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An Artificial Deep Neural Network-Based Hyperspectral Infrared Sounder Uniform Scene Detection Model

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Abstract

The Visible Infrared Imaging Radiometer Suite (VIIRS) and Cross-track Infrared Sounder (CrIS) are key instruments that currently deployed on both the Suomi National Polar-orbiting Partnership (SNPP) and Joint Polar Satellite System (JPSS-1) satellites, for the purpose of providing improved surface and atmospheric information for weather and climate applications. The combination of them together can take advantage of both their spatial and spectral capabilities. In this presentation, a fast uniform scene detection model is developed for CrIS based on the artificial deep neural network (DNN) technique. A training dataset is first built based on their collocated measurements selected from different seasons to represent different atmospheric and surface conditions. Then, we use collocated VIIRS within CrIS footprint as a truth to train the CrIS spectra for uniform scene detection. This proposed method has a global accuracy of around 90% through the comparison with the truth value determined by VIIRS, while avoiding huge data and time-consuming collocation between CrIS and VIIRS and then facilitates some specific applications, such as data quality control, ensemble data reduction, and so on.