Project Proposal for Finals

October 20, 2019

1 TOPIC

Climate change has been at the top of our minds and on the forefront of important political decision-making for many years. We hope you can 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 your help to better understand the clouds.

Shallow clouds play a huge role in determining the Earth's climate. They're also difficult to un-derstand and to represent in climate models. By classifying different types of cloud organization, researchers at Max Planck hope to improve our physical understanding of these clouds, which in turn will help us build better climate models.

There are many ways in which clouds can organize, but the boundaries between different forms of organization are murky. This makes it challenging to build traditional rule-based algorithms to separate cloud features. The human eye, however, is really good at detecting features—such as clouds that resemble flowers.

The discovery of new phenomena and mechanisms often begins with a scientist's intuitive ability to recognize patterns, for example in satellite imagery or model output. Typically, however, such intuitive evidence turns out to be difficult to encode and reproduce. Here, we show how crowd-sourcing and deep learning can be combined to scale up the intuitive discovery of atmospheric phenomena. Specifically, there is a focus on the organization of shallow clouds in the trades, which play a disproportionately large role in the Earth's energy balance. Based on visual inspection four subjective patterns or organization were defined: Sugar, Flower, Fish and Gravel. As an example, we created global climatologies of the four patterns. These reveal geographical hotspots that provide insight into the interaction of mesoscale cloud organization with the large-scale circulation. Our project shows that combining crowd-sourcing and deep learning opens new data-driven ways to explore cloud-circulation interactions and serves as a template for a wide range of possible studies in the geosciences.

2 OBJECTIVE:

In this challenge, we will be building a model to classify cloud organization patterns from satellite images. If successful, we can help scientists to better understand how clouds will shape our future climate. This research will guide the development of next-generation models which could reduce uncertainties in climate projections.

3 TEAM:

There is no team. I will be working alone on this topic/ Kaggle Challenge/ CS 583 Final Project.

4 COMPETITION DEADLINES:

- Merger Deadline: November 11, 2019
- Entry Deadline: November 11, 2019
- End Date (Final Submission Deadline): November 18, 2019 11:59 PM UTC
- Start Date: August 16, 2019

5 COMPETITION SPECIFIC TERMS:

COMPETITION TITLE: Understanding Clouds from Satellite Images

COMPETITION SPONSOR: Max Planck Institute for Meteorology
COMPETITION SPONSOR ADDRESS: Bundesstraße 53, 20146 Hamburg, Germany

Also, a website of the sponsor for this competition is also provided which I will be posting in order to get a better understanding for the nature of the competition.

Website: https://www.kaggle.com/c/understanding_cloud_organization

As per the instructions, I will also be uploading the this file onto my GitHub repository which goes by the name :

`Kaggle-competition---CS583-Final---Project`

The link for the GitHub repository is as follows:

https://github.com/ayajnik/Kaggle-competition---CS583-Final---Project