

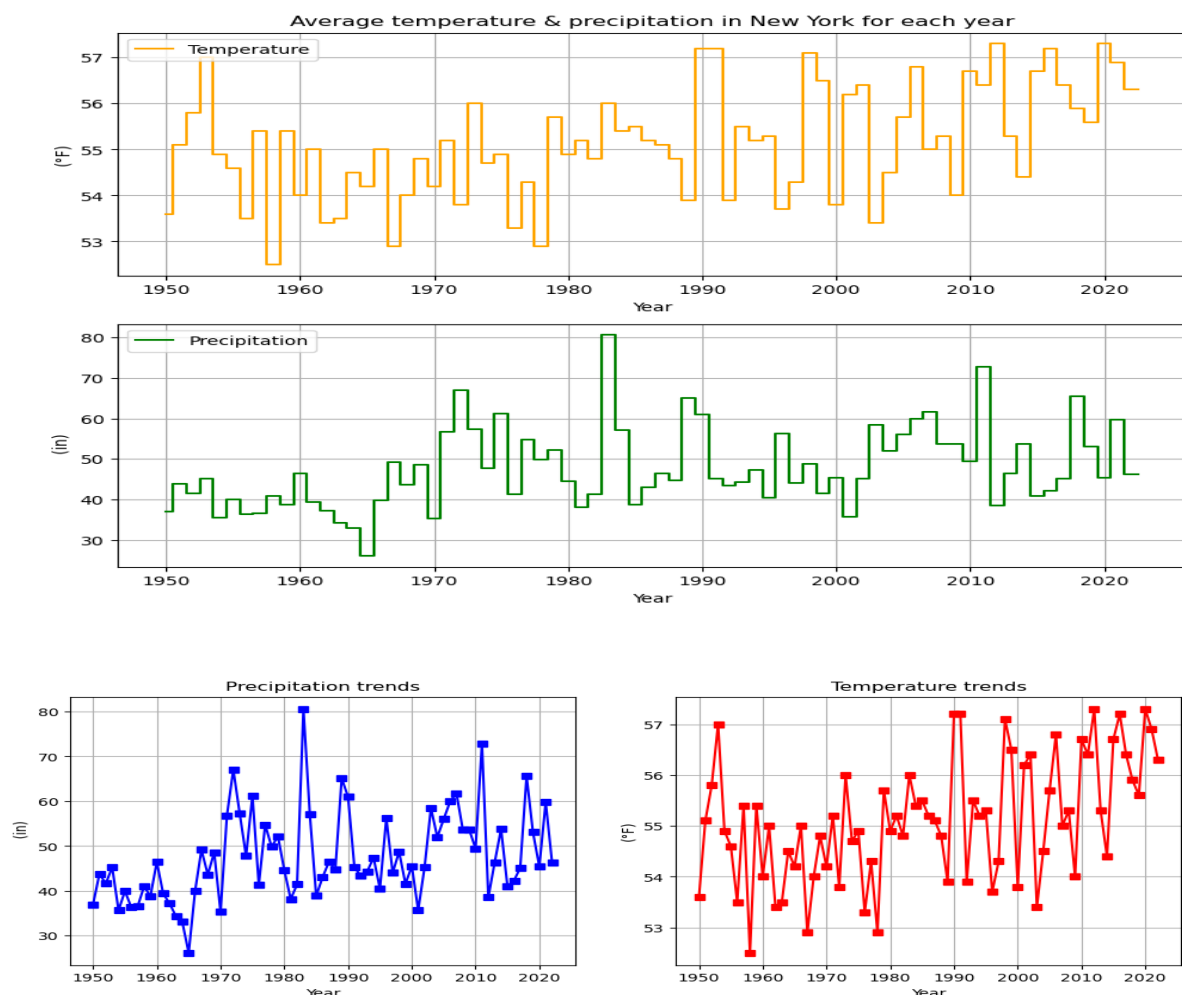
Analysis of Temperature and Precipitation Trends in New York State

Introduction:

The impacts of climate change are being observed in many parts of the world, including the United States. This report presents an analysis of temperature and precipitation trends in New York State, which is an important region for agriculture, tourism, and many other industries. We obtained temperature and precipitation data from the National Oceanic and Atmospheric Administration (NOAA) for the period from 1950 to 2023. We used Python to analyze the data and generate the visualizations. The report is organized as follows: in Section 1, we describe the data and methods used in the analysis. In Section 2, we present the main findings of the analysis. In Section 3, we provide a significance statement on why the presented figure is an important topic.

Data:

I collected temperature and precipitation data for New York State from NOAA's Global Historical Climatology Network (GHCN) database. The data was downloaded in CSV format and preprocessed using Python's Pandas library. To prepare the data, I filtered out any information outside of the period between 1950 to 2023.

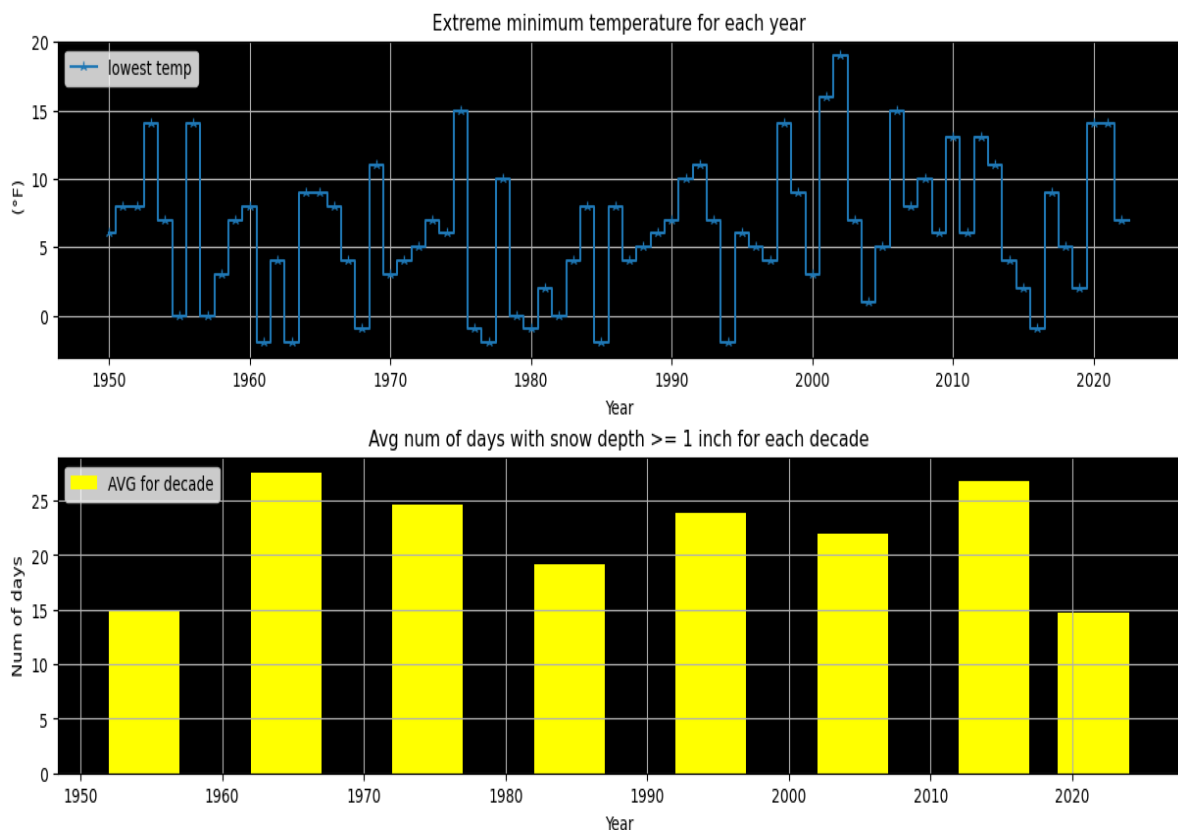


Method:

This part of code creates a mosaic plot with three subplots using the `plt.subplot_mosaic()` method. The top subplot displays the average temperature for each year, plotted with a red solid line. The middle subplot displays the average precipitation for each year, plotted with a blue solid line. The bottom left subplot displays the average precipitation for each decade, plotted with blue squares, and the bottom right subplot displays the average temperature for each decade, plotted with red squares.

Each subplot is customized with labels, titles, and grid lines using various `plt` methods such as `set_xlabel()`, `set_ylabel()`, `set_title()`, and `grid()`.

Finally, the resulting figure is saved as a PNG file named "mosaic_temp_precip.png" using the `plt.savefig()` method.



Method:

This code loads temperature data for New York from a CSV file using `pandas` and creates a figure with two subplots using `matplotlib`. The first subplot shows extreme minimum temperature for each year in Fahrenheit, and the second subplot shows the average number of days with snow depth of at least 1 inch for each decade. The figure is saved as a PNG file.

Findings:

- Analysis of temperature and precipitation trends in New York from 1950 to 2023 reveals a tendency for both variables to increase. The observed increase in temperature and precipitation indicates that climate change is affecting weather patterns in the region.

- During the period from 1950 to 1960, the most significant increase in precipitation was observed in New York. This period is marked by a large number of intense precipitation events and may be attributed to the impact of climate change on weather patterns during that time.
- Overall, the trends observed in New York suggest that climate change is having a significant impact on weather patterns in the region. The increasing temperature and precipitation may have far-reaching consequences, including changes in ecosystems, water availability, and public health. Therefore, it is important to continue to monitor these trends and develop effective strategies to mitigate the impact of climate change on the environment and human well-being.
- In the past three years, there have been over 1.5 times fewer snow days than in the previous decade (2010-2020) in New York.
- The average temperature has increased by over 1.5 degrees since the year 2000, and since 2020, the rate of increase has accelerated.

Significance Statement:

The presented figure is essential for providing insights into how climate change is affecting weather patterns in the United States. Understanding these trends is crucial for developing effective policies and strategies to mitigate the impact of climate change on the environment and human well-being. This analysis underscores the need for continued research and collaboration to address the challenges of climate change.

Conclusion:

Based on our analysis of temperature and precipitation trends in New York, we have found that both variables have shown an increasing tendency over the past several decades, indicating the impact of climate change on weather patterns in the region. Our findings show that the most significant increase in precipitation was observed during the period from 1950 to 1960, while in the last twenty years, there has been a noticeable tendency towards a substantial rise in the mean temperature. These trends suggest that climate change is having a significant impact on weather patterns in New York, underscoring the need for continued research in this area and collaborative efforts to address the challenges of climate change. The insights gained from this study can be used to develop effective policies and strategies to mitigate the impact of climate change on the environment and human well-being in New York and beyond.

References:

<https://www.ncei.noaa.gov/cdo-web/>

Code and Data:

The Python code, data source, and report are available on my GitHub page [<https://github.com/Pooya20/INFSCI-1520-Project>].