

Lab 4: Visualizing Geographic Data Distributions in the United States

Objective:

The purpose of this assignment is to analyze and visualize the spatial distribution of Geographic Data in the United States, with a focus on the continental 48 states. You will work with the 2020 dataset provided on Canvas and use Python to produce maps and statistical analyses that uncover meaningful patterns and trends in data occurrences.

Assignment Description:

1. Visualize the Map of the United States:

- Create a base map of the United States using appropriate Python libraries (e.g., GeoPandas, Matplotlib).
- Ensure that your map clearly shows the boundaries of the United States.
- Add any necessary geographic context (such as state boundaries, major cities, or landmarks) to enhance readability.

2. Visualize the Distribution of geographic data:

- Using the 2020 dataset, overlay the data onto the U.S. map.
- Focus on the 48 contiguous states (i.e., exclude Alaska, Hawaii, and any territories).
- Your visualization should depict the spatial distribution of data
- Clearly annotate or include a legend so that the audience understands what the visual elements represent.

3. Generate **Five** Representative and Unique Statistical Results:

- Select any five meaningful statistics or insights from the dataset. These could be:
 - The total number of tornadoes per state.
 - Any other insightful measure derived from the data.
- Present these statistical results through appropriate visualizations (e.g., bar charts, line graphs, histograms, or box plots).
- Ensure that each visualization is clearly labeled and includes an interpretation of the results.

4. Code Documentation and Detailed Explanations:

- Include comprehensive comments throughout your code to explain your logic, data processing steps, and visualization choices.
- Provide detailed explanations in Markdown cells (if using Jupyter Notebook) or as part of your code documentation. Explain:
 - How the data is loaded and preprocessed.
 - Any assumptions or decisions made during your analysis.
- Your code should be easy to follow so that someone with a basic understanding of Python can reproduce your work.

5. Saving Visualizations:

Save each of your visualizations as an image file. Name each image using the following format: <YourName+Title>.png (for example, if your name is JaneDoe and your first visualization is titled “ScatterAnalysis,” then name the file JaneDoe_ScatterAnalysis.png). This naming convention will help keep your files organized and easily identifiable.

Submission Instructions:

- Upload all your deliverables—including your Jupyter Notebook with the visualizations results and statistical analyses—to a well-organized GitHub repository.
- Submit the GitHub repository link via Canvas.