Assignment no 1: Distribution of Sunshine Hours in US Cities

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1   Introduction

This report analyses the distribution of sunshine hours across various US cities throughout the year, focusing on geographical and seasonal patterns, as well as the influence of location (latitude and longitude). The analysis explores how these factors contribute to variations in sunshine duration across different cities of the United States.

2   Key Findings

- **Geographical Distribution:** Southern cities like Miami and Houston have more consistent sunshine hours throughout the year compared to northern cities like Seattle and Chicago.

- **Latitude and Longitude Impact:** Cities at lower latitudes, such as Miami, generally have more sunshine hours. San Francisco shows high sunshine hours despite a higher latitude, indicating regional climate effects.

- **Peak Sunshine Hours:** San Francisco reaches its peak sunshine in June, while Miami peaks in May. Seattle experiences peak sunshine in July.

- **Spread of Sunshine Hours:** Miami has stable sunshine hours with minimal variation. Seattle shows significant variation, with low winter sunshine and high summer peaks.

- **Monthly Trends:** Most cities experience increased sunshine during summer months (June-August) and decreased hours in winter (December-February).

- **Color Encoding:** The YlOrBr color map helps identify periods of high (dark orange-brown) and low (light yellow) sunshine across cities and months.
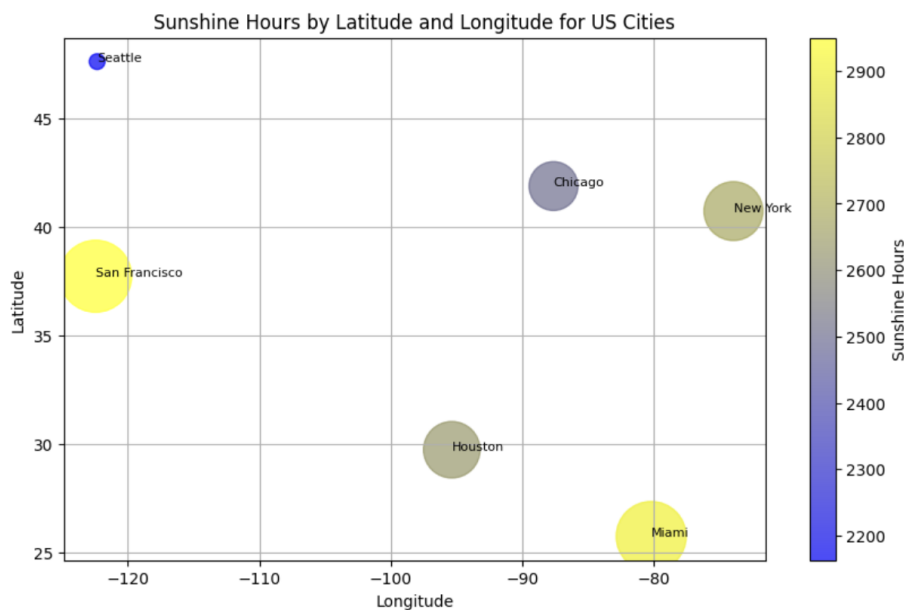
3   Visualization Insights

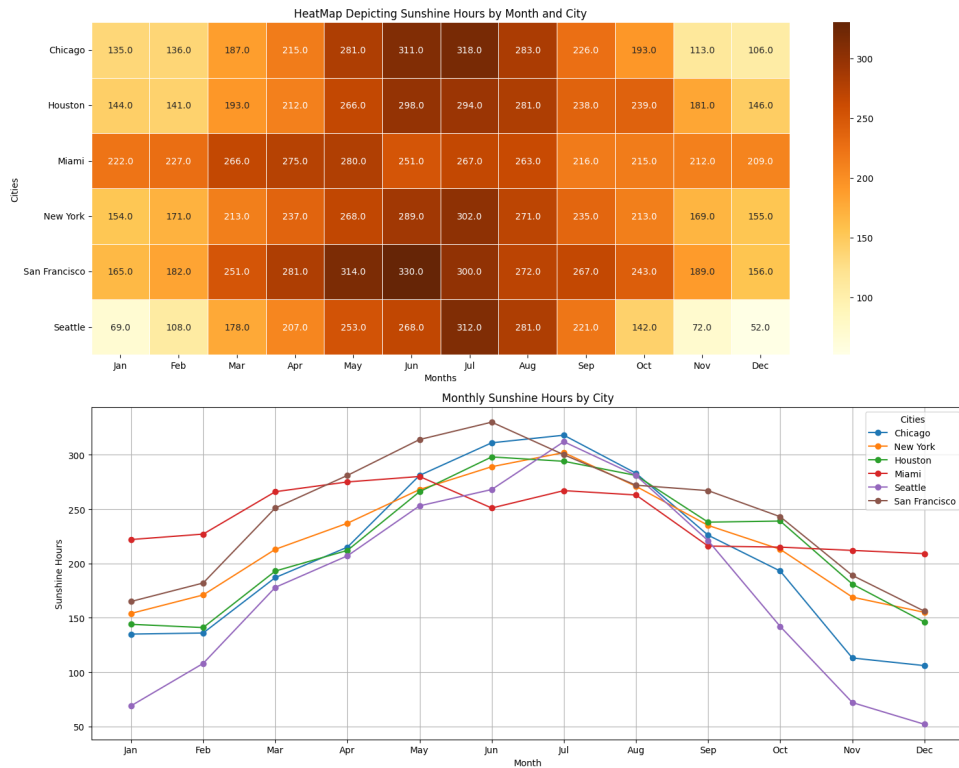*Figure 1: Sunshine Hours by Latitude and Longitude for US Cities*

Figure 2: Line Plot and Heat Map of Monthly Sunshine Hours Across US Cities

The visualizations provide key insights into sunshine distribution across regions in USA:

- Bubble/Scatter Plot (Figure 1): Shows the geographical distribution of sunshine hours. Cities like Miami and San Francisco have high sunshine, indicated by yellow, while Seattle shows lower hrs in blue.

- Heat Map and Line Plot (Figure 2): - Heat Map:Illustrates monthly sunshine variations. Darker shades indicate higher sunshine, with summer months generally brighter. whereas Line Plot Displays monthly trends for each city, highlighting seasonal peaks in summer and lows in winter.

These visualizations effectively capture the geographical and seasonal variations in sunshine across US cities.

4   Conclusion

The scatter plot and heat map/Line plot provide valuable insights into the distribution of sunshine hours across US cities:

1. **Geographical Distribution**: - Scatter Plot:Cities in the southern and western US, like Miami and Houston, receive more sunshine, as indicated by larger and brighter bubbles. Seattle, in the north, has fewer sunshine hours while heat map Highlights seasonal patterns, with summer peaks in most cities and winter lows particularly noticeable in Seattle and Chicago.

2. **Latitude and Longitude Effects**: - Cities at lower latitudes generally have more sunshine. San Francisco's high sunshine hours despite its latitude suggest regional climate influences. - A negative correlation exists between latitude and sunshine hours; as latitude increases, sunshine decreases.

3. **Seasonal Variations**: - Miami maintains high sunshine almost all year-round. - Seattle shows significant seasonal variation, with low winter and high summer sunshine. - Other cities like New York and Chicago exhibit clear seasonal patterns.

In conclusion, these visualizations shows effectively how geographical location, latitude, and seasonal changes influence sunshine distribution across US cities. Provides a detailed temporal analysis and a broad geographical overview.