OAK RIDGE NATIONAL LABORATORY
MANAGED BY UT-BATTELLE FOR THE DEPARTMENT OF ENERGY
FACT SHEET

Monitoring Biomass at Regional and Global Scales

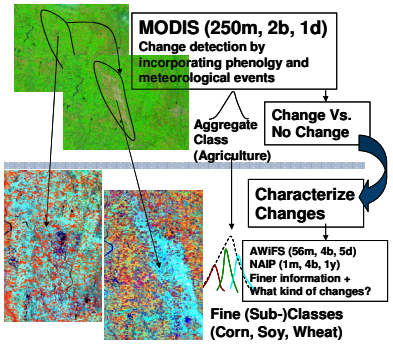
A Spatiotemporal Data Mining (STDM) Framework

Challenges in Monitoring Biomass over Large Spatiotemporal Extents

Monitoring crops over large geographic regions is still a challenging problem due to the issue of scaling local/field information to regional scales. Spatiotemporal variability in crop phenological cycles and/or anomalous events, as well as coarse-resolution pixels and mixed pixels, are complicating factors. Such problems are further accentuated in areas where farm plots are relatively small and fragmented across the landscape; such areas may be less amenable to regional remote crop monitoring, as the task of distinguishing between natural and agricultural vegetation may be difficult using traditional methods. Crop monitoring requires reduction of false positives, incorporation of ancillary geospatial data and external events (e.g., floods), scaling of algorithms for large geographic regions, and reduction of human costs by greater automation.

Spatiotemporal Data Mining Framework

By exploiting recent advances in statistical modeling and machine learning approaches, ORNL is designing a generic spatiotemporal data mining framework for monitoring and characterizing changes in croplands using multispectral and temporal remote sensing images and spatial databases. The STDM framework provides innovative solutions based on extensions to the state-of-art change detection techniques by taking into account the crop phenology and external (meteorological) events to reduce false-positives (changes). The new techniques that we are developing allow characterization of changes and extraction of finer information by exploiting multi-resolution images.



Benefits to Stakeholders

- Provides timely information about dynamic changes in biomass (crops) at regional and global scales
- Provides reliable information (reduced false-positives) about the changes
- Provides fine-resolution information
- Reduces manual costs
- Easily adoptable to new geographic regions
- Works in areas where getting ground-truth information is hard

Publications

- Ranga Raju Vatsavai, Shashi Shekhar, Budhendra L. Bhaduri: A Learning Scheme for Recognizing Sub-classes from Model Trained on Aggregate Classes. Joint IAPR International Workshop on Statistical Pattern Recognition, LNCS Vol. 5342, 967-976, Springer, 2008.
- Ranga Raju Vatsavai. Incremental Clustering Algorithm for Earth Science Data Mining. In Intl. Conf. on Computational Science, Workshop on Data Mining in Earth Sciences, Springer, 2009.

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