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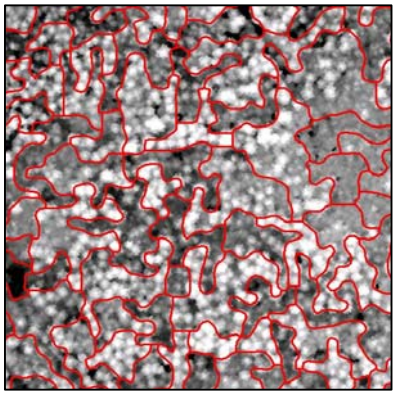
GEOBIA

GEOBIA 2008 - Pixels, Objects, Intelligence
GEOgraphic Object Based Image Analysis for the 21st Century

Calgary, Alberta, Canada





Editors
Geoffrey J. Hay, Thomas Blaschke and Danielle Marceau

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We thank Mr Ryan Powers and Mr Shawn Mueller for compiling this document.

Front Images (provided by G.J. Hay: http://www.ucalgary.ca/f3gisci/profs)
These images (from left to right) are intended to represent the evolution from pixels to objects to intelligence. (L) A fused (1.0 m) QuickBird forest scene in Campbell River British Columbia, Canada. (M) A 3D perspective of the same QuickBird scene draped over the corresponding lidar digital canopy model (DCM). (R) Size Constrained Region Merging (SCRM) segmentation results automatically derived from the DCM.

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Introduction and Welcome

Dear Colleagues,

Dr. Geoffrey J. Hay
Conference Chair

On behalf of the Conference Planning Committee, we invite you to peruse this proceeding of the international conference: ***GEOBIA 2008 - Pixels, Objects, Intelligence: GEOgraphic Object-Based Image Analysis for the 21St Century***. Please note that only full proceedings papers have been included in this document. GEOBIA, 2008 was held at the University of Calgary, Alberta, Canada August, 5-8, 2008. A total of 137 participants from 19 different countries attended the conference and 8 workshops over the 4-day period that featured 3 keynote addresses, more than 63 regular oral presentations in three concurrent sessions, poster sessions and a student prize award for best paper. A special joint session titled *'GEOBIA in Support of Government of Canada Needs*' was also held. GEOBIA, 2008 was co-organized in partnership with the Canadian Space Agency, the ASPRS and the ISPRS. A GEOBIA special issue of Photogrammetric Engineering and Remote Sensing (PE&RS) will be published in 2009.

Dr. Thomas Blaschke
Conference Co-Chair

GEOBIA (pronounced *ge-o-be-uh*) is a recent sub-discipline of Geographic Information Science devoted to developing automated methods to partition remote sensing (RS) images into meaningful image-objects, and assessing their characteristics through spatial, spectral and temporal scales. Its applications range from agriculture and natural resource management, to national defense and global climate change. Its economic impact spans from data collection, hardware and software vendors, developers and users, to recipients of sound sustainable environmental policy.

Dr. Danielle Marceau
Conference Co-Chair

GEOBIA 2008 builds upon the success of the 1st International Conference on Object Based Image Analysis (OBIA 2006), held in Salzburg Austria, where over 120 participants from 24 different countries attended to discuss the latest advances in this developing field. An edited book[1] has been published from extended peer-reviewed conference papers. A GEOBIA Wiki[2] has also been established to facilitate community interaction related to this conference.

A key objective of this event was to facilitate a forum for this growing international community of practice from which we can better share in the latest developments of GEOBIA theory, methods, and applications so as to more intelligently exploit remote sensing imagery. Our theme - ***'Pixels, Image-objects, Intelligence: GEOgraphic Object-Based Image Analysis for the 21st Century'*** - is intended to highlight this objective, and the evolution of this discipline.

We invite you to help build this discipline by contributing your comments, expertise and experience at GEOBIA, 2010, to the GEOBIA Wiki and to the newly proposed GEOBIA.org website.

[1] Object-Based Image Analysis - Spatial concepts for knowledge-driven remote sensing applications. Eds: Thomas Blaschke, Stefan Lang, Geoffrey J. Hay. Springer Lecture Notes in Geoinformation and Cartography, 2008
[2] http://wiki.ucalgary.ca/page/GEOBIA

Committees and Organization:

The Organization committee was lead by Dr Geoffrey J. Hay (Geography, University of Calgary) with Co-Chairs Dr Thomas Blaschke (Z_GIS: Austria), and Dr Danielle Marceau (Geomatics Engineering, University of Calgary). The scientific committee included ten Remote Sensing and GIScience experts from academia, government and industry working throughout North-America and Europe.

Conference Chair & Co-Chairs:

- Geoffrey J. Hay (U.Calgary, AB, Canada)
- Thomas Blaschke (Z_GIS, Salzburg, Austria)
- Danielle Marceau (U.Calgary, AB, Canada)

Scientific Committee (alphabetical order):

- Thomas Blaschke (Z_GIS, Salzburg, Austria)
- Guillermo Castilla (U.Calgary, AB, Canada)
- Manfred Ehlers (U.Osnabrück, Germany)
- Geoffrey Hay (U.Calgary, AB, Canada)
- Maggi Kelly (U.C.Berkeley, USA)
- Stefan Lang (Z_GIS, Salzburg, Austria)
- Marguerite Madden (U.Georgia, USA)
- Danielle Marceau (U.Calgary, AB, Canada)
- Greg McDermid (U.Calgary, AB, Canada)
- Mike Wulder (Canadian Forest Service, BC, Canada)

Executive Committee (alphabetical order):

- Yves Crevier (GRIP, Canadian Space Agency)
- Marcelle Grenier (Environment Canada, QC, Canada)
- Mryka Hall-Beyer (U.Calgary, AB, Canada)
- Erica Borgstrom (Conference & Special Events, U.Calgary)
- Tim Fukami (Conference & Special Events, U.Calgary)

Keynote Abstracts:

GEOGRAPHIC OBJECT-BASED IMAGE ANALYSIS (GEOBIA) IN CONTEXT: PAST, PRESENT AND FUTURE.
Geoffrey J. Hay, University of Calgary

What is Geographic Object-Based Image Analysis (GEOBIA)? To answer this we provide a historical, geographical and contextual overview leading up to this conference. We then propose a formal definition of GEOBIA along with a brief account of its coining and recommend a key objective for this new discipline. We then, propose GEOBIA's main tenets and discuss its plausible future. Much remains to be accomplished.

10 YEARS OF OBJECT-ORIENTED IMAGE ANALYSIS FOR GEOSPATIAL APPLICATIONS: EVOLUTION AND OUTLOOK.
Martin Baatz, Gregor Willhauck, Christian Hoffmann. Definiens

Automated feature extraction from earth observation data is a key requirement in numerous application fields. Increased availability of remote sensing data and increasing market request generate a demand for high-throughput information extraction. Spectral variation, level of detail and the multitude of forms of appearance of specific types of landcover features however are only some aspects that set significant challenges for fully automated analysis. Object-based and object-oriented image analyses have proven in recent years to be a new paradigm for automated feature extraction. At the same time, a shift in focus from desktop based interactive workflows to industrial production workflows can be observed. This contribution discusses requirements and challenges within this context. In order to support fully automated processing, semantic segmentation approaches are needed that are knowledge-based as well as context-driven and support modelling at the same time. Fast adaptation to new tasks, scalability and integratability are further key requirements. An overview about the evolution of Definiens object-oriented Cognition Network Technology is combined with an outlook on future trends and developments.

AUTOMATED FEATURE EXTRACTION FROM TERRESTRIAL AND AIRBORNE LIDAR.
Stuart Blundell, David W. Opitz, Raj Rao Visual Learning Systems, Inc.

The U.S. Army and other Department of Defense (DoD) combat and combat support agencies requires automated feature extraction (AFE) software for collecting very high-resolution 3D urban features from terrestrial LIDAR data to support the ground-based Warfighter operating in the urban battlespace. Advanced vehicle-mounted and man-portable terrestrial Light Imaging and Range Detection (LIDAR) systems capture accurate 3D measurements of the urban environment with spatial resolutions on the order of 5 centimeters or less [Blais, 2004]. The 3D imaging capability of these systems is negated, however, by a lack of commercial software tools capable of exploiting terrestrial LIDAR datasets [Shiode 2001]. Current approaches for creating high-resolution 3D urban models are expensive requiring thousands of man-hours to digitize feature geometries, assign textures to features and attribute features. The lack of robust AFE software tools for collecting geospecific urban features from terrestrial LIDAR systems directly impacts applications for facility reconnaissance, special operations planning and urban warfare decision-making. Visual Learning Systems, Inc. (VLS) has developed a IDAR AFE system capable of extracting over 1,000 buildings per minute as 3D Shapefiles from airborne LIDAR. In this presentation we provide an overview of the VLS solution for 3D AFE from advanced terrestrial LIDAR systems operating in urban environments.

Proceedings Papers:

Session 1: *Comparison of object-based vs. pixel-based methods*

A COMPARISON OF THE PERFORMANCE OF PIXEL-BASED AND OBJECT-BASED CLASSIFICATIONS OVER IMAGES WITH VARIOUS SPATIAL RESOLUTIONS.
(KEY WORDS: Pixel-based image analysis, Object-based image analysis, Accuracy assessment, Simulated images)
Y. Gao, J.F. Mas

CORRELATION OF OBJECT-BASED TEXTURE MEASURES AT MULTIPLE SCALES IN SUB-DECIMETER RESOLUTION AERIAL PHOTOGRAPHY.
(KEY WORDS: texture, segmentation, correlation, multiresolution, aerial photography, object, vegetation)
A. S. Lalibertea, A. Rango

A COMPARISON OF OBJECT-BASED AND PIXEL-BASED APPROACHES TO ESTIMATE LIDAR-DERIVED FOREST CANOPY HEIGHT USING QUICKBIRD IMAGERY.
(KEY WORDS: Canopy height, Geographic object-based image analysis (GEOBIA), Geographic object-based texture (GEOTEX), Tree-ray-shadow geometry (TG), Quickbird, Lidar)
G. Chen, G. J. Hay, G. Castilla, B. St-Onge, R. Powers

COMPARISON OF PIXEL- AND OBJECT-BASED SAMPLING STRATEGIES FOR THEMATIC ACCURACY ASSESSMENT.
(KEY WORDS: Quality, object-based, pixel-based, confusion matrix, samples)
Julien Radoux, Pierre Defourny and Patrick Bogaert

CLASS MODELLING OF BIOTOPE COMPLEXES – SUCCESS AND REMAINING CHALLENGES.
(KEY WORDS: Object-based image analysis, aggregated functional units, CNL, hybrid approach)
D. Tiede, S. Lang, F. Albrecht and D. Hölbling

THE ROLE OF EDGE OBJECTS IN FULL AUTONOMOUS IMAGE INTERPRETATION.
(KEY WORDS: Autonomous classification, crucial features, anchor objects, transferability)
R. de Kok, P. Wezyk, M. Weidenbach

EVALUATION OF ASTER SPECTRAL BANDS FOR AGRICULTURAL LAND COVER MAPPING USING PIXEL-BASED AND OBJECT-BASED CLASSIFICATION APPROACHES.
(KEY WORDS: Agriculture, Land cover, Object, Segmentation, Spectral, Mapping, ASTER, Remote Sensing)
Mst. Farida Perveen, Ryota Nagasawa, Md. Shawkat Ali and Husnain

OBJECT-ORIENTED HIERARCHICAL IMAGE VECTORIZATION.
(KEY WORDS: Segmentation, scale, image vectorization, Delaunay triangulation, Minimum Spanning Tree, Scalable Vector Graphics, visual perception)
A. N. Skurikhin, P. L. Volegov

ACCURACY ASSESSMENT METHOD FOR WETLAND OBJECT-BASED CLASSIFICATION.
(KEY WORDS: Accuracy assessment, object-based classification, error matrix, fuzzy logic, wetland mapping)
M. Grenier, S. Labrecque, M. Benoit and M. Allard

Session 2: *Comparison of segmentation methods; 3D applications (a)*

OBJECTIVE IMAGE SEGMENTATION EVALUATION FRAMEWORK.
(KEY WORDS: Automation, comparison, image, information content, nearness, objective evaluation indices, segmentation)
Christopher Henry and James F. Peters

QUANTITATIVE SEGMENTATION EVALUATION FOR LARGE SCALE MAPPING PURPOSES.
Frieke Van Coillie, Ghent University
(KEY WORDS: Image Sharpening, Segmentation, IKONOS, SPRING 4.3, eCognition 5.0)
T. Novack, L. M. G. Fonseca, H. J. R. Kux

LIBRARY CONCEPT AND DESIGN FOR LIDAR DATA PROCESSING.
(KEY WORDS: lidar data, Point Cloud, Design, Data Management System, Processing)
Nicolas David, Cl´ement Mallet, Fr´ed´eric Bretar

ASSESSMENT OF REMOTE SENSING IMAGE SEGMENTATION QUALITY.
(KEY WORDS: Comparison, evaluation methods, software, remote sensing, IKONOS, high resolution)
M. Neubert, H. Herold

Session 3: *Automated feature detection (a)*

MAPPING ROAD TRAFFIC CONDITIONS USING HIGH RESOLUTIONS SATELLITE IMAGES.
(KEY WORDS: Remote Sensing, Vehicle Detection, Pattern Recognition, Traffic Statistics, High-Resolution Satellite Images, Object-Based Segmentation, QuickBird)
S. Ø. Larsen, J. Amlien, H. Koren, R. Solberg

RECOGNIZING MEANDERS TO RECONSTRUCT RIVER DYNAMICS OF THE GANGES.
(KEY WORDS: river metrics, Landsat, Ganges delta, Bangladesh)
E. A. Addink, M. G. Kleinhans

MULTI IMAGE MATCHING OF STRAIGHT LINES WITH GEOMETRIC CONSTRAINTS.
(KEY WORDS: Matching, Straight Lines, Correlation, Plane Intersection)
A. F. Elaksher

AUTOMATIC CLASSIFICATION OF CENTRAL ITALY LAND COVER: COMPARATIVE ANALYSIS OF ALGORITHMS.
(KEY WORDS: Land cover, comparative analysis, pixel-based algorithms, IKONOS, multispectral images)
P. Zingaretti , E. Frontoni, A. Bernardini, E. S. Malinverni

COMPARATIVE ANALYSIS OF AUTOMATIC APPROACHES TO BUILDING DETECTION FROM MULTI-SOURCE AERIAL DATA.
(KEY WORDS: Building detection, comparative analysis, pixel-based and object-based algorithms, LIDAR, multispectral images)
E. Frontoni, K. Khoshelham, C. Nardinocchi, S. Nedkov, P. Zingaretti

Session 4: *Monitoring (a)*

INCORPORATION OF TEXTURE, INTENSITY, HUE, AND SATURATION FOR RANGELAND MONITORING WITH UNMANNED AIRCRAFT IMAGERY.
(KEY WORDS: segmentation, texture, scale, aerial photography, accuracy, vegetation, object, classification)
A. S. Laliberte, A. Rango

OBJECT-BASED CHANGE DETECTION OF HISTORICAL AERIAL PHOTOGRAPHS REVEALS ALTITUDINAL FOREST EXPANSION.
(KEY WORDS: High Resolution, Forest, Temporal, Change Detection, Soil)
M. Middleton, P. Närhi, M-L. Sutinen, R. Sutinen

OBJECT-BASED LAND-USE AND LAND-COVER MAPPING USING SPECTRAL, SPATIAL AND TOPOGRAPHIC INFORMATION FROM IKONOS IMAGERY.
(KEY WORDS: Vegetation Types, Multispectral IKONOS Image, Segmentation Quality, Object-based Classifications, Topographic Variable, Stream, Euclidean Distance Image)
Minho Kim, Bo Xu, and Marguerite Madden

AN INVERSE ANALYSIS OF UNOBSERVED TRIGGER FACTOR ACCORDING TO SLOPE FAILURE TYPES.
(KEY WORDS: Slope failure types, Trigger factors, Inverse analysis, Structural equation modeling, Spatial data integration)
Hirohito KOJIMA and Shigeyuki OBAYASHI

OBJECT BASED CLASSIFICATION TECHNIQUES IN URBAN CHANGE PLANNING.
(KEY WORDS: Change Detection, Digital Map, Object Based Analysis, Segmentation, Urban Growth, Very High Resolution Imagery)
Mana Nikfal, Farhad Samadzadegan

Session 5: *New classification and segmentation methods (a)*

A FRAMEWORK FOR THE EVALUATION OF MULTI-SPECTRAL IMAGE SEGEMENTATION.
(KEY WORDS: Image segmentation, synthetic images, similarity indices, segmentation metrics, segmentation evaluation)
André R. S. Marçal, Arlete S. Rodrigues

UNIVERSAL OBJECT SEGMENTATION IN FUSED RANGE-COLOR DATA.
(KEY WORDS: Expectation Maximization, Data Fusion, SICK LMS, CCD camera, Segmentation)
Jeff Finley and Chris Lewis

A METHOD FOR ADAPTING GLOBAL IMAGE SEGMENTATION METHODS TO IMAGES OF DIFFERENT RESOLUTIONS.
(KEY WORDS: Object based image analysis, image segmentation, transferability of rule bases)
P. Hofmann, Josef Strobl, Thomas Blaschke

MODIS EVI AS AN ANCILLARY DATA FOR AN OBJECT-BASED IMAGE ANALYSIS WITH MULTI-SPECTRAL MODIS DATA.
(KEY WORDS: Enhanced Vegetation Index (EVI), Moderate Resolution Imaging Spectral-radiometer (MODIS), Phenology, Object-based image analysis)
Y. Gao, J.F. Mas

MULTI SCALE OBJECT BASED DETECTION AND CLASSIFICATION OF ROADS AND VEHICLES IN HIGH RESOLUTION OPTICAL SATELLITE IMAGERY.
(KEY WORDS: Object based, Detection, Classification, Vehicles, Roads, High resolution, Satellite imagery)
A. Oostdijk, M. van Persie, H.H.S. Noorbergen, J.W. van Rijn

Session 6: *New classification and segmentation methods (b)*

FUZZY IMAGE SEGMENTATION FOR URBAN LAND-COVER CLASSIFICATION.
(KEY WORDS: Segmentation, classification, land-cover, image-regions, image-objects, fuzzy)
I. Lizarazo, J. Barros

AUTOMATIC ADAPTATION OF SEGMENTATION PARAMETERS APPLIED TO NON-HOMOGENEOUS OBJECTS DETECTION.
(KEY WORDS: Parameter Adaptation, Parameter Tuning, Object Detection, Segmentation, Genetic Algorithms, Hough Transform)
C. M. B. Fredrich, R. Q. Feitosa

IMAGE-TO-MAP CONFLICT DETECTION USING ITERATIVE TRIMMING: APPLICATION TO FOREST CHANGE.
(KEY WORDS: trimming, change, vector, kernel density estimate, Quickbird)
Radoux, J. and Defourny, P.

AN OBJECT-BASED LAND-USE CELLULAR AUTOMATA MODEL TO OVERCOME SCALE SENSITIVITY.
(KEY WORDS: Scale dependency, raster-based cellular automata model, object-based cellular automata model, dynamic neighborhood, land-use change, simulation)
Niandry Moreno, Fang Wang, and Danielle J. Marceau

USE OF STATISTICAL DISTRIBUTION FOR SEGMENTATION OF SAR IMAGES OF OCEANIC AREAS.
(KEY WORDS: SAR, Statistics, Ship Detection, Processing, Image, Algorithms, Oceans, Remote Sensing)
R.F.Rocha

VEGETATION FIRE FUELS MAPPING IN THE SAN DIEGO CITY CANYONS – A METHOD COMPARISON.
(KEY WORDS: Mapping, hazards, high resolution, comparison, segmentation)
M. Neubert, S. Kropp, S. Wagenknecht, D. Stow, L. Coulter

CHANGE DETECTION FOR UPDATES OF VECTOR DATABASE THROUGH REGION-BASED CLASSIFICATION OF VHR SATELLITE DATA.
(KEY WORDS: Change detection, Database updating, Very high spatial resolution satellite images, Object based classification, PLEIADES-HR data)
Carleer Alexandre, Wolff Eléonore

GEO-OBJECT BASED VHR IMAGE CLASSIFICATION SUPPORTED BY GIS LAYERS AND EXPERT KNOWLEDGE.
(KEY WORDS: object classification, digital analysis, land cover, VHR satellite images)
J. Chmiel, A. Fijałkowska

Session 7: *Government session presentations:*

FOREST MONITORING INFORMATION NEEDS IN CANADA.
Mike Wulder, Natural Resources Canada, Canadian Forest Service – presented by Joanne White

THE USE OF EARTH OBSERVATION TO ASSESS GROUND WATER RESOURCES.
Stéphane Chalifoux, NRC, Earth Sciences – Ground water

WETLAND MAPPING USING OBJECT BASED CLASSIFICATION OF RADARSAT AND LANDSAT-ETM IMAGES FOR PROTECTED AREAS.
Marcelle Grenier, Environment Canada – Ecosystem Conservation

SPACE-BASED MONITORING TO SUPPORT WILDLIFE RESEARCH, MANAGEMENT AND ENFORCEMENT TO DELIVER ON ENVIRONMENT CANADA'S MANDATE.
Jason Duffe, Environment Canada – Pesticides Evaluation

OBJECT-BASED RESOURCE INFORMATION EXTRACTION: RELEVANCE TO ECOLOGICAL INVENTORY AND MONITORING.
Rajeev Sharma, National Parks Directorate El Branch – Ecosystem Monitoring

Session 8: *Monitoring (b)*

HAVE FORESTS REALLY BECOME DENSER? AN OBJECT-ORIENTED ASSESSMENT OF A KEY PREMISE IN WILDFIRE POLICY.
(KEY WORDS: forest fire, object, management, ecosystem, hazards, land cover, vegetation, orthorectification)
R.V. Platt, T. Schoennagel

DEVELOPMENT OF PROCESS TREES FOR OBJECT-ORIENTED CHANGE DETECTION IN RIPARIAN ENVIRONMENTS FROM HIGH SPATIAL RESOLUTION MULTI-SPECTRAL IMAGES.
(KEY WORDS: Object-Oriented Change Detection, Definiens Developer, Rule Sets, Riparian Zones, QuickBird)
K. Johansen, L.A. Arroyo, S. Phinn, C. Witte

STUDYING THE EARTHQUAKE EFFECT ON LINEAMENT DENSITY CHANGES BY REMOTE SENSING TECHNOLOGY.
(KEY WORDS: Earthquake, Lineament Density, Remote Sensing, Feature-Based Methods)
A.Sharifi, M.A.Rajabi, N.Fuladi Moghaddam

QUANTITATIVE COMPARISON OF SEGMENTATION RESULTS FROM IKONOS IMAGES SHARPENED BY DIFFERENT FUSION AND INTERPOLATION TECHNIQUES.
(KEY WORDS: Image Sharpening, Segmentation, IKONOS, SPRING 4.3, eCognition 5.0)
T. Novack, L. M. G. Fonseca, H. J. R. Kux

INNOVATIVE WOODY BIOMASS RESOURCE ASSESSMENT USING MULTIPLE RESOLUTION SATELLITE IMAGERY AND GEOBIA TECHNOLOGY.
(KEY WORDS: Renewable Energy, Biomass, Satellite Imagery, GEOBIA, QuickBird, Landsat, Feature Analyst)
J. W. San Souci

MONITORING VEGETATION STRUCTURE IN FLOODPLAINS FOR FLOOD RISK ESTIMATION.
(KEY WORDS: flood risk, floodplain, natural vegetation, De Blauwe Kamer, the Netherlands)
E. A. Addink, M. E. ten Haaf, S. M. de Jong

Session 9: *Delineation of man-made features*

DETECTION OF RING SHAPED STRUCTURES IN AGRICULTURAL LAND USING HIGH RESOLUTION SATELLITE IMAGES.
(KEY WORDS: Ring graves, Quickbird, template matching, contrast enhancement, archaeology, remote sensing)
S. Ø. Larsen, Ø. D. Trier, R. Solberg

BUILDING DETECTION FROM HIGH-RESOLUTION SATELLITE IMAGERY USING ADAPTIVE FUZZY-GENETIC APPROACH.
(KEY WORDS: Building Extraction, Image Processing, Genetic Algorithms, Fisher Linear Discriminant, High Resolution Satellite Imagery)
E. Sumer, M. Turker

HIDDEN MARKOV MODELS APPLIED IN AGRICULTURAL CROPS CLASSIFICATION.
(KEY WORDS: Crop Identification, Hidden Markov Models, Multitemporal Analysis, Object-based Image Analysis)
P. B. C. Leite, R.Q. Feitosa, A.R. Formaggio, G. A. O. P. Costa, K.Pakzad, , I. D. A. Sanche

EXTRACTION OF RAILROAD OBJECTS FROM VERY HIGH RESOLUTION HELICOPTER-BORNE LIDAR AND ORTHO-IMAGE DATA.
(KEY WORDS: LIDAR, object extraction, three-dimensional, GIS integration)
M. Neubert, R. Hecht, C. Gedrange, M. Trommler, H. Herold, T. Krüger, F. Brimmer

ROBUST DETECTION OF BUILDINGS FROM A SINGLE COLOR AERIAL IMAGE.
(KEY WORDS: Color Aerial Imagery, Building Detection, Segmentation, Mean-shift, Photometric Quasi-invariants)
Ali Özgün Ok

Session 10: *Ontology*

FROM PIXELS TO GRIXELS: A UNIFIED FUNCTIONAL MODEL FOR GEOGRAPHIC OBJECT-BASED IMAGE ANALYSIS.
(KEYWORDS: GEOBIA, Remote Sensing, Image Analysis, Knowledge, Ontology)
I. Lizarazo, P. Elsner

SEGMENTATION: THE ACHILLES HEEL OF OBJECT–BASED IMAGE ANALYSIS?
(KEY WORDS: digital cartography, spatial framework, segmentation, land cover)
Geoffrey Smith and Daniel Morton

Session 11: *New classification and segmentation methods (c)*

IMALYS - AN AUTOMATED AND DATABASE-INTEGRATED OBJECT-ORIENTED CLASSIFICATION SYSTEM.
(KEY WORDS: Segmentation, Classification, Database, Automation, Method, Software)
E. Matejka, M. Reinhold, P. Selsam

MULTILEVEL OBJECT BASED IMAGE CLASSIFICATION OVER URBAN AREA BASED HIERARCHICAL IMAGE SEGMENTATION AND INVARIANT MOMENTS.
(KEY WORDS: hierarchical segmentation, shape, object-based classification, invariant moments, high resolution imagery, watershed transformation)
Peijun Li, Jiancong Guo, Haiqing Xu and Xiaobai Xiao

QUANTUM-INSPIRED EVOLUTIONARY ALGORITHM AND DIFFERENTIAL EVOLUTION FOR THE AUTOMATIC ADAPTATION OF SEGMENTATION PARAMETERS.
(KEY WORDS: Image Segmentation, Genetic Algorithm, Optimization, Quantum-Inspired, Differential Evolution)
L. M. Melo, G. A. O. P. Costa, R. Q. Feitosa, A. V. Abs da Cruz

INTERIMAGE: AN OPEN SOURCE KNOWLEDGE BASED FRAMEWORK FOR AUTOMATIC INTERPRETATION OF REMOTE SENSING DATA.
(KEY WORDS: Interpretation, Classification, Knowledge Base, Open Systems, Inter-Operability)
D. A. B. Oliveira, G. A. O. P. Costa, R. Q. Feitosa, E. F. Castejon, L. M. G. Fonseca

DEVELOPING AN AGENT BASED SYSTEM FOR CUSTOMIZING DISTRIBUTED GIS SERVICES.
(KEY WORDS: GIServices, GIS Meta Data, Mobile Agent, Information Technology)
Aliaa Youssif, Atef Galwash and Marwa Shahin

RANGE IMAGE SEGMENTATION USING THE NUMERICAL DESCRIPTION OF MEAN CURVATURE VALUES.
(KEY WORDS: Laser Scanner, Range Image Segmentation, Mean Curvature values, Crease-step edge)
Yahya Alshawabkeh, Norbert Haala, Dieter Fritsch

Session 12: *Map updating and tree crown delineation*

INDIVIDUAL TREE DETECTION BASED ON DENSITIES OF HIGH POINTS FROM HIGH RESOLUTION AIRBORNE LIDAR.
(KEY WORDS: Airborne LiDAR, densities of high points, tree detection, Inverse Watershed segmentation, Canopy Height Model (CHM), Digital Terrain Model (DTM))
M.Z.A. Rahman, B. Gorte

AUTOMATIC DELINEATION OF FOREST STANDS FROM LIDAR DATA.
(KEY WORDS: LiDAR segmentation, automatic stand delineation, stand definition, stand quality, forest stand delineation, automatic feature extraction, region growing)
V. J. Leppänen, T. Tokola, M. Maltamo, L. Mehtätalo, T. Pusa, J. Mustonen

APPLIED 3D TEXTURE FEATURES IN ALS BASED TREE SPECIES SEGMENTATION.
(KEY WORDS: lidar, Segmentation, Tree species classification, Alpha shape, 3D texture)
T. Tokola, J. Vauhkonen, V. Leppänen, T. Pusa, L. Mehtätalo, & J. Pitkänen

ESTIMATING CANOPY COVER FROM EUCALYPT DOMINANT TROPICAL SAVANNA USING THE EXTRACTION OF TREE CROWNS FROM VERY HIGH RESOLUTION IMAGERY.
(KEY WORDS: canopy cover, object-based, image segmentation, tree crowns, northern Australia, tropical savanna)
Tim Whiteside and Waqar Ahmad

Co-organization & Partnership

Co-organization Partners:

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