

Machine learning applied to Satellite Observations

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grow across a variety of fields, our team at the National Oceanic Atmospheric Administration (NOAA) Earth System Research Laboratory (ESRL) is researching the application of these techniques for processing of satellite observation data. With the recent launch of new satellites like the Geostationary Operational Environmental Satellite (GOES)-16, the data volume has increased by orders of magnitude and can be difficult to process in a timely manner using traditional methods. Deep Learning has shown promising advancements to significantly improve both processing speed and scientific accuracy of results.

Through our research, we are using a Convolution Neural Network (CNN) to identify regions of interest (ROI) from satellite observations. These areas include cyclones, both tropical and extratropical, cyclogenesis, and eventually convection initiation. Additionally, our team has started preliminary research into the use of CNN's with satellite data for other areas including hurricane intensification where a CNN model is trained to predict the likelihood of a tropical system will jump two categories in the next 24 hours, and the use of CNN's to generate soil moisture product from satellite radiance observations to improve soil moisture within atmospheric prediction models.

This presentation will provide an introduction to our research efforts into the application of deep learning, the tradeoffs on computing and accuracy when designing neural networks, along with the challenges of data preparation including creation of "labeled" data, training the model, and where we see these applications heading into the future.

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