Climate Data Report and Analysis

Introduction

This report analyzes data collected from NOAA weather stations in the state of California over May 1993. The data is an average of the weather stations' readings for that month. I have also exported the same data for the month of May 1994 as a tool for comparison.

Body

Data

This report was written using MyJupyterNotebooks. First I imported Pandas, MatPlotLib, Seaborn, and Geopandas to analyze and write reports on the data. Next, I extracted the weather data from NOAA's website, which can be found here. I used station names and geographic locations, temperature averages and minimum and maximum temperature, precipitation, sun, average wind speed and total wind movement, and snowfall. Both May 1993 (which had readings from 530 weather stations) and May 1994 (which had readings from 552 weather stations) were collected. I noticed that the sun/solar radiation column had very few entries, so I ended up dropping that column in order to focus on the other variables.
This data was extracted in the format of a .csv file and then imported into Jupyter Notebooks. Next, I downloaded a Shapefile map of the state of California from the United States Census Bureau, which can be accessed here. This file was exported as a shapefile (.shx) and then imported into Jupyter Notebooks.
In order to make the data easier to work with, I found the average of each column for the month of May 1993 for the entire month, and replaced null values with those averages. I did the same for the month of May 1994, finding the average of that table and then using those data to substitute null values.
Finally, I used my California shapefile to generate a map of the state of California across which to plot the weather data.

Method

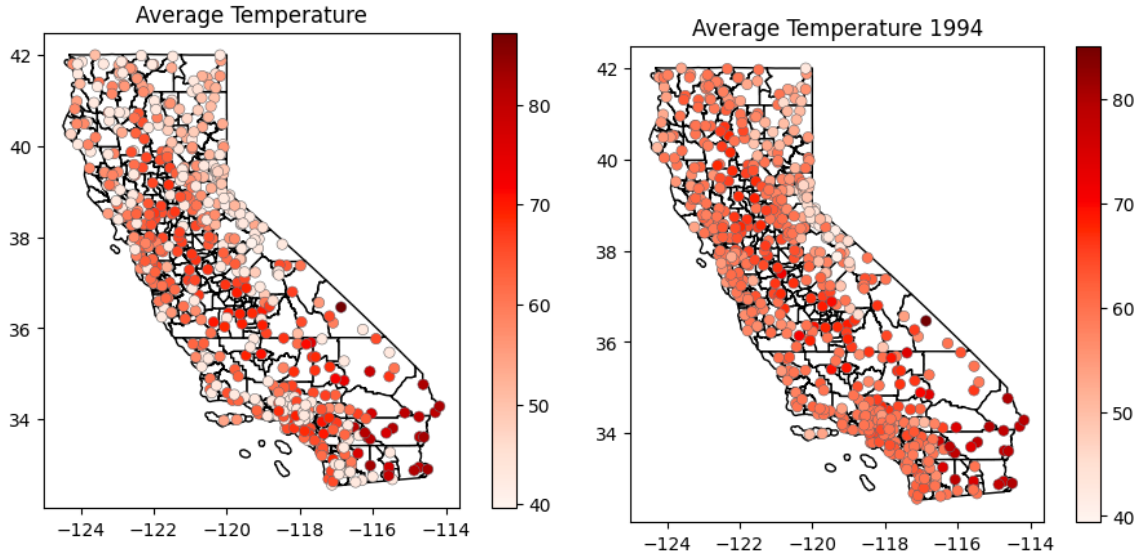
First, I created a blank plot of the state of California. Using my cleaned dataset for May 1993, I then created a chloropleth map for the average temperature and layered it over the California map. The values created a gradient from lowest to highest average temperature. Next, I mapped the rest of my variables using the same method. This gave me my predicted temperature for the next year.
In order to test my prediction, I used the historical data to create chloropleth maps for the year 1994 as well. I compared these maps to my predictions. I found that the numbers were not accurate, but the map showed that the same areas which I predicted to have a higher temperature, rainfall, etc. were comparatively higher as I had expected.

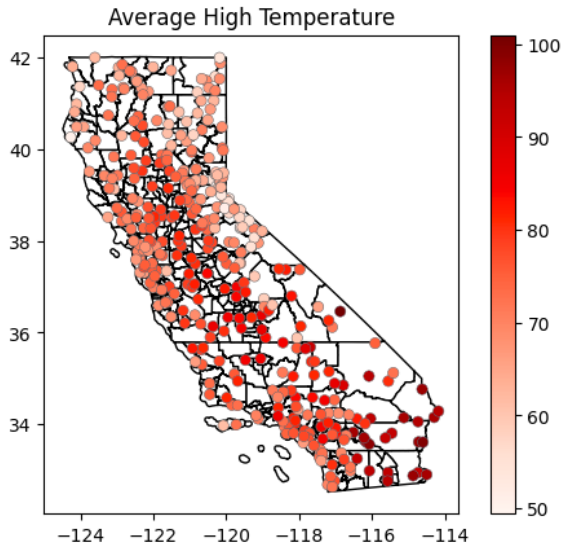
Results

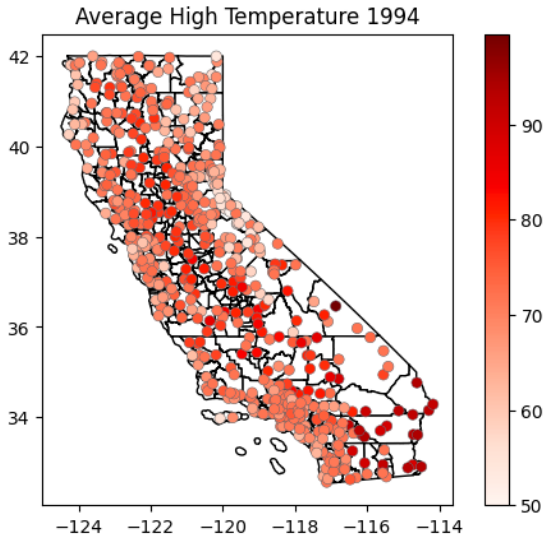
For the state of California in the month of May 1993, the average temperature was 43°F, with a high of 52°F and a low of 36°F. There was an average of 1 inch of rain, and 0.009 inches of snow. The average wind speed was 0.35m/s and wind movement was 54.
For the state of California in the month of May 1994, the average temperature was 60°F, with a high of 72°F and a low of 48°F. There was an average of 1 inch of rain, and 0.22 inches of snow. Wind speed measured 7m/s and wind movement was 1977.
These results varied by geographic location, as can be seen in the maps below. In general, while trends were easy to predict, May 1994 was much warmer and windier than May 1993, and had one station that experienced an unseasonably high snowfall, which can likely be counted as an outlier.

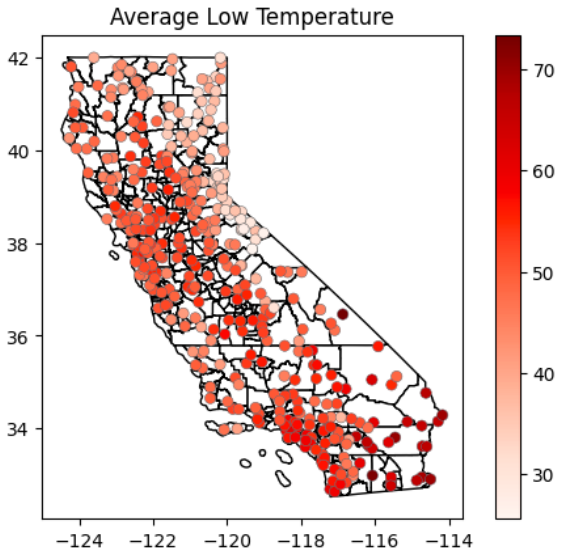
Analysis

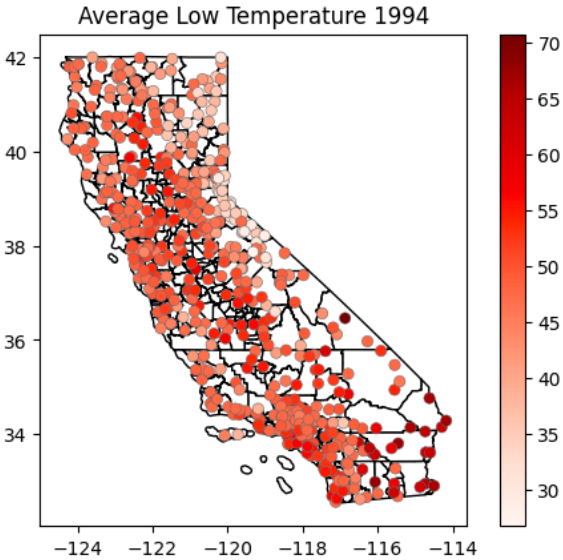
Comparisons between 1993 and 1994 datasets:

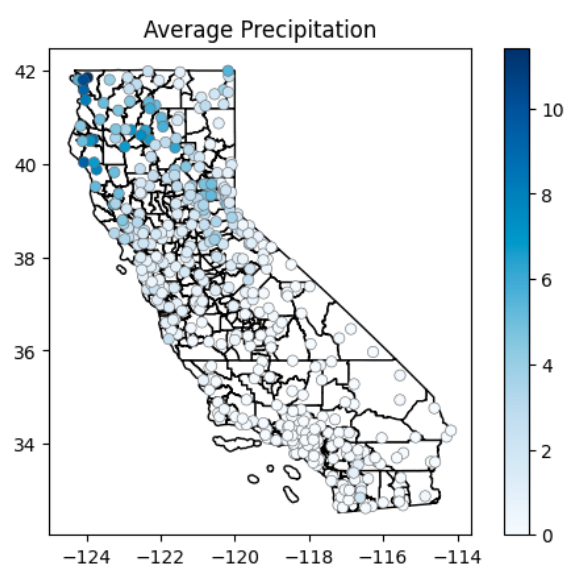


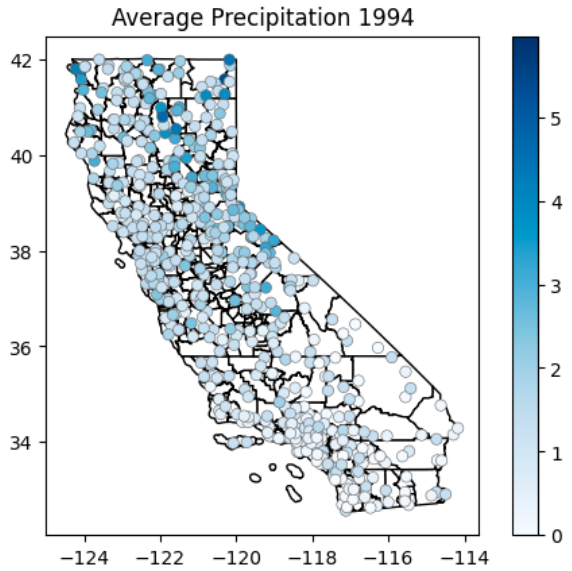

Average High Temperature
42
40
38
36
34
−124
−122
−120
−118
−116
−114
100
90
80
70
60
50

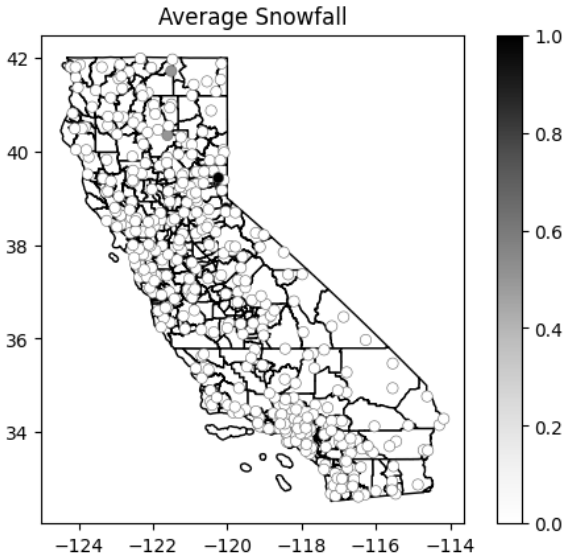

Average High Temperature 1994
42
40
38
36
34
−124
−122
−120
−118
−116
−114
90
80
70
60
50

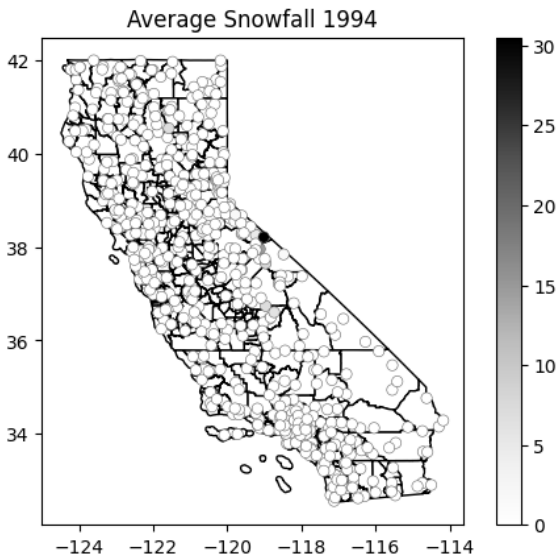

Average Low Temperature
42
40
38
36
34
−124
−122
−120
−118
−116
−114
70
60
50
40
30

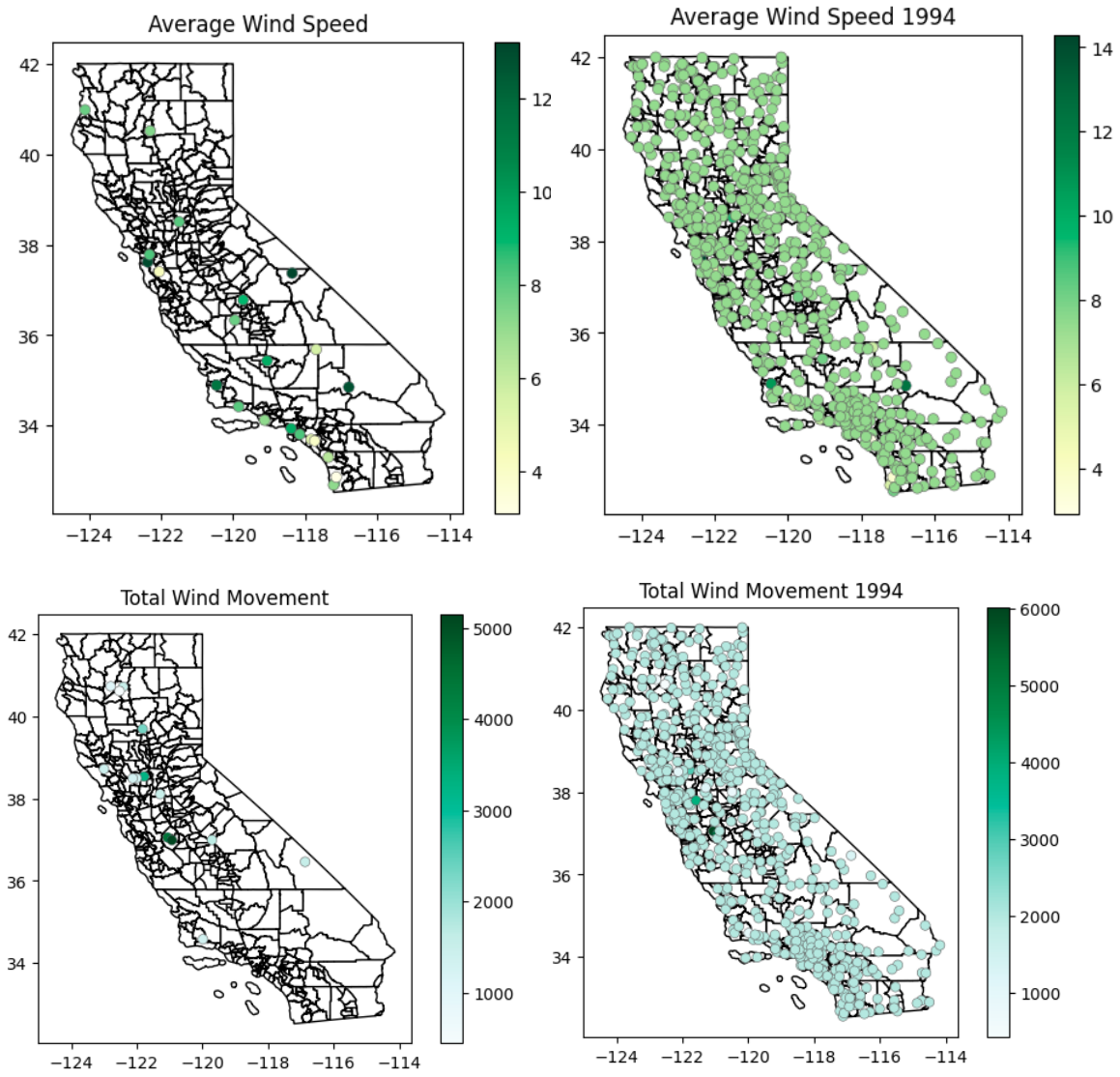

Average Low Temperature 1994
42
40
38
36
34
−124
−122
−120
−118
−116
−114
70
65
60
55
50
45
40
35
30


Average Precipitation
42
40
38
36
34
−124
−122
−120
−118
−116
−114
10
8
6
4
2
0


Average Precipitation 1994
42
40
38
36
34
−124
−122
−120
−118
−116
−114
5
4
3
2
1
0


Average Snowfall
42
40
38
36
34
−124
−122
−120
−118
−116
−114
1.0
0.8
0.6
0.4
0.2
0.0


Average Snowfall 1994
42
40
38
36
34
−124
−122
−120
−118
−116
−114
30
25
20
15
10
5
0



Conclusion

Generally in the month of May, southern and central California will have higher temperatures, less rainfall, and less snowfall than the northern regions. Northern California will be cooler and have more rain and snow. Central and western California, especially near the coast, will be more windy compared to the other regions.

Of note, the state of California seems to have greatly increased the number of weather stations from 1993 to 1994.