**CS 583 Final Project Proposal**

**Understanding Clouds from Satellite Images**

Team members: Wenbo Cao, Bowen Li, Lijin Zhou

1. Problem statement:

Climate change has been at the top of our minds and on the forefront of important political decision-making for many years. We are supposed to use this competition’s dataset to help demystify an important climatic variable. Scientists, like those at Max Planck Institute for Meteorology, are leading the charge with new research on the world’s ever-changing atmosphere and they need our help to better understand the clouds. Shallow clouds play a huge role in determining the Earth's climate. They’re also difficult to understand and to represent in climate models. By classifying different types of cloud organization, researchers at Max Planck hope to improve their physical understanding of these clouds, which in turn will help them build better climate models.

1. Description of data set:

* train.csv - the run length encoded segmentations for each image-label pair in the train\_images
* train\_images.zip - folder of training images
* test\_images.zip - folder of test images;
* sample\_submission.csv - a sample submission file in the correct format

The images were downloaded from [NASA Worldview](https://worldview.earthdata.nasa.gov/). Three regions, spanning 21 degrees longitude and 14 degrees latitude, were chosen. Due to the small footprint of the imager (MODIS) on board these satellites, an image might be stitched together from two orbits. The remaining area, which has not been covered by two succeeding orbits, is marked black.

The labels were created in a [crowd-sourcing activity](https://www.zooniverse.org/projects/raspstephan/sugar-flower-fish-or-gravel). Ground truth was determined by the union of the areas marked by all labelers for that image, after removing any black band area from the areas.

The segment for each cloud formation label for an image is encoded into a single row.

1. Brief implementation plan:

* Implement famous CNN frameworks (e.g. Resnet, Alex-net, VGG16, Google-Net) to find out the baseline;
* Add more layers to these traditional frameworks to improve their performance by fixing bottom layers and training top layers;
* Using some optimized measures (e.g. Data Augmentation, Ensemble Methods) to improve ranks on both public and private leaderboards.

1. Team members & task allocation:

Team members: Wenbo Cao, Bowen Li, Lijin Zhou

Task allocation: Each person works on 2 CNN models. Gather information and build our own model.

Wenbo Cao: AlexNet, EfficientNetb2

Bowen Li: GoogleNet, MaskRCNN

Lijin Zhou: ResNet, U-Net