Under the Weather: An Analytical Perspective on Precipitation

Problem Solving with Data (17:610:562)

Nrithya Saravanabhavan

Akash Pandey

Xiqiao Tong

Brenden Murphy

Under the Weather: An Analytical Perspective on Precipitation

The objective of this report is to predict if it would rain on the day of Rutgers University 251st Commencement day (May 14th, 2017). The data for this study has been obtained from the National Oceanic and Atmospheric Administration. The Global Historical Climatology Network (GHCN) is an integrated database of climate summaries from land surface stations across the globe. The data contains historical weather parameters from the year 1763 till date.

In order to choose the weather parameters most relevant to the location of the venue, HighPoint Solutions Stadium, New Brunswick, the data extracted for this study originates from 2 stations in the New Brunswick area - USC00286062 which was operational from the year 1896 to 1968 and USC00286055 which was operational from the year 1968 till date.
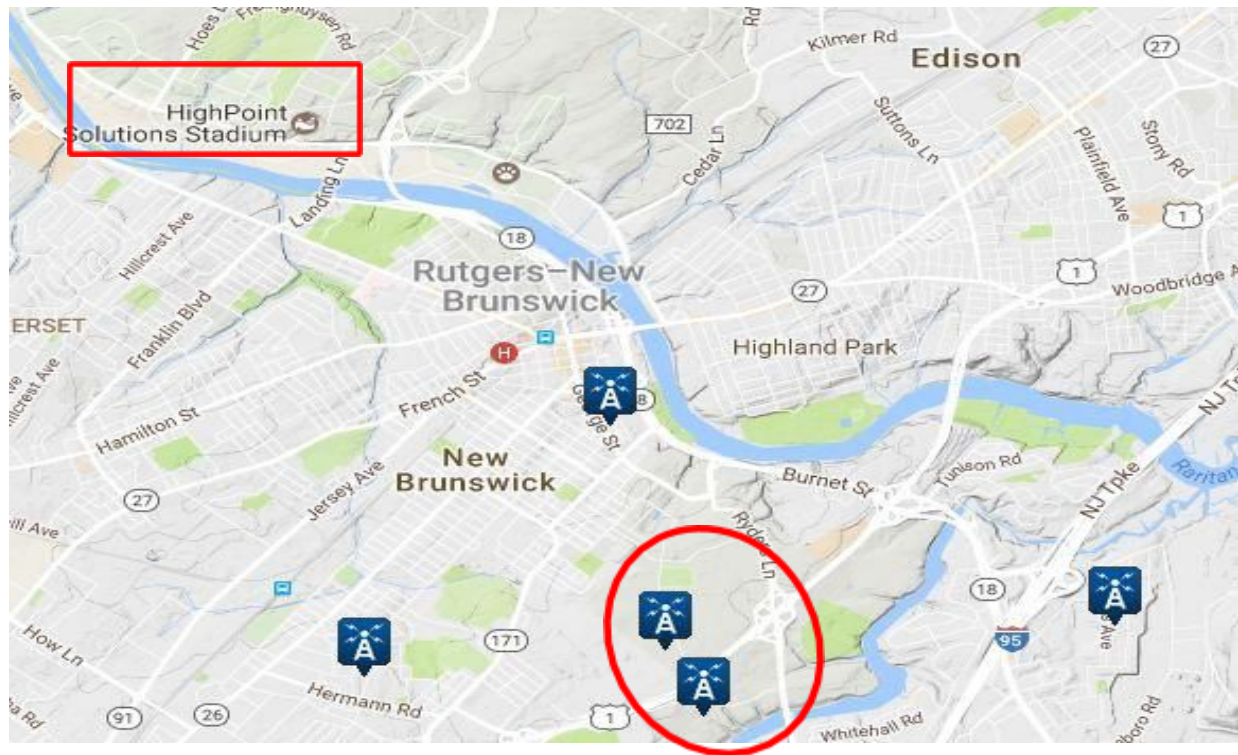
In order to understand the weather parameters which affect precipitation the most, a list of weather prediction models were studied. The most highly discussed parameters were Latitude, Altitude,Temperature and Relative Humidity (Munandar, 2016; Danladi et al. 2017). Since the location was already determined, the focus was on the parameters of Temperature and Relative Hmidity. The database from NOAA was explored to obtain data relative to these parameters.

Parameter	Description	Unit
PRCP	Precipitaion	tenths of mm
TMAX	Maximum Temperature	tenths of degrees in Celcius

TMIN	Minimum Temperature	tenths of degrees in Celcius
TOBS	Temperature at the time of observation	tenths of degrees in Celcius
EVAP	Evaporation Index	tenths of mm

Due to the large volume of the dataset, extraction of these parameters with respect to New Brunswick Stations was done using Unix.

```
grep -h "USC00286055"

grep -h "USC00286062,....0513"

grep -h "USC00286055,....0513"
```

Since climatic trends are better determined with most recent years, the first set of extraction was done on the data available from the years 1992 to 2016. The next set of extraction was done to understand the trend of weather parameters on the day of May 14th for the past 101 years. Both these datasets were used to understand the distribution of these variables and the relationship between these variables with precipitation.

Millimeters		Inches	
0 –	24	<	0.9
25 –	74	1.0 –	2.9
75 –	124	3.0 –	4.9
125 –	224	5.0 –	8.9
225 –	274	9.0 –	10.8
275 –	374	10.9 –	14.8
375 –	474	14.9 –	18.7
475 –	724	18.8 –	28.5
725 –	974	28.6 –	38.4
975 –	1474	38.5 –	58.1
1475 –	2474	58.2 –	97.4
2475 –	4974	97.5 –	195.9
4975 –	7474	196.0 –	294.3
7475 –	10004	294.4 –	394.0
> 10005		> 394.0	

Total Annual Rainfall
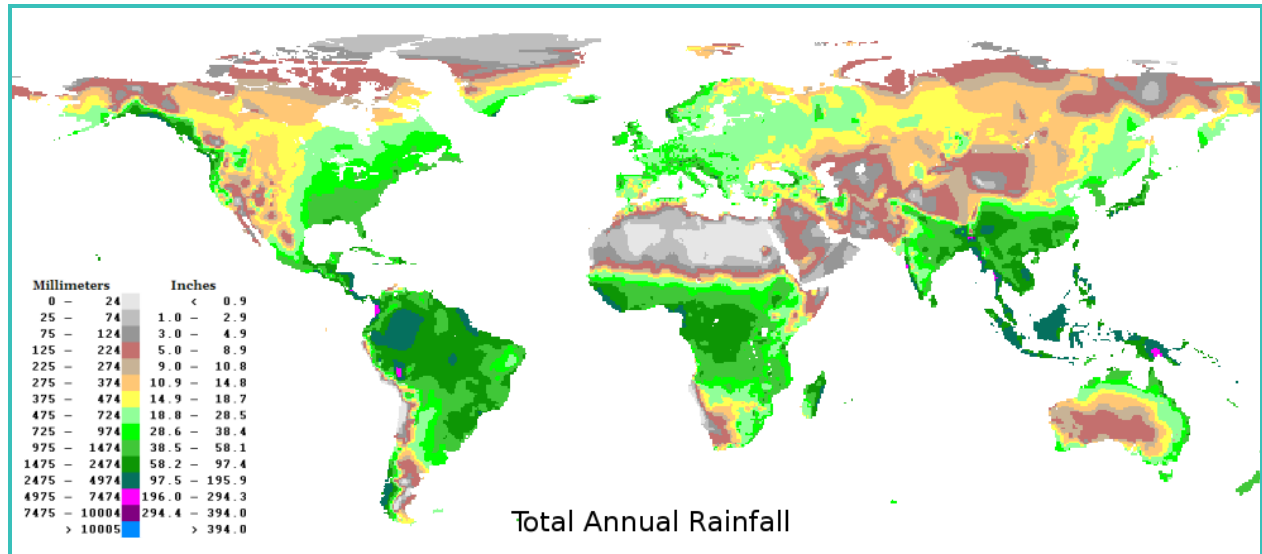
Base on research, there are four main factors that affect the rainfall worldwide, Latitude, Altitude, Humidity and Temperature. For latitude, it rain more in the areas near the equator than in the temperature zones and polar regions. The temperature is higher near the Equator so there is more evaporation. When it comes to altitude, it rains more in high areas than in low areas. Humidity stands for the amount of water vapour in the air. This is produced by the evaporation of water from oceans, lakes, rivers, wetlands and plants. it rains more on the coast than inland. Seas are a source of humidity.