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H31G-1596: DeepSAT's CloudCNN: A Deep Neural Network for Rapid Cloud Detection from Geostationary Satellites

Wednesday, 13 December 2017
08:00 - 12:20
New Orleans Ernest N. Morial Convention Center - Poster Hall D-F

Cloud and cloud shadow detection has important applications in weather and climate studies. It is even more crucial when we introduce geostationary satellites into the field of terrestrial remote
sensing. With the challenges associated with data acquired in very high frequency (10-15 mins per scan), the ability to derive an accurate cloud/shadow mask from geostationary satellite data is
critical. The key to the success for most of the existing algorithms depends on spatially and temporally varying thresholds, which better capture local atmospheric and surface effects.
However, the selection of proper threshold is difficult and may lead to erroneous results. In this work, we propose a deep neural network based approach called CloudCNN to classify
cloud/shadow from Himawari-8 AHI and GOES-16 ABI multispectral data. DeepSAT's CloudCNN consists of an encoder-decoder based architecture for binary-class pixel wise segmentation. We train CloudCNN on multi-GPU Nvidia Devbox cluster, and deploy the prediction pipeline on NASA Earth Exchange (NEX) Pleiades supercomputer. We achieved an overall accuracy of 93.29% on test samples. Since, the predictions take only a few seconds to segment a full multi-spectral GOES-16 or Himawari-8 Full Disk image, the developed framework can be used for real-time cloud detection, cyclone detection, or extreme weather event predictions.

Authors

Subodh Kalia *
NASA Ames Research Center

Shuang Li
NASA Ames Research Center

Sangram Ganguly
Bay Area Environmental Research Institute Moffett Field

Ramakrishna R Nemani
NASA Ames Research Center

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