Seasonal Variations in U.S. Air Quality: An Analysis of EPA Monitoring Data

by

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Description: This project undertaken solo aims to explore the relationship between pollutants and various factors such as city vs. rural environments, population density, and geography (e.g. distance from an ocean) using detailed monitoring data from the EPA. The analysis will remain flexible, adjusting the hypothesis based on the data available.

Hypothesis: To determine if there are significant differences in pollution levels across different seasons.

Approach:

- Data Preparation: Clean and preprocess the data to ensure accuracy and completeness.
- Exploratory Data Analysis (EDA): Conduct an initial analysis to understand the distribution and characteristics of the data.
- Hypothesis Testing: Formulate and test hypotheses based on the exploratory analysis.
- Visualization: Create visual representations to illustrate the spatial and temporal distribution of pollutants.
- Interpretation: Draw conclusions on the relationships between pollutants and the various factors examined.

Dataset: The dataset used for this project is the "annual_conc_by_monitor_2023.csv" file provided by the EPA. This dataset includes detailed measurements of pollutant concentrations from air quality monitoring stations across the United States. Key pollutants such as SO2, NO2, PM2.5, Ozone, CO, and Pb are included, along with geographic and temporal details for each monitoring site. The dataset allows for a granular analysis of air quality at specific locations and times, making it ideal for comparing different regions and demographic characteristics.

Conclusion: This project aims to provide a comprehensive analysis of how various factors such as urbanization, population density, and geographic location influence air quality. By maintaining flexibility in the hypothesis and allowing the data to guide the analysis, the findings will contribute to a better understanding of air quality dynamics. The results can inform public health policies and regulatory measures to mitigate pollution and improve overall air quality.

References: U.S. Environmental Protection Agency. (2023). Air Quality Data. Retrieved from https://aqs.epa.gov/aqsweb/airdata/download_files.html