

High-performance Spatiotemporal Data Mining
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Abstract

Biomass monitoring over large geographic regions using remote sensing poses several challenges. Existing change detection techniques are not adequate or scalable for continuous monitoring. On the other hand characterizing changes requires accurate classification of remote sensing images. Supervised classification over large geographic regions poses the following challenges: (i) inadequate ground truth data, (ii) aggregate challenges, (iii) spatial homogeneity, and (iv) spatial heterogeneity. In this poster, we present recent advances in spatiotemporal data mining, especially the techniques that exploit the subtle multidimensional signals through the joint use of high temporal resolution (MODIS) data and moderate- and fine-spatial resolution (AWiFS) satellite images for extracting multi-temporal biomass change information, including crop types and their conditions. Specifically, we show Gaussian Process (GP) based classification and change detection technique, and semi-supervised classification technique. In addition, we show computational challenges in scaling these algorithms for large geographic regions and provide recent results on shared and distributed memory systems.