**Final Project Progress Report: Satellite Image Weather Classification**

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**Problem:** Classifying satellite images of various weather phenomena

Satellite images of cloud / smoke patterns can be difficult to interpret by the naked eye alone, especially without meteorological training. Furthermore, it would be difficult to manually monitor clouds on the Earth all at once to identify emerging weather phenomena. To facilitate the process of identifying weather patterns, our model will classify satellite images based on the type of weather patterns they contain (i.e. hurricanes, dust storms, wildfires).

**Data set:** The main data set consists of hurricane image data, from its early stages all the way into its ending. Which is also split into different years and general areas like the Pacific and Arctic. To try and develop a more intelligent model, we also included other data images into the dataset consisting of other weather phenomena that could occur such as dust storms, wildfires, and even just regular images of non-affected areas.

**Progress:** We have obtained sample images of hurricanes from NASA’s datasets. These datasets consist of image sequences showing the progression of individual weather events. We’ve also chosen some preliminary classifier models to test the complexity of the problem. We have a shallow CNN model and a more robust model, Resnet50.

**Preliminary models:**

* Shallow CNN:
  + 5 layers of 4x4 filter conv layers with stride of 2 and leaky relu activation (alpha = 0.2)
  + 1 flatten layer
  + 1 dropout layer (20% rate)
  + 1 dense layer with 2 outputs and softmax activation for multiclass classification
* Resnet50:
  + 5 blocks
    - A block consists of a weight layer and a summing layer which adds both the weighted output and the pre-weighted input, giving the gradient a chance to bypass the weight layer if it’s unimportant for certain filters.

**Next Steps:**

* Examine data cleaning techniques such as eliminating outliers from the training set
* Adapt current models and explore other options
* Look into balancing the training classes to avoid biasing the classifiers