Qualifying Exam

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Exam Committee

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Exam Logistics

Date:

Friday, January 24, 2014

Time:

1:00-2:15pm

Location:

Innovation Center
Pervasive Technology Institute
Digital Science Center #156 (Situation Room)
2719 E. 10th Street
Bloomington, IN 47408

Proposed Research Talk

Title Optimization Techniques and the Detection Layer Boundaries in Polar Radar Imagery

The polar ice sheets interact with climatic forces, and the impact of their retreat on global sea level would be profound. Forecasting the evolution of ice sheets in Greenland and Antarctica will depend on the development of accurate numerical models. Currently, ice sheet models suggest a response to climate change on a millennia timescale, an idea, which advocates considerable time to develop planning strategies for responding to global climate effects. However, existing models cannot explain the recent satellite observations showing rapid thinning of ice sheet margins, the speedup of several outlet glaciers in Greenland, and the disintegration of ice shelves in West Antarctica. In order to better understand the mechanisms controlling either the net loss or gain of ice, there is a need to use radio echo sound techniques to collect ice thickness over ice sheet margins and mapped internal layers in polar firn.

The Center for Remote Sensing of Ice Sheets (CReSIS) has developed and deployed nonintrusive instruments for increasing measurement capabilities of the polar regions, which are critical to understanding rapid glacial changes. Analyzing the large amounts of collected subsurface features is important to validate models, but identifying ice features, particularly internal layers, are challenging since multiple, non-existence layers cause domain experts to skip and misclassify them. The polar science community has developed brute force techniques for manually selecting key layer boundaries but, the custom software provides a tedious and time - consuming task to be performed efficiently and consistently. There is a need for techniques to support the automatic analysis of near surface internal layers.

This qualifying exam focuses on the internal layer problem and discuss optimization techniques for minimizing energy to improve boundary detection.

References

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