

# **Proposal for Capstone Project 1**

**Title: Projecting rainfall averages in North Carolina for the next 50 years.**

## ***Problem:***

In the agricultural industry, knowledge about precipitation levels for the present and the future are extremely valuable to the success of the industry. If precipitation levels for an area decline over many years, individual farmers are left to provide their own irrigation for their crops. Decreasing precipitation levels may lead to an increase in cost for the farmer to grow certain types of crops. If precipitation levels can be predicted for the upcoming season or even for several years, the farmer may decide to forgo planting one crop versus another. Thus, knowledge about future precipitation levels can be extremely beneficial to the agricultural industry. In addition, government agencies must know how to plan for varying levels of precipitation. Plans must be put in place to create reservoirs that will be available for the water consumption needs of the population. Conversely, an increase in precipitation levels may lead to flash flood events resulting in damage to infrastructure. Governments must plan for these events and try to mitigate the effects of increased precipitation with laws and regulations set in place early.

Therefore, in this project I will project yearly rainfall averages in North Carolina for the next 5 years (2020 - 2024) then I will provide 95% confidence intervals for the following 45 years (2025-2069). I will use rainfall records from over 29 stations across North Carolina over the past 100 years, climate trends, and rainfall data from neighboring states.

## ***Data:***

Dataset is acquired from National Oceanic and Atmospheric Administration's (NOAA) National Centers for Environmental Information Climate data. The dataset includes 15 variables (Location, Year, January, February, March, April, May, June, July, August, September, October, November, December, Annual Total), 29 different locations, and 38,365 observations. The dataset will be compared to similar datasets obtained from the 5 bordering states: Georgia, Kentucky, South Carolina, Tennessee, and Virginia.

## ***Solution Outline:***

First, I will summarize the sample statistics for each location to determine the average rainfall and to determine any yearly and seasonal trends in rainfall amounts. Then I will use this data to determine any patterns that could be used for predicting rainfall amounts in the future.

## ***Deliverables:***

This project I will deliver a report of my findings, the code I used to generate my findings, and a raster map of North Carolina with projected annual rainfall for the for the next 5 years (2020 - 2024) then I will provide 95% confidence intervals for the following 45 years (2025-2069). by color with varying levels of intensity. I will also include a second map that shows the differences

in rainfall from present day to the projected amounts. Lastly, I will separate projected data into projected annual rainfall per decade.

***Data Links:***

North Carolina: <https://w2.weather.gov/climate/xmacis.php?wfo=rah>

Surrounding States:

Tennessee: <https://w2.weather.gov/climate/xmacis.php?wfo=ohx>

Kentucky: <https://w2.weather.gov/climate/xmacis.php?wfo=lmk>

South Carolina: <https://w2.weather.gov/climate/xmacis.php?wfo=cae>

Georgia: <https://w2.weather.gov/climate/xmacis.php?wfo=ffc>

Virginia: <https://w2.weather.gov/climate/xmacis.php?wfo=akq>