Investigating a Machine-Learning Approach for Satellite Precipitation Retrievals

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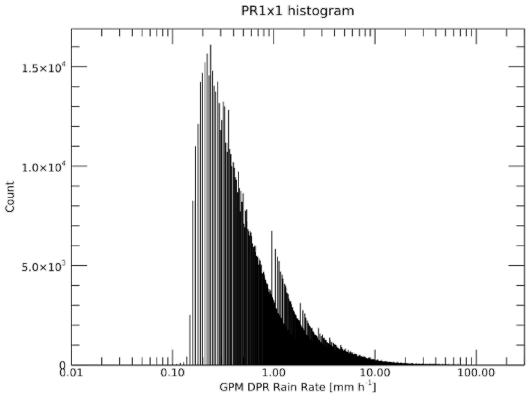
Objectives

- To investigate, build, and train supervised machine learning and deep learning models to retrieve precipitation rate using brightness temperature (Tb) satellite observations
- To identify useful data procured from high-resolution satellite products to monitor global precipitation systems
- To test and evaluate the performance of trained models

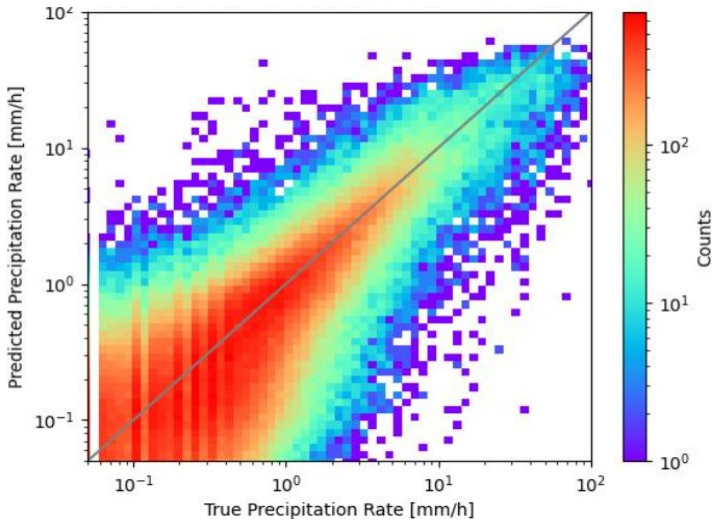
Results

- Two models - Random Forest and Convolutional Neural Network (CNN), accurately predict the precipitation rate using brightness temperatures as input.
- While the CNN model delivers good accuracy of precipitating elements, its ability to delineate rain from no-rain is modest.
- A 2-step approach shows as the most successful, using RF model to detect precipitation (delineate between rain/no-rain conditions) and CNN model to retrieve the precipitation rate value.

- Models are trained on two years of collocated GPM passive (GMI) and active (DPR) Tbs and precipitation rate observations (top right)
- Months of June and December are used as independent testing data (bottom panels)



Random Forest Performance



CNN Performance