Weekly Journal

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1 Work Update

This week, I played around with EC2 and S3 AWS, the code base, and read some articles. [1, 2, 3]

1.1 AWS

The majority of my time was spent getting familiar with EC2 and S3. I installed R in the instance and test ran some simple R script through the terminal. I wanted to test R script that works on some sample data by connecting the EC2 instance and S3 bucket, but I got lost through the process. Although I made the bucket public, I kept getting a 403 Access Denied Error and Unable to locate credentials. There is so much documentation for AWS that I found myself drowning in it with over 30 open tabs of documentation and Stack Overflow, but I want to try again this week as a group.

1.2 Code Base

I was always told by a friend that if you want to learn code, you should always type it yourself to truly understand the importance of each line. So after some frustration with AWS, I moved to the code base so I could start implementing the non-parallel version of the K-means clustering code. I started an R Notebook and went through the code and checking the data through the process using North Carolina as my study area. I changed the CRS of the boundary to WGS84 in QGIS but I forgot to remove county boundaries so I used gUnaryUnion in R, which could be the reason why mask is not working. I will attach my R Notebook when I submit this journal.

2 Literature Review

This week I mostly focused my articles on the effects of climate change on agriculture. An article by Peng et al. discusses the importance of additional climatic variables (other than temperature and precipitation) on studying the impacts of climate change on agriculture. They researched several variables like humidity, wind speed, sunshine duration, and evaporation from agricultural data (rice, wheat, corn) from 1980 to 2010 in China. They found that because the relationship between tempearture and other climatic variables are not static, the correlation varies over time. For example although humidity tends to increase during climate change, humidity decreases during the warmest months because of the increase in extremely high temperatures. In addition, wind speeds are expected to increase because of climate change. Therefore, the omission of both humidity and wind speeds will result in the underprediction of the cost of climate change. [3]

Two other articles I read were focused around climate change, agriculture, and invasive plant species (IPS). The potential of invasive plant expansion is expected to increase due to changing ecoregions resulting from climate change. They used WorldClim data and found that the most important climatic suitability variable for IPS was annual mean temperature and temperature seasonality. Places that predict to have the greatest risk of expansion is Northern Europe, the UK, South America, North America, southwest China, and New Zealand. [2] An article published in 2003 talks about research of invasive species in agriculture. It foound that many exotic insect, weed, and pathogen species are responsible for a large portion of the $130 billion losses estimated to be caused by pests each year. Although the United States's ARS scientists are taking great lengths to research invasive species, the

scope is too big. The number of exotic organisms plus the many that have not been recognized are making it difficult for researchers to plan accordingly. [1]

References

[1] Raymond Carruthers. Invasive species research in the united states department of agriculture-agricultural research service. *Pest Management Science*, 55(6–7):827–834, 2003.

[2] Chun-Jing Wang, Qiang-Feng Li, and Ji-Zhong Wan. Potential invasive plant expansion in global ecoregions under climate change. *PeerJ*, 7:e6479, 2019.

[3] Peng Zhang, Junjie Zhang, and Minpeng Chen. Economic impacts of climate change on agriculture: The importance of additional climatic variables other than temperature and precipitation. *Journal of environmental economics and management*, 83:8–31, 2017.