Earth Observation Data Analysis: Machine Learning Perspective

Susmita Ghosh
Department of Computer Science and Engineering
Jadavpur University

Leveraging multi-temporal images, the Earth observation (EO) data analysis plays a crucial role in monitoring urban expansion, environmental changes, etc. However, a key challenge of such images has been the limited availability of ground truth information, which affects the performance of machine learning-based models. To address this, besides using unsupervised models, *neural network-based semi-supervised, active, and self-supervised* learning techniques have been explored, balancing accuracy vs. data deficiency. While supervised methods ensure accuracy, the present talk will demonstrate the efficacy of semi-supervised/active learning-based approaches that minimize annotation dependency/ labeling effort.

Hyperspectral images, on the other hand, play a major role in obtaining detailed information. However, this data is challenged by its high dimensionality thereby leading to computational inefficiency, model overfitting, and difficulty in capturing both spatial and spectral relationships simultaneously. Therefore, dimensionality reduction becomes a challenge in exploiting such data. The present talk will provide a glimpse of various band selection/extraction techniques, both using supervised and unsupervised frameworks. Recent work on Attention-based Deep neural models for land-use analysis will also be touched upon in this talk.