
Graduate Seminar
&
Student Technical Conference



Tuesday November 26th, 2013

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Monday, December 2nd, 2013

Department of Geodesy and Geomatics Engineering

University of New Brunswick

The Department would like to welcome you to the
2013 Graduate Seminar & Student Technical Conference

Where:

Gillin Hall – Room D-108

When:

Tuesday, November 26th 2013 at 10am

&

Monday, December 2nd 2013 at 10am

Department of Geodesy and Geomatics Engineering

Geodesy and Geomatics Engineering
Graduate Seminar and Student Technical Conference

Chair: *Titus Tienaah (PhD)*

Tuesday, November 26th 2013 (GD108)

10:00: **Welcome note**

10:05: **Hazus Flood Model in Canada – New Brunswick Municipal Project**

Heather McGrath (MScE)

10:30: **A Web Application for the Monitoring and Visualization of Wireless Sensor Data of Historical Sites**

Sabarish Senthilnathan Muthu (MScE)

10:55: **Designing and Developing a Scalable Platform for Visualizing and Mapping Activities using Geotagged Tweets to Increase Location-based Information**

Seyed Emad Mousavi (MScE)

11:20: **Geospatial Analysis and Intelligence Application (GAIA)**

Alex Dave Szrajbman (Instituto Militar de Engenharia, Brazil)

11:45: **Closing Remarks**

Monday, December 2nd 2013 (GD108)

10:00: **Hydrodynamic Model Skill Assessment and Interpretation of Residual Circulation Patterns**

Ian W. Church (PhD)

The following paper has also been reviewed in this round and will be presented in a separate session (date TBA):

3D University of New Brunswick – Ionospheric Modelling Technique

Wei Zhang (MScE)

Hazus Flood Model in Canada – New Brunswick Municipal Project

Heather McGrath

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Abstract

In New Brunswick the prospect of flooding due to snow melt, ice jams, and heavy rain storms is a concern as communities and extensive infrastructure have been developed close to rivers. Canadian municipalities are facing a pressing need to perform risk assessments to identify and measure areas at risk of potential economic and societal losses due to flooding. To this end Natural Resources Canada, Earth Sciences Sector is testing and validating the FEMA Hazus-MH software. Using Hazus-MH one can model potential flood levels, their recurrence, and determine the potential economic losses of structures and facilities built in the area. An adaption of the U.S.A. Hazus-MH flood model is necessary as revisions to the default inventory databases and algorithms are required to support Canadian settings. This project will be reviewing municipalities in New Brunswick and selecting of one for inclusion in the Hazus Canada pilot program.

A Web Application for the Monitoring and Visualization of Wireless Sensor Data of Historical Sites

Sabarish Senthilnathan Muthu

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Abstract

Smart Monitoring of Historic Structures [SMooHS, 2010] was a research project commissioned by the European Union to continuously monitor, visualize and analyze environmental data at historic sites, specifically temperature, humidity, air velocity, strain and crack opening, acoustic emissions, vibration, ambient or UV light levels, or chemical attack, captured using wireless sensor networks. The monitoring was continuous and the sampling rate was not uniform. As a result a large dataset was acquired. To make the sampling uniform and reduce the dataset, data resampling is essential. In addition, visualization of the resampled data also needs to be incorporated. The objectives of my research were to develop a secure Web application to facilitate the following: (a) processing of the data captured from the wireless sensor networks by resampling; (b) data visualization of this resampled data using time series 2D plots; and (c) data exportation of this resampled data in CSV format. The resampling and visualization using 2D plots were achieved using GNU Octave, a high-level programming language, primarily intended for numerical computations [Eaton et al., 1998]. GNU Octave is an open-source version of MATLAB, which runs in Linux based environments. PHP was used as the server-side scripting language, MySQL as the back-end database, and Joomla as the Content Management System (CMS). PHP was used to connect to the MySQL database, which acts as a central storage location for all the data captured from the wireless sensor networks. The data fetched from MySQL was passed to GNU Octave scripts for resampling and visualization. The data exportation is facilitated through PHP. The result of this research was a secure Web application, which facilitated data processing using resampling and visualization of this resampled data as time series plots.

Designing and Developing a Scalable Platform for Visualizing and Mapping Activities using Geotagged Tweets to Increase Location-based Information

Seyed Emad Mousavi

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Abstract

The availability of location based data has substantially increased due to the growth of social networks which provide access to huge amount of geo located data and with the recent developments in the field of cloud computing, the possibility to process and analyze this massive amount of data in order to design and provide spatial services has become easier to achieve. In this paper, an architecture for a cloud based platform will be proposed in order to increase location-based information using the geotagged data captured from Twitter and also using Twitter data collected from a case study area in Vancouver, British Columbia, the results for the proposed architecture will be evaluated and tested. The architecture consists of three main components, data collection, data processing, result data visualization. For the data collection component, a Java application has been written to collect the geotagged Tweets using Twitter's API. Apache Hadoop has been used to handle the processing component and using MapReduce as its framework and Hbase and Hive on top of Hadoop, the processing part of the architecture has been facilitated, and for the visualization component, using Mapbox's API and JavaScript, the platform has become ready to deploy. In the end the results from the case study area are presented and discussed, and advantages and disadvantages of our approach have also been elaborated.

Geospatial Analysis and Intelligence Application (GAIA)

Alex Dave Szrajbman

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Abstract

Developing easy to use products focused on the end user is growing increasingly important in a world dominated by “apps”. Software is not expected to be able to do every conceivable task with each dataset, but rather only a few specific ones as fast as possible with a user interface that has little to no learning curve necessary. This is the motivation to develop the present program: an easy to use application focused on helping the decision-making process for the Brazilian military through a 2.5D map viewing platform with tools such as straight distance, shortest distance on the terrain and visibility. Such program could also be helpful in situations such as recent landslides in Rio de Janeiro, Brazil, when combined with fast cartography techniques, such drone-based mapping, to better understand the current terrain situation and optimize operations such as rescue attempts.

Hydrodynamic Model Skill Assessment and Interpretation of Residual Circulation Patterns

Ian W. Church

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Abstract

A 3D baroclinic hydrodynamic model has been developed to investigate the estuarine circulation within the Port of Saint John, in southern New Brunswick. The model simulates the movement of fresh waters from the Saint John River and saline waters from the Bay of Fundy over three seasonal periods which are representative of river flood stages. Outputs include temperature, salinity and current velocities in three dimensions over the domain of the port. Modelling the circulation of the port allows for improved estimates of the driving forces behind the sedimentation in the harbour, which is a critical factor in understanding and estimating annual dredging requirements.

The model simulation periods coincide with a dense physical oceanographic observation campaign from the UNB Ocean Mapping Group vessel, the Heron. The validity of the model output can then be assessed through statistical comparison to the physical observation data. After testing the skill of the model, the output is used to describe seabed erosional and depositional patterns through examination of seabed residual current patterns. Variations in seabed residual circulation patterns provide a tidally averaged estimate of the movement of sediment throughout the harbour.

3D University of New Brunswick – Ionospheric Modelling Technique*

Wei Zhang

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Abstract

Ionospheric modelling has become an focus area within the global navigation satellite system (GNSS) community using several satellite-based augmentation systems (SBAS) (e.g., Wide Area Augmentation System (WAAS), European Geostationary Navigation Overlay Service (EGNOS), and MTSAT Satellite-based Augmentation System (MSAS)). Data-driven models have been applied with these systems and demonstrated as the best candidates for post-processing and other real-time applications due to their real-time applicability and relatively higher accuracy compared to empirical ionospheric modelling techniques.

In this paper, our objective is to improve the accuracy for the real-time positioning applications. To achieve this, I extended the University of New Brunswick-Ionospheric Modelling Technique (UNB-IMT) from two-dimensions (2D) to three-dimensions (3D) by modelling the vertical dimension of the ionosphere using empirical orthogonal functions (EOFs) to eliminate the potential mapping function errors. The benefits of the new proposed modelling technique are demonstrated in a small regional network using post-fit residuals, and estimated vertical total electron content (vTEC).

(* Note: This paper will be presented in a separate session (date TBA).



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