

FACULTY MENTOR

Gerstoft, Peter

PROJECT TITLE

Sparse modeling and machine learning in geoscience

PROJECT DESCRIPTION

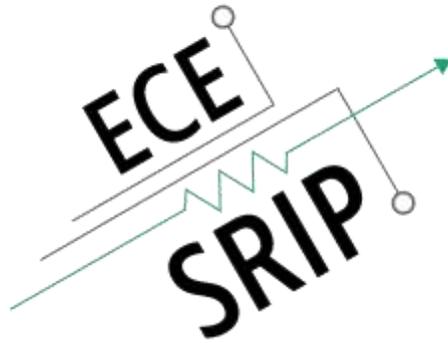
Sparse modeling and machine learning methods have recently shown great promise in the analysis of ocean acoustic and seismic data for improving models of the Earth. Sparse models approximate signals of interest using few vectors, called atoms, from a potentially large dictionary of atoms. Dictionary atoms can be generic functions, e.g. wavelets or sinusoids, or can be learned directly from the data via dictionary learning, a form of unsupervised machine learning. Sparse models with learned dictionaries have achieved widespread use and success in many tasks including image restoration and medical imaging. In this project you will have the opportunity to work with seismic and ocean acoustic data, including temperature measurements and waveform recordings from sensor arrays, to apply sparse modeling and machine learning concepts to their analysis, and potentially obtain improved models of the solid earth or dynamic oceans.

INTERNS NEEDED

2 MS students

PREREQUISITES

Linear Algebra and Machine Learning



FACULTY MENTOR

Gerstoft, Peter

PROJECT TITLE

Detecting and Classifying Ships in the Ocean with Sound

PROJECT DESCRIPTION

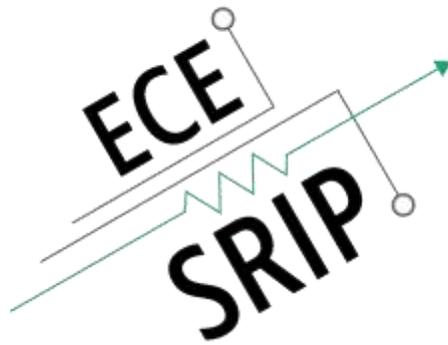
Acoustic data from long-term cabled ocean arrays, such as the Ocean Observatories Initiative, can be used to train machine learning models to detect and classify ships using their spectral characteristics. Ship classification is traditionally done by defining spectral metrics e.g. related to propeller speed. This project will focus on training a model to learn features related to ship size/type directly from the spectrogram data.

INTERNS NEEDED

2 MS students

PREREQUISITES

Python/pandas main language, Matlab a plus. Familiar with Scikit learn and/or Keras/Tensorflow. Looking for a student with interest or experience in timeseries analysis and pulling, validating, and merging data from online sources.



FACULTY MENTOR

Gerstoft, Peter

PROJECT TITLE

MIMO Array Channel Sounder and Beamformer

PROJECT DESCRIPTION

To work on the design, operation, and experimentation of a multiple input multiple output (MIMO) antenna array for experimental testing of concepts in wireless communication.

INTERNS NEEDED

2 MS Students

PREREQUISITES

Have taken some form of wireless communications course in the last 3 years.