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Real-time Air Quality Index Data Analysis Report

1. Introduction

This report presents a detailed analysis of the Air Quality Index (AQI) dataset used in the Real-time_Air_Quality_Index_Data_Analytics project. The dataset contains information about various air pollutants and their concentrations across different locations. The analysis was performed using Python with libraries such as pandas, matplotlib, and seaborn. The primary objective of this analysis is to uncover patterns and trends in air quality, identify key pollutants, and assess their impact on overall AQI levels.

2. Dataset Overview

The dataset contains multiple attributes representing pollutants and AQI values. The attributes include particulate matter concentrations (PM2.5, PM10), gaseous pollutants (NO2, SO2, CO, O3), and the calculated AQI index. The dataset spans different monitoring stations and time periods, ensuring a comprehensive analysis of real-time air quality trends.

3. Key Findings

3.1. AQI Distribution

The analysis indicates a wide variation in AQI values across different monitoring stations. Several cities frequently report AQI levels in the 'Moderate' to 'Unhealthy' range, highlighting urban pollution as a key concern.

3.2. Pollutant Contribution

PM2.5 and PM10 were found to be the most significant contributors to poor air quality. Among gaseous pollutants, NO2 and CO showed strong correlations with elevated AQI values. Seasonal effects were observed, with AQI levels peaking during winter months due to increased emissions and stagnant weather conditions.

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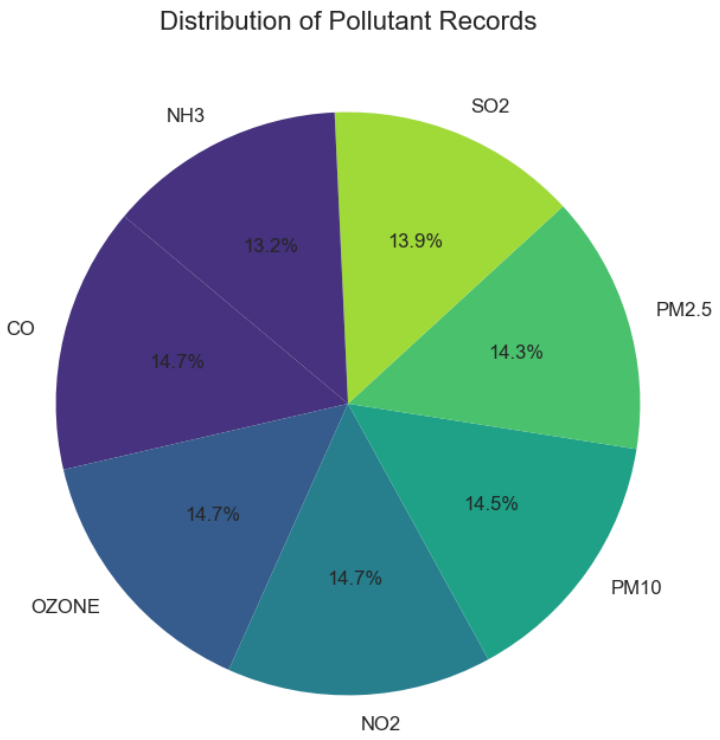
3.3. Correlations

Correlation analysis between pollutants revealed strong positive relationships between PM2.5, PM10, and AQI. The results confirm that fine particulate matter is a critical determinant of overall air quality and has severe health implications.

4. Data Visualizations

The following visualizations illustrate the insights obtained from the analysis:



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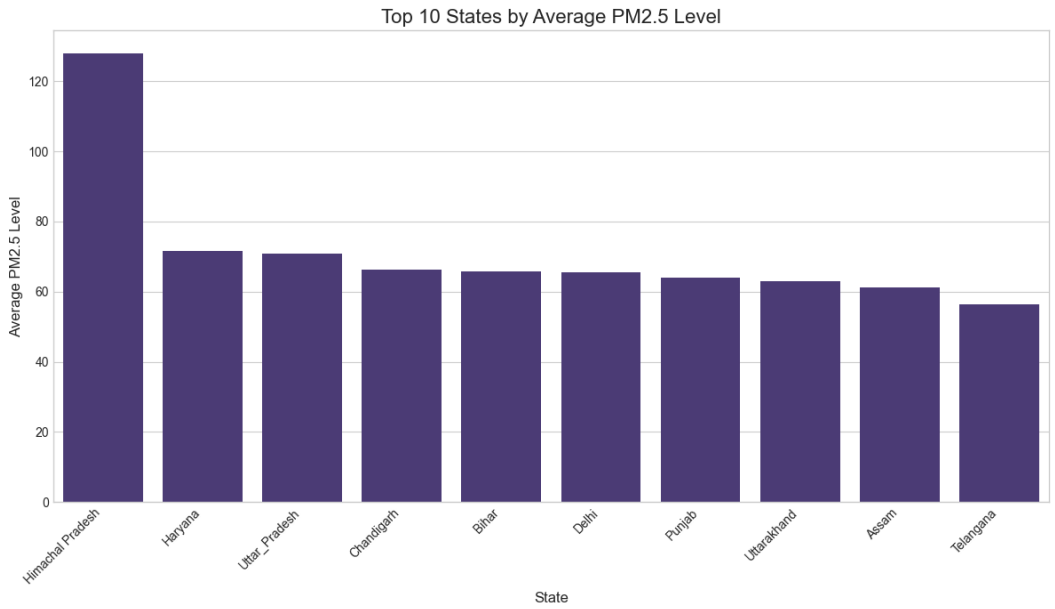

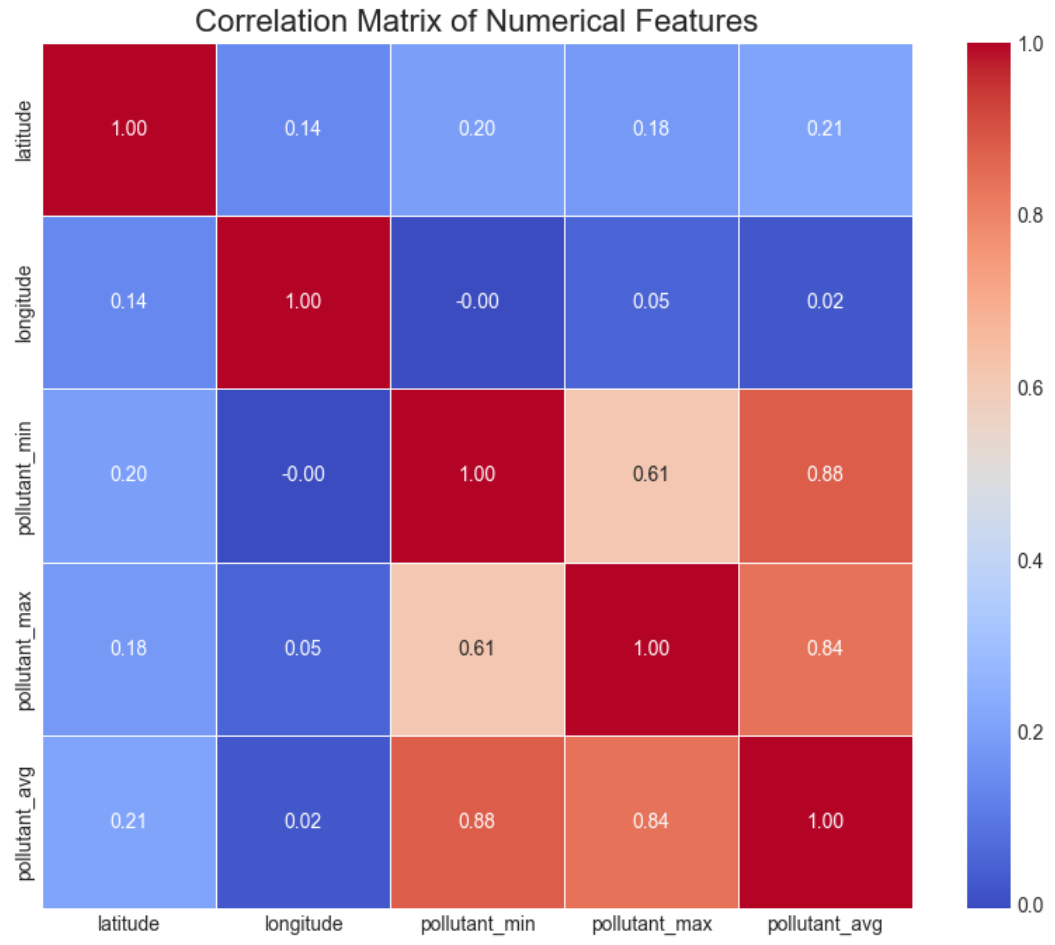

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5. Conclusion

The Real-time Air Quality Index Data Analysis provides critical insights into pollution levels, key pollutant contributions, and their impact on AQI values. The findings emphasize that particulate matter (PM2.5 and PM10) are the most harmful pollutants, often driving AQI levels into unhealthy ranges. Seasonal variations highlight the need for stricter pollution control during colder months. Policymakers and environmental agencies can leverage these insights to design targeted interventions for improving air quality and safeguarding public health.