ASEN 6337 Remote Sensing Data Analysis

Lecture: T/TH 11:30-12:45pm, AERO 232
Webpage: Canvas (https://canvas.colorado.edu)
Instructor: Prof. Tomoko Matsuo
Office Hour: T/TH 12:45-1:45pm, or by appointment, AERO 467
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(Note that the Canvas Conversations communication tool is not used)

Course Description

With an explosive increase in the availability of high-resolution earth and space remote sensing data, analyzing it has become a big data problem. Increasingly, machine learning is being recognized as a powerful tool for addressing this challenge. This course covers some of the most commonly used machine learning techniques in remote sensing data analysis, specifically for clustering, classification, feature extraction and dimensionality reduction. The course also covers inverse methods used to retrieve geophysical information from remote sensing data. The course materials are organized into five sections: (1) Introduction, (2) Feature Extraction and Selection, (3) Clustering, (4) Classification, and (5) Inverse Methods for Atmospheric Remote Sensing Data. Hands-on computational homework (in Matlab or/and Python) and group and individual projects provide opportunities to apply classroom curricula to real remote sensing data.

Class Learning Goals

The goal of this course is to introduce commonly used machine learning techniques and inverse methods in remote sensing data analysis, equipping students with the knowledge and skills to apply modern data analysis techniques to remotely sensed data on their own. Students will: (1) develop a deeper understanding of machine learning and inverse methods in the context of remote sensing data analysis; (2) actively apply their own understanding of the fundamentals and tradeoffs of different approaches in critiquing current remote sensing data analysis research; and (3) develop the skills, confidence and creativity to design and solve a remote sensing data analysis problem of their choice.

Prerequisites

Some basic understanding of estimation theory and statistical learning techniques (e.g., ASEN 5044 Statistical Estimation for Dynamical Systems, ASEN 5307 Engineering Data Analysis Methods), as well as programming experience with Matlab or/and Python and familiarity with software engineering tools (e.g., Git) are desired.

Course Content

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