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Q1. Usage purpose and difference
Q2. Application use-case
Q3. Advantage about each technology
Q4. Consideration

The results of the interview is like below.

Table 1. Interview results about BIM-based R-PLM

No	Results
Q1	1. BIM: focus on the application such as the building information modeling/query/analysis methodologies using the authoring, analysis tools 2. PLM: focus on managing the life-cycle process and information management systematically. It supports the schema modeling language to manage the product and process structure, normally
Q2	1. BIM: Object with 3D geometry modeling, Object information identification, Quantity/Information Takeoff from objects, Collision detection, Model analysis etc 2. PLM: Product information schema modeling/management, Process schema modeling/management, Process execution monitoring, Configuration management, PBS (Product Breakdown Structure) definition/management etc
Q3	1. BIM: Early decision making, Prefabrication, Rework rate reduction, Change order reduction 2. PLM: Optimistic project / process management, Interoperability cost reduction
Q4	1. As-is such as current railway business management system, operating & maintenance system and To-be analysis needs 2. Collaboration scope and process definition based on BIM-based R-PLM needs 3. Interfacing methodology consideration between the BIM-based R-PLM and the other heterogeneous systems such as PMIS, ERP etc 4. System tailoring consideration to fit the railway project type 5. GIS-based BIM technology consideration to manage the railway facility management and operation

3. Conclusion

As the viewpoint of application consideration with the difference, the use-case, the advantage, we conducted the expert interview and suggested the consideration when BIM-based PLM is used in the railway industry.
The purpose of the next research is to develop the BIM-based R-PLM (Railway-PLM) framework to apply these technologies to the railway engineering domain effectively.

Acknowledgements

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Riparian zone classification along the Seom River using LiDAR

Cha Su-Young* and Cho Yong-Hyeon**

Abstract

Detailed riparian vegetation and land cover types cannot be easily recorded by a coarse-scale multi-spectral imagery because of narrow riparian width and difficult accessibility. The technology upgrade with the high point density of airborne Light detection and ranging (LiDAR) will allow achieving a detailed description of geographic objects. The objective of this work is to evaluate the airborne LiDAR systems for mapping the riparian vegetation and land cover with naturally dynamic riparian environments, in the Seom River, Heongseong, South Korea. The twelve land cover types were differentiated: pool, riffle, gravel bar, sand bar, grass, salix spp., phragmites community, tree, bare soil, agricultural area, concrete, and asphalt. Surfaces constructed from the LiDAR points included a digital elevation model (DEM), digital surface model (DSM), canopy height model (CHM), and an intensity model (IM) are used with decision tree classifier. Twelve types of riparian vegetation and land covers were classified with the accuracy of 83.23%. The results of classification illustrate the potential of airborne LiDAR data to differentiate classes of riparian zone quickly and accurately.

Keywords : Riparian zone, vegetation, land cover, LiDAR, decision tree classifierGeographical Factor, Optimal

1. Introduction

Governments responsible for river management have relied on the aerial photographs and field methods. These procedures are time consuming, labor intensive or expensive of river monitoring (Petzold et al., 1999; Creutin et al., 2003). Aerial photographs from previous years were used to explore past spatial condition of the riparian zone derived from the dynamic nature of floodplains (Rosso et al., 2008)

High resolution Light detection and ranging (LiDAR) technology can be used to collect detailed topographic and land cover characteristic data in riparian zone because LiDAR technology has the ability to provide accurate height and positional data. The high point density of airborne laser mapping systems enables achieving a detailed description of geographic terrain objects and vegetation.

During the last decade, the use of LiDAR technology to study aquatic and riparian habitats has become common. The findings of previous studies describes airborne LiDAR data provided information faster than photography and spectral-radiometry (Akasheh et al., 2008; Everitt et al., 1991; Hutchinson et al., 1990; Meisner and Lindstorm, 1985), and was very cost effective and efficient in mapping riparian and wetland systems (Neale, 1997; Irish & Lillycrop, 1999; Lefsky et al., 2002; Dowling & Accad, 2003). Few studies in South Korea have investigated the estimation of riparian zone from aerial LiDAR data.

Therefore, the objective of this work is to develop the algorithm of identifying the mesoscale hydraulic features and vegetation of the natural riparian zones from commercially available LiDAR data. The riparian zone mapping

procedure is organized in three sequential steps: (1) height stratification; (2) intensity separability; and (3) classification.

2. Methods and Results

2.1. Study area

The Seom River, which is a tributary of the South Han River, runs north to south in southwestern Hoengseong, Gangwon-do, South Korea (Study site; 37 29N, 127 58E; 106m elevation). The site located on the upper reach of the Seom River receives 1140.2mm of rainfall annually, with the highest levels of precipitation occurring from the month of mid-June to late-July. The average temperature is 10.7 degree Celsius. The dominant types of vegetation in this area are reed (Poaceae spp. including Phragmites japonica community, Phragmites communis, and Miscanthus sacchariflorus etc.) interspersed with a few individuals of willow (Salix spp. including Salix gracilistyla Miquel and Salix gilgiana Seem etc.).

2.2. Data acquisition

The LiDAR survey for this study area was conducted in 16, 21 August and 22 September 2009. The government carried out the project of the topographic mapping of the entire Hoengseong province in 2009 (from May to October), covering an area of 997㎢, using the LIDAR technology. The laser Optech ALTM Gemini 167 (Airborne Laser Terrain Mapper) sensor, which was used to survey the site, includes a high resolution discrete dual pulse return (first and last) with a 1064 nm wavelength and 167 kHz max PRF(pulse repetition frequency). The average of the emitted LiDAR sample point density was 3.78 per 1 square meters. GPS surveys were conducted to get reference points for comparison with the LiDAR data in June 2013. Land cover types varied along the riverine and were divided into the vegetation and land classes based on the criteria of the natural survey method by the Ministry of Environment Korea.

2.3. Surface derivations

LiDAR provides both height data and intensity data that reflect material characteristics of objects. A DEM (Digital Elevation Model) - also sometimes called a digital terrain model (DTM) - generally refers to a representation of the Earth's surface, excluding features such as buildings, trees, and shrubs etc. A digital surface model (DSM) on the other hand includes buildings, vegetation as well as natural terrain features. Four LiDAR derived surfaces were used in order to classify the desired land types for the study site. These surfaces were a digital elevation model (DEM), digital surface model (DSM), canopy height model (CHM), and an Intensity model (IM) with a 0.5m cell resolution considering point density of the original data. In this study, as the LiDAR data is necessary to convert the point data to grid form, both DEM and DSM were rasterized from the LIDAR ground points that were used to construct Triangulated Irregular Networks (TINs) based on the ellipsoidal height, using linear interpolation. Linear interpolation is the simplest method of getting values at positions in between the data points. Canopy Height Model (CHM) representing the difference between the DSM and the DEM was developed to create the height of Land surface including plant and building. Canopies above these heights tend to display both first (nearer to the canopy surface) and last (nearer to the ground) pulse raw airborne LiDAR information. CHM data shows the bare soil or areas of low vegetation coverage (less than 0.5 m

elevation difference), whereas larger elevation differences were found for all areas of substantial vegetation coverage as well as for settlement area. The intensity model (IM) was constructed from the LiDAR point intensity values by merging of both raw first and last pulse points. This was by constructing a TIN based on the average intensity returns, and subsequently interpolating the triangular network into a rasterized image with a 0.5 m resolution. The development of these layers was aided by using ENVI LIDAR Version 3.1 and ENVI version 5.0.

2.4. Results

The twelve land cover types were differentiated in riparian zone which consists of the riverine area and upland area: pool, riffle, gravel bar, sand bar, grass, salix spp., phragmitis community, tree, bare soil, agricultural area, concrete, and asphalt. The result showed that the Seom River was a smooth overall form with small pools, riffles as shown in the straight reach. The depth of water was sallow from 0.5m ~ 1.6m. In some area, the river has not returned any points, due to water absorption and no backscatter. The Salix spp. in riparian zone was well differentiated from Phragmitis japonica communities by adding of the canopy height model, though the intensity values could be confounded. Most of the trees were shown in mountainous forest areas with the height over 7.5 m. However, trees were still misclassified because of the shadow of the tree crowns. The height more than 4m, in this study, was classified the trees with the intensity value is more than 150, but the green roof was misclassified in this category. In buildings and trees cases, it is difficult to separate accurately, either because of shadows or the color of the roof. Accuracy assessment indicated that 83.90% of the LiDAR image was correctly classified as twelve types of riparian vegetation and land covers.

3. Conclusion

The results of classification demonstrated that the intensity and height data derived the airborne LiDAR is an effective tool in classifying a riverside riparian zone. The vegetation of the riparian zone is often narrow and difficult to assess using conventional means such as aerial photography. The joint use of this new technology will provide unavailable information relevant for runoff generation, the spatial distribution of riparian characteristics, and is based on spatial and temporal dynamics derived from the dynamic nature of floodplains. In addition, using this map will minimize cost for making maps which have to be revised regularly. As river management move forward for restoration efforts of riparian zone, this more detailed map will be incorporated into a decision support.

Acknowledgements

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Improvement Strategy of Land Category Classification by Introducing Solar Energy Grading

Kim, Ji Yoo* · Um, Jung Sup**

Abstract

In case of current domestic cadastral classification system, the usage type is used to register and manage according to the purpose of using land. The current cadastral parcel classification per usage is classified into 28 cadastral parcel. However, this system is limited to classify only the important factors of cadastral parcel. Therefore, it cannot function as a geographical information.

This is the basic study to realize the cadastral parcel of multi purposes considering factors against the climate changes, escaping from simple method of cadastral parcel.Since the problem of climate change is urgent due to the industrialization, as a preparation to replace the fossil energy, the solar energy is to be in the limelight. If the more detailed cadastral classification system can be introduced according to the insolation, sunshine, it is assumed to be utilized as various purposes for residential area and agricultural area based on the characteristics of solar energy. In using the land, it is assumed that the future system is designed considering the insolation and sunrise to set up the cadastral parcel to increase the values of land use compared to the existing system dramatically. Method of analyzing solar energy by using GIS is possible to analyze the quantitiative analysis according to topographic characteristics, certain time zone(summer solstice, winter solstice, morning,afternoon),various characteristics of space and time per latitude and longitude. It is important to select the standard of analysis to compare and analyze per cadastral parcel through solar energy. Since the results of analysis are different when various variables(area, cadastral parcel, lot, topographical characteristics and seasons etc.) are applied.

After establishing the research area of water shed unit, by using the analysis module of solar energy, distribution map of solar energy was made per research lot. It could be checked that various solar energy distribution was shown per research lot and research cadastral parcel.

The result of this study will be a important basic material to suggest the improvements of cadastral classification system against the climate change by comparing and analyzing the isolation and sunrise

Keywords : Solar Energy, Land Parcel, Land Category

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POSTER Ⅲ

Designing an Efficient Octree Structure to Index Huge 3D Terrestrial Laser Scanning Data

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Abstract

The volume of point cloud data scanned by 3D terrestrial laser scanners has grown enormously as the performance of scanners has greatly evolved. Fast point query is essential for efficient processing of the data and more interests should be paid to solve the problem. Several indexing methods are applicable to the purpose, and octree, a 3-dimensional analogue of quadtree, is considered as a promising one. Though octree has been already utilized in related applications, little are focused on efficient implementations of octree itself in order to extend the volume of manageable data, meanwhile, maintaining the query speed. As the volume of point cloud exceeds the size of PC's main memory, file-based approaches are now practically substituting memory-based ones even sacrificing the query speed.

In the present study, an effective form of octree is implemented using C++ language. Firstly, a memory-efficient nodal structure is designed and an array-based declaration of nodes is utilized to reduce main memory usage. Secondly, a hierarchical tree structure is created in main memory and leaf nodes holds pointers to point in data files instead of 3D point coordinates. In the approach, each node of the tree structure can be quickly traversed through main memory which is spared by avoiding duplication of point cloud from file to memory.

The performance of the approach was evaluated against memory-based one by a point querying operation which finds neighboring points residing within a given radius from individual points in the point cloud. Tested with 18 million 3D points of 400MB size, the proposed method suffered from heavy degradation of query speed originated from poor performance of hard disk drive. Nevertheless, about 300 million 3D points of 7GB size were enough indexed and queried in a system equipped with 3GB main memory. In conclusion, the approach is expected to be effectively utilized as an indexing structure for a massive amount of 3D point cloud data.

Keywords : Octree, Point Query, 3D Terrestrial Laser Scanning, Point Cloud

A Study on Automatic Recognize Road Sign by Fuzzy Algorithm

Kim, Nam Hoon*, Sohn, Hong Gyoo, Park, Je Sung***, Jeon, Doe, Gyu*****

Abstract

In currently, new paradigm of automobile is smart car. Actively collect new and important information and perform difficult action instead of operator is final goal of smart car. The role of spatial information technology in smart car market is active processing spatial information that collected by smart car.

In this study, we set road sign information to important information in road spatial information. Our goal is extract road sign in image, and recognize kinds of road signs. The final goal is updating road sign database by compare with prior database and noticing to user after automatic extraction road sign. We use image processing to extract road sign and fuzzy algorithm to recognize kinds of road sign.

Keywords : Road Sign, Fuzzy Algorithm, Image Processing, Black Box, Heuristic

1. Introduction

Nowadays, vehicle market has expanded rapidly. Accordingly, Automobile technology has evolved. Automobile reached electronics and complex set of sensor beyond the machine. This automobile called the smart car.

The role of spatial information technology in smart car market will be process various spatial information that collected by smart car's sensors. Especially, combine of geo-location information and optic information is significant source of spatial information technology. In this study, we use optic information that collected by blackbox in the vehicle.

We focus extract road sign information and recognize it's attribute. Our final goal is updating road sign database by compare with prior database and noticing to user after automatic extraction road sign. We use image processing method and fuzzy algorithm to perform this study.

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2. Body

We use color ratio to extract RGB ratios. Road sign has the characteristic RGB ratios. Also perform Canny Edge detection and

Hough transform to extract road sign, and opening function to erase noise of image. The result of this process given binary image.

The attribute of road sign is the kinds of road sign. It is given by shape that inside of road sign. We use Canny edge detection again extract shape of road sign. But the shape of road signs are different from each others even contains same meaning. This is due to each producers of road sign are different form each others. So we add some buffer to edge image. After add various size buffer to this edge image, we perform Fuzzy algorithm to get attribute of signs.

3. Conclusion

Using image processing and Fuzzy algorithm has potential to extract attribute of road sign image. Further study will perform more high tech heuristic method and modify speed of processing.

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Tracking Cadastral Parcels Suitable for Cool Roof Location using GIS

Shin, Hye Jin*, Um, Jung Sup**

Abstract

Due to an increase in cooling energy and the temperature rise of the summer by climate change, the problem of power supply and demand is increasing. In this situation, the ratio of energy consumption that building occupy is more than 40% of the total. If you want to study the color of the roof of the building of Korea through a satellite picture and aviation image, It is prominently identified as dark. the color of the roof like this raise to about 60 ~ 88 ℃ the surface temperature in summer roof and indoor temperature also lead to an increase in the cooling energy. There's an innovative alternative. That is changing the roof into a cool roof that has high reflectance. This alternative allows you to increase the solar reflectance of the roof of the building, to reduce the power consumption of Cooling energy. (Kim, ok, 2010; Ryu, Taek-Hyoung,, Um, Jung-Sup; Choi, Jin-Ho, Um, Jung-Sup)

Building can be constructed at the building site of land catagory and the energy saving effect is identified by Cool Roof. At this time we need to get the best energy efficiency for tracing the ideal site to install Cool Roof of the building site of land category. Therefore, in this study, it is intended to present a proposal that keeps track of the ideal site by using the building site of land category. Thus, by using 'the Solar analyst' that is a solar radiation program of GIS, (Um, Jung-sup, 2009) we made a diagram of seasonal distribution of the solar energy and compared and analyzed site which have a high amount of insolation and sunshine for each the building site of land catagory that is extracted from a cadastral map. The site, which has a high solar energy in the summer, is not suitable for the building but is suitable for installing Cool Roof. We found out a variety of distribution of solar energy for each site. So ideal site is tracked to install Cool Roof. It is believed that the results of this study, and play an important role as a basic data for tracking ideal site for the cool roof installation by comparing and analyzing the amount of insolation and sunshine, for each the building site of land category.

Keyword: Cool Roof, Solar Energy, Land Category

Acknowledgements

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Using Growth Model and GIS to Predict Forest Carbon Storage and Sequestration Based on National Forest Inventory

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Abstract

This study was performed to estimate the forest carbon storage and sequestration change using National Forest Inventory (NFI) data of South Korea. This study was performed in 4 steps. i) Develop forest growth models using NFI data by considering topographic and climatic factors. ii) the regression models were developed to predict mean diameter at breast height (DBH), tree height (h) and number of trees (Nha) for red pine stand based on radial growth model. iii) Combine current (actual) forest cover map (DBH class, age class, canopy closure). iv) Estimate the forest carbon storage and sequestration using the growth model. In this process, the forest cover data, growth data of NFI, climatic data, and topographic data were integrated GIS, and GIS-based spatial information was prepared. The volume and the current annual growth rate in 2010, predicted by the growth model, were 127.2 m^3 ha^{-1} and 5.0%, respectively. Both estimates were similar to that listed in the statistical yearbook of forestry (125.6 m^3 ha^{-1} and 4.7%). The average forest volume and carbon storage would increase by 228.8 m^3 ha^{-1} (120.4 Cton ha^{-1}). However, the forest carbon sequestration would decrease by 0.58 Cton ha^{-1} $year^{-1}$. Significant declines in carbon sequestration were predicted in western coastal area and south-eastern inland areas in particular red pine forest. Therefore, we have to prepare the strategies for adapting climate change in terms of the preservation of forest carbon storage and sequestration. This GIS-based forest carbon prediction model can be useful for decision making in national carbon control.

Keywords : national forest inventory, carbon stock, forest type map, climate change, growth model

This study was conducted as part of a research project of the Korea Forest Research Institute (Project FE 0100-2009-01, Effect of climate change on forest ecosystem and adaptation of forest ecosystem).

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Impervious Surface Mapping of Cheongju by using Rapideye Satellite Imagery

Park, Hong Lyun · Cho, Young Sun · Choi, Jae Wan · Choi, Seok Geun

Abstract

While various methods are applied to describe impervious surface with a view to preventing natural disasters factors like renewal cycles, time, and cost limit such efforts. This research used Rapideye satellite imagery for effective creation of impervious surface. The Rapideye images of Cheongju, Chungcheongbuk-do was analyzed with constrained linear spectral unmixing model and we performed an analysis of the accuracy of impervious surface Map created using the previous Land Cover Map.

Keywords : Impervious Surface, Rapideye, Constrained Linear Spectral Unmixing Model

1. Introduction

The increase of impervious surface in lowlands due to recent rapid urbanization interferes with the circulation of water and air, thus influences the urban ecology, environmental pollution and hydrological issues as change in outflow and decrease in base flow. Factors such as long renewal cycles for city plan, time, and cost in mapping impervious surface limit such efforts. Many researches have been carried out to check the status and figure out changes to impervious accurately and rapidly. In this paper, we produced the impervious surface map using Rapideye satellite imagery.

2. Methodology

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2.1 Target Areas and Pre-processing

This research has been performed on Cheongju, Chungcheongbuk-do. Cheongju has conditions favorable to image analysis, as the city demonstrates diversity in geographical conditions with downtown, farmlands, forests, and rivers. In pre-processing, the coordinates of the image were converted to WGS84 and geometric correction was performed. Also, DN value of satellite images was converted to spectral reflectance to conduct the study.

2.2 Creation of impervious surface

Rapideye satellite imagery is composed of five bands. Because spectral bands of Rapideye data that should be considered to extract impervious surface in this study are not sufficient for the analysis of impervious surface, forests, grasslands, wastelands, water, and shadows, $Ratio_{B1B2}$ and $RNDVI$ were artificially created and added.

First, We extracted water and shadow class using spectral data and a decision tree algorithm. And then, constrained linear spectral mixed model was applied to create abundance map of impervious surface, grasslands, forests, wastelands. And impervious surface map was created by integrating the images of water class

extracted as above. Fig 1 is result of constrained linear spectral mixed model.

Figure 1. Result of constrained linear spectral mixed model

The analysis of zonal statistics was performed on the above impervious surface Map by using polygon features of Land Cover Map, in order to create impervious ratio corresponding to each polygon features. Fig 2 is result of zonal statistics, and Fig. 3 is impervious surface Map created based on the Land Cover Map.

Figure 2. result of zonal statistics

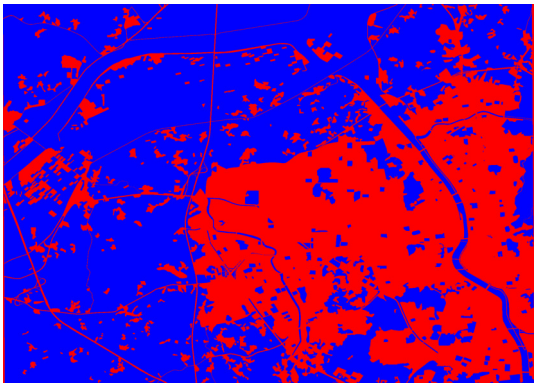

Figure 3. Impervious surface map based on Land Cover Map

2.3 Accuracy Test

The accuracy test performed to analyze impervious surface Map that was created through proposed method. The experiment shows that result by our method represents accuracy rate of 93.0664%, and then, the Kappa coefficient was calculated at 0.8550.

3. Conclusion

In this paper, we can produce the impervious mapby using spectral mixture model and decision tree algorithm on Rapideye satellite data. It is expected that future studies will make possible its utilization in various areas through creation of higher-accuracy impervious surface.

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Object-based change detection of satellite imagery in urban area

Wang, Biao · Choi, Jae Wan · Jung, Sung Heuk · Choi, Seok Geun

Abstract

The change detection accuracy can be decreased by using geometric difference of multi-temporal image. In this paper, the change detection technique that is appropriate for multi-temporal image and object-based segmentation is proposed.

Keywords : Change detection, object-based segmentation, multi-temporal image

1. Introduction

Change detection technique is to detect the object or topographic change by using remote sensing data which is obtained from different times. It plays an important role in many different domains such as monitoring of building construction, disaster areas identification, assessment of vegetation changes, monitoring urban growth, and update of spatial database. However, most of change detection techniques are sensitive to the geometric characteristic of satellite image, and then, some change detection indexes have a problem that can not reflect relative characteristics of images. The results of some researches show that the use of image fusion, image segmentation can be effectively improve the accuracy of change detection(D. Lu, et. al., 2004)

In this study, the unsupervised change detection is applied to the multi-temporal satellite images by using the image segmentation method and application to cross-sharpening method.

2. Method

In this research, cross-sharpened image have four pieces by using multi-spectral image and high-resolution panchromatic image corresponding to reference data and target data(B. Wang, et. al., 2013). The eight bands of image segmentation can be generated by using MSRG(modified seeded-region growing) method, which is robust, rapid and does not require a tuning parameter(Y. Byun et. al., 2011). To keep the size of object classification, we set the seed parameter to 100, and obtained segmentation image and boundary image. A feature intercept image is generated by correlation analysis technique in object-based of image segmentation(J. Im et. al., 2008).

3. Result

In this study, an area with 2400*3200 pixels of high-resolution QuickBird and WorldView-2 satellites were used. Pre-processing includes geometric and radiometric correction. In order to

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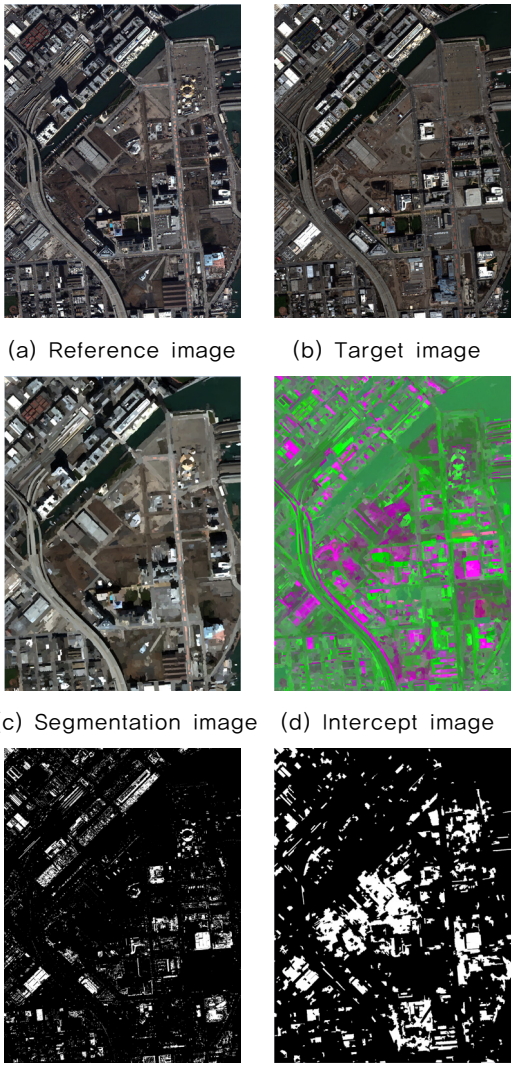
improve the accuracy of change detection, shadow image is extracted by pixel-based from reference and target data.

Compared with result of existing change detection algorithm(Fig. 1(e)), the object-based change detection by cross-sharpened image show that higher change detection accuracy(Fig. 1(f)).



(a) Reference image (b) Target image

(c) Segmentation image (d) Intercept image

(e) ERGAS result (f) Object-based result

Fig. 1. Experimental result

4. Conclusion

In this study, image fusion and segmentation method was applied to improve accuracy of unsupervised change detection method. The error of building area can be removed what caused by shadow and undulating displacement. In future, we will conduct research about change detection thresholds and individual recognition.

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Research about Position Determination and Accuracy Analysis to Manage 3-D Underground Space Information

Son, Myung Chan, Kang, In Joon, Liu, Jia

Abstract

In our country, land survey and measurement have been doing for a long time in order to solve the cadastral non-coincidence problem scattered across the country. A large investment has also been done to the cadastral renovation project which registered in new cadastral record.

The result of the hard work is: on Mar 17th 2012, the supertition of cadastral renovation and implement rules of supertition have been put into practice. At the same time of the laws being enacted, large budget has been put to explore cadastral system which is more advanced than cadastral renovation project.

While the cadastral renovation project is carried out, the existing cadastral has been changed a lot. As the space information in the plane expands to 3d space information, the cadastral management scope and the scope of land surface both over ground and underground are expanding. The cadastral registration map is also changed from 2d to 3d measurement.

In this research, in order to acquire the information of underground space, EDM, MEMS INS and air pressure sensors have been used to measure the location of the underground space and do the accuracy analysis.

Keywords : Underground Space Information, Cadastral Renovation Project, MEMS INS, Air Pressure Sensor

1. Introduction

The model area of this research is the parking lot of Busan University construction building and the built increasing tunnel capacity Yeonsan tunnel. In order to examine the accuracy and the practicability of the 3d location measuring technique, underground structure such as tunnel and underground parking lot have been selected to be the model area. Table 1 shows the related information of studied model area.

<Table 3.1> Model area's related information of this research

Field	Model Area	Construction Period	Note
Test Rap	Parking Lot of Construction Building, Pusan National University	Completed	Underground Parking Lot
	Yeonsan Tunnel, Busan	Completed	Tunnel

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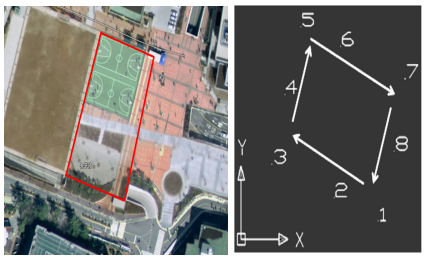
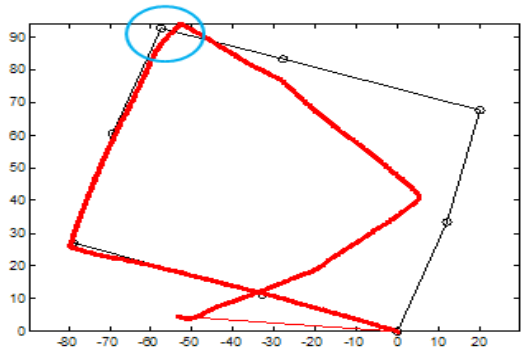
2. Research content

Figure 2 shows the scene of Busan University in door parking area and process of measurement by using MEMS INS sensor.



<Figure 2> Busan University in door parking area (left) and the MEMS INS measurement process(right).

Figure 3 shows the comparison of range error between the result acquired by MEMS INS sensor and the result from ECM measurement.



<Figure 3> Step detection information and range error of measurement point by using light wave measurement.

3. Conclusion

The following results can be obtained through this research.

Firstly, underground space information can be acquired very likely by using MEMS INS technology in the underground parking area where wireless communication couldn't be used.

Secondly, we can not only acquire the X, Y coordinates by using MEMS INS and the air pressure sensor, but also can get the z coordinate and judging by this could get the 3d underground space information.

An algorithm whose objects are structures with unambiguous distinguish between the layers by using MEMS INS and pressure sensor should be obtained to meet error range requirement of cadaster.

Acknowledgements

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Flood Simulation of Upriver District Considering an Influence of Backwater

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Abstract

This study aims to predict inundation and flood-stricken areas more accurately by simulating flood damage caused by reversible flow of rain water in the upper water system through precise 3D terrain model and backwater output. For the upstream of the South Han-River, precise 3D terrain model was established by using aerial LiDAR data and backwater by area was output by applying the storm events of 2002 including the history of flood damage. The 3D flood simulation was also performed by using GIS Tool and for occurrence of related rainfall events, inundation events of the upriver region of water system was analyzed. In addition, the results of flood simulation using backwater were verified by making the inundation damage map for the relevant area and comparing it with flood simulation's results. When comparing with the results of the flood simulation applying uniformly the gauging station's water surface elevation used for the existing flood simulation, it is found that the results of the flood simulation using backwater are close to the actual inundation damage status. Accordingly, the causes of flood occurred in downstream of water system and upstream that has different topographic characteristics could be investigated and applying the simulation with backwater is proved more proper in order to procure accuracy of the flood simulation for the upriver region.

Keywords : Flood, Simulation, Backwater, Upper water system, GIS

Assessment of Hopfield Neural Network Capability for Land cover super-resolution mapping using simulated SPOT image

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Abstract

It is possible to obtain the land cover proportions from the remotely sensed image using soft classification. These land cover proportions are then used as input data for a procedure called "super-resolution mapping" to produce the predicted hard land cover layers at higher resolution than the original remotely sensed image. There are various algorithms can be applied for super-resolution mapping, among them the Hopfield Neural Network (HNN) has showed some advantages. The HNN has improved the land cover classification through super-resolution mapping greatly with the high resolution data. However, the super-resolution mapping is based on the spatial dependence assumption, therefore it is predicted that the accuracy of resulted land cover classes depends on the relative size of spatial features and the spatial resolution of the remotely sensed image. This research is to evaluate the capability of HNN to implement the super-resolution mapping for SPOT image to create higher resolution land cover classes. The results show that, the HNN super-resolution produced more accurate land cover classes than those of hard classification. However, the super-resolution mapping cannot work well for very small land cover features comparing with the original image spatial resolution.

Keywords : Hopfield Neural Network, Super-resolution mapping, Spatial dependence

A Study on The Site Survey Possibility Evaluation of GPS Survey Robot

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Abstract

Korea has such an industrial development from about 1,000 industrial complexes throughout the country to start with the Seoul-Incheon Highway (Part 1 Gyeongbu Line) and Ulsan Industrial Complex in 1962. There is was introduced 1 individual survey through GPS survey to get out of the same survey method that has made from a number of workers at the existing total station in these large-scale construction sites such as a highway or industrial complex. However, GPS surveying equipment is expensive and not made in the size or weight, and it was not individual survey anymore, as the fixed surveying equipment of more than 2 basing points(base station) was installed, and the equipment was installed in the known point with more than 3 equipments needed. To overcome this drawback, the National Geographic Information Institute, Ministry of Lands has installed 45 observatories across the country regularly, and from that moment began the individual survey.

In general, all construction sites have in danger every second and demands of modern people is increasing to avoid a 3-D (dangerous, difficult, dirty) jobs. This study, to reflect the current trends, studied the survey robot that can be used directly in the construction site, and evaluated the possibility of a site survey by analyzing the survey result and judging its precision through GPS surveying robot.

Keywords : GPS Survey Robot, GPS, Survey Robot, Site Survey

Validation of GPS signal delay in troposphere for Asian sand storm

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Abstract

Dust storms originate from the arid area are of concern to microwave propagation and satellite telemetry due to they can be influenced to carrier depolarization and phase delay. Aerosol and fine dust particles significantly affect the propagation of some microwave until the radio frequencies are approached and their extinction cross-section becomes appreciable. As technology advances, and new methods of making measurements are developed or made more economical, it becomes feasible to make comparative measurements of the same parameters using independent techniques. One such technique is the ground-based GPS meteorology, which is able to quickly and inexpensively expand the number of global upper-air moisture observations for radiosonde and satellite verification. On 31 March-02 April 2007, heavy Asian dust storm hit the Korean peninsula in East Asia causing extensive damages. The Korean GPS permanent stations were used to estimate precipitable water vapor (PWV) during dust storm season. The GPS PWV estimates have monitored the density variations of dust storm associated with anomalous atmospheric wet/dry conditions. In order to monitor the GPS PWV variations to establish the relationship with the level of atmospheric concentration of aerosol particulates during an Asian dust storm, GPS PWV estimations were analyzed during March 30-April 04, 2007. It can be found that the temporal variations of GPS PWV are correlated with the spatio-temporal variability of the PM10 data. Also, the GPS tropospheric delay variations were monitored to establish the relationship with the specific density of particles during an Asian dust storm. A Micro Pulse Lidar (MPL) is a useful tool for measuring vertical profiles of atmospheric aerosols, and it was used as a reference data to study the vertical profiles of an Asian dust storm. The MPL is designed for long-term continuous observations of aerosol vertical distribution. The depolarization ratio obtained with this function is useful for separating the contributions of non-spherical mineral dust and spherical pollution aerosols in the observed aerosol mixture. The time series of aerosol extinction coefficient for soil dust and spherical particles display examples of vertical distribution of backscattering intensity and depolarization ratios for the Asian dust storm case in Seoul, Korea, 2007. The time series results of GPS zenith wet delay (ZWD) show that the high values of non-spherical extinction coefficient were observed after the increasing of GPS ZWD.

Keywords : Dust storm, GPS meteorology, Zenith wet delay, Precipitable water vapor

Quantitative analysis of rip current with GPS drifter in Haeundae beach

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Abstract

The occurrence of rip current in the Haeundae beach, which is one of the most famous beaches in South Korea, has been threatening beach-goers security in summer season annually. Many coastal scientists have been investigating rip currents by using field observations and measurements, laboratory measurements and wave tank experiments, and computer and numerical modeling. Rip current velocity is intermittent and may rapidly increase within minutes due to larger incoming wave groups or nearshore circulation instabilities. It is important to understand that changes in rip current velocity occur in response to changes in incoming wave height and period as well as changes in water level. GPS buoy have been used to measure water levels, atmospheric parameter and other physical conditions in sea, river or lake for the purposes of navigation, tide correction, the altimeter range calibration, ocean environment and pollution monitoring. In order to detect velocities and directions of long-shore current, as well as rip current, we developed GPS buoy system and investigated. The wave height measured by in-situ hydrometer in a cross-shore array clearly increased before and after occurrence of rip current, and wave period also was lengthened around an event. These results show that wave height and period correlate reasonably well with long-shore current interaction in the Haeundae beach. Additionally, current meter data and GPS buoy data showed that rip current velocities, about 0.2 m/s, may become dangerously strong under specific conditions.

Keywords : GPS drifter, Rip current, Haeundae beach

A Study on the Weight Lightening Algorithm of 3-Dimensional Large Object based on Spatial Data LOD

Sang Keun Baik, Joon Yeop Na, Chang Hee Hong

Abstract

Recently, Construction information is being changed from CAD to BIM, and GIS has been extended from outdoor to indoor information. In these circumstances, the needs about continuous use of construction information linked with GIS in stages of maintenance, operation and service as well as planning, design and construction are growing constantly. To this end, It is essential element to represent 3-dimensional large object in establishing BIM-GIS interoperability platform by combination of construction and spatial information. In this study, we design spatial data LOD for making spatial object and texture by level, and develop weight lightening algorithm of large spatial object.

Keywords : Spatial data, LOD, 3-Dimensional Large Object, Weight Lightening

Services of IT-based Response System for Volcanic Disaster and GIS System

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Abstract

This report is one of the application example of GIS analysis. Display the analyzed GIS map using basic map, statistic economic and social data and convergence of 3D data in National Emergency Management Agency. This paper describe for more accurate and useful data for linkage of data interoperability and rules and direction of data flow characteristics.

Keywords : Open Source, Service Oriented architecture, Volcanic Disaster, IT Service

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