Graduate Seminar Conference

Thursday, November 27th, 2008

Department of Geodesy and Geomatics Engineering
University of New Brunswick

The organizers would like to welcome you to the
2008 Graduate Seminar Conference

Where: E-11

When: Thursday, November 27th 2008

Please join for refreshments after the Conference in room E-52, GGE Conference Room.

Seminar Organizer
Auke van der Werf & Kealeboga Moreri,
with thanks to Sylvia Whitaker

Geodesy and Geomatics Engineering

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Graduate Seminar Conference

E-11
Thursday, November 27th, 2008

11.00	Opening Remarks
Session 1:	**GIS and GPS** Chair: Auke van der Werf
11:05 am	A RuleML Study in Georeferenced Health Information Retrieval *Sheng Gao*
11:25 am	Establishment and Maintenance of a New Real Time Geospatial Frame – TZRF10 for Tanzania *James Daniel Mtamakaya*
11:45 am	Estimation of Troposphere Decorrelation Using the Combined Zenith-dependent Parameter *Yong-Won Ahn*
12.05 am	**Short Break**
Session 2:	**Remote Sensing** Chair: Kealeboga Moreri
12:15 pm	A Novel Point Matching Algorithm for High Resolution Satellite Images *Zhen Xiong*
12:35 pm	Change Detection with Different Spatial Resolution Images *Yongdae Gweon*
12.55 pm	**Reception**

A RuleML Study in Georeferenced Health Information Retrieval

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Abstract

To facilitate health surveillance, flexible ways to integrate, deduce and represent health information become increasingly important. Health data are collected and stored in heterogeneous ways, which causes barriers to health information retrieval. Ontologies, as shared specifications of conceptualizations, can facilitate the semantic query of information. From georeferenced health data, their implicit spatial relationships can be discovered from the spatial location. Meanwhile, health information has thematic, spatial, and temporal components. There is strong need from health practitioners to map health data into certain administrative areas.

In this paper, we designed and implemented an eHealthGeo system to support ontology based query and visualization of health information. An ontology is created for the semantic definition of thematic, spatial, and temporal factors of health information. The ontology is realized as an interchangeable RuleML knowledge base, consisting of facts and rules. Rules are also used for thematic, spatial, and temporal query and inference of health information. The implemented eHealthGeo system combines a reasoning engine with a mapping engine to enable health information roll-up and visualization. It uses OO jDREW as the reasoning engine to deduce implicit information such as spatial relationships. Geotools is used as the mapping engine to generate health maps with the response from the reasoning engine. This eHealthGeo study demonstrates a RuleML approach to supporting semantic health information retrieval and management.

ESTABLISHMENT AND MAINTANANCE OF A NEW REAL TIME GEOSPATIAL FRAME -TZRF10 FOR TANZANIA

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Abstract

Tanzania like most of the African countries has old and convectional geodetic network. This network was established and computed by the Directorate of Overseas (DOS) Surveys of the Great Britain way back 1950 with the arc 30th meridian of the Clarke 1880 modified ellipsoid with its base at Cape Town in the Republic of South Africa. The present network does not satisfy the overgrowing mapping requirements of the country as well requirement of other Geo-related information that include homogeneous cross boarder mapping activities (most of the international boundaries have not been physical defined), smooth Land regularization projects, production and update of large topographical maps in urban areas and homogenous spatial mapping between different regions.

For long Tanzania have trying to establish a new geocentric frame that would be capable of minimizing some of these problems as well as providing ways towards continental global mapping frame AFREF. However, lack of appropriate expertise of doing so has been one of the major limiting factors to reach the required national objectives.

Using the UNB knowledge and the expertise of the Canadian GSD in maintaining the NAD83 (CSRS), I shall develop a conceptual plan towards the realization and maintenance of a new geospatial frame TZRF10 in the ITRF system for Tanzania. Basing on the technological advancements in satellite positioning, the new frame TZRF10 shall be integrated with the new **GNSS-RT** system so as to support to near real time application. Three different case studies shall be developed and evaluated for their performance.

Estimation of Troposphere Decorrelation Using the Combined Zenith-dependent Parameter

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Abstract

For dual-frequency GPS observables, one of the largest error sources affecting high-precision positioning solutions arises from the unmodelled troposphere. Even for the short baseline, the resultant solution can be degraded once there is strong anomaly effect due to the troposphere. The problem can be more difficult as the troposphere parameters are highly correlated with the height component.

In order to decorrelate those parameters, we introduce a new approach in this paper. Instead of two separate parameters, we combine them into one common parameter as they are both zenith-dependent parameters. We have examined the feasibility of our proposed method for estimating the positioning and residual troposphere parameters. Data collected in Southern Texas, USA, on August 21, 2005 over a baseline length of around 7.8 km was reprocessed. The positioning solution from the new combined proposed parameter has been tested, evaluated, and compared with that from the conventional estimation method. By using the methodology, significant positioning improvement was achieved in the horizontal component as well as the vertical component. The estimated troposphere parameters using the combined parameter are also compared with that from the uncombined parameter. In addition, possible usage of Spirent's STR4760 GPS L1/L2/L2C hardware simulator to generate similar tropospheric anomaly patterns is addressed for further research.

A Novel Interest Point Matching Algorithm for High Resolution Satellite Images

Zhen Xiong

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Abstract:

Interest point matching is the key technique for image registration. It is widely used for 3D shape reconstruction, change detection, medical diagnosis, computer vision and pattern recognition. Although numerous algorithms have been developed for different applications, it is still a problem to process the local distortion of images that are normally acquired with different viewpoints. Remote sensed images are normally acquired with a wide baseline and typically contain local distortion due to ground relief variation. Basically interest point matching algorithms can be grouped into two categories: area-based and feature based. Although the area-based and feature-based algorithms have their own particular advantages in specific circumstances, they all face the common problem: ambiguity in smooth areas, such as grass, water, highway surfaces, building roofs, etc. In this paper, a new algorithm for interest point matching of remote sensed images is proposed. The key technique of this algorithm is to detect super interest points and construct a control network. Sufficient spatial information is then available to reduce the ambiguity and avoid false matches. We commence our paper with a brief review of current research on interest point matching. We then introduce the proposed algorithm in detail and describe experiments with three sets of high resolution satellite images. The experiment results show that the proposed algorithm can successfully process local distortion in remote sensing images and can avoid ambiguity in matching the smooth areas. It is simple, fast, and accurate.

Change Detection with Different Spatial Resolution Images

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Abstract

Aerial photos have been increasingly and commonly used in various spatially related applications. Many municipalities and government agencies, therefore, have constructed aerial photo databases all over the world. Keeping these databases up-to-date is the most important part of making them effective so that aerial photo databases are expected to be updated as frequently as possible. In practice, however, some of them are barely updated because of high cost.

In this study, a cost-effective and practical method is suggested to detect land-cover changes to support decision making for updating aerial photo databases. Instead of using high-resolution aerial photos, therefore, free accessible medium-resolution Landsat ETM from GeoBase is proposed to compare with orthophotomaps from SODB (Provincial Softcopy Orthophotomap DataBase) by the SNB (Service New Brunswick). There are some restrictions to compare these two different spatial-resolution images such as the salt-and-pepper effect, misclassification and difficulty of identifying changes. In order to overcome the restrictions, orthophotomaps are decomposed, segmented and classified through wavelet transform and object-oriented approach and then post-classification comparison is applied to find changes.

The experiment shows that the method produces higher classification accuracy and may not completely count on the quality of the image segmentation. Although it is difficult to detect detailed changes from two different spatial-resolution images, the method is quite cost-effective and practical to locate necessity of updating aerial photo databases.

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