Multi-Parameter Air Quality Monitoring System

1 Introduction

Pollution refers to the presence of harmful substances in the environment, including air, water, and land.

The Air Quality Index (AQI) is a tool used to report daily air quality. It tells you how clean or polluted the air is and what associated health effects might be a concern.

2 Data Set Analysis

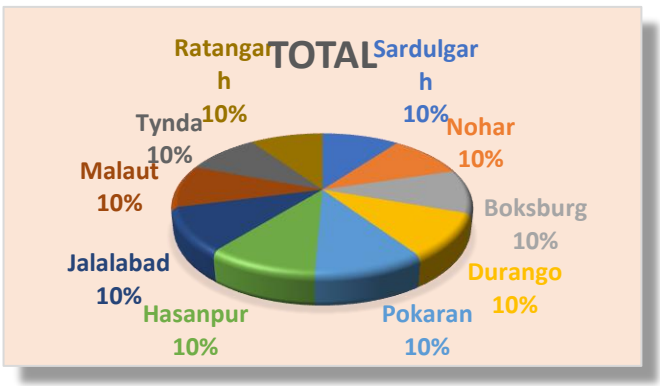
Data Set Analysis:

The "AQI and Lat Long of Countries" dataset offers a comprehensive framework for analyzing air quality across countries and cities. It includes detailed columns such as country, city, aggregated AQI values and categories, pollutant-specific AQI data (CO, Ozone, NO_2, PM2.5), and geographical coordinates (latitude and longitude). The data reflects significant variation in AQI values, enabling robust geospatial and categorical analysis to understand regional pollution patterns and sources.

4 Result

United States of America	500
Russian Federation	500
Pakistan	500
South Africa	500
India	500
Republic of Korea	421
Democratic Republic of the Congo	392
China	386
Mexico	384
Chile	358
Angola	285
Indonesia	281
Australia	264
Brazil	247
Iran (Islamic Republic of)	222
Nigeria	217
Senegal	211
Malaysia	209
Namibia	204
Saudi Arabia	196

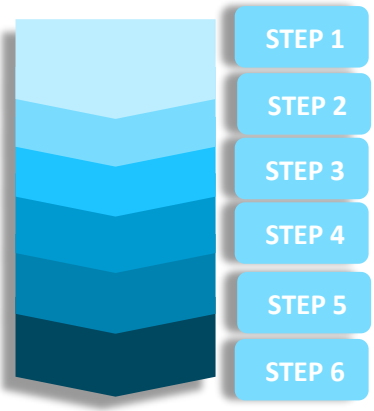
United States of America, Russian Federation, Pakistan, South Africa ,India are the highest AQI value 500,which is categorized as Hazardous



Among pollutants, **PM2.5 AQI** shows the strongest correlation with overall AQI, highlighting its significant role in determining air quality. Sardulgarh, Nohar, Boksburg, Durango, Pokaran, Hasanpur, Jalalabad are the city which have 500 PM2.5 AQI value.

3 Methodology

Methodology: 1 Data Cleaning: Ensured accuracy by handling duplicates and inconsistencies. 2 Descriptive Statistics: Summarized pollutant AQI metrics. 3 Geospatial Analysis: Mapped AQI values to visualize regional differences. 4 Categorical Analysis: Analyzed AQI categories for pollutants. 5 Trend Identification: Explored pollutant correlations and AQI trends. 6 Question Analysis: Answered dataset-based queries (A1–A8).



5 Conclusion

This report highlights the importance of multi-parameter air quality monitoring to identify pollution hotspots and guide mitigation efforts. Addressing dataset limitations can improve its effectiveness.

6 Recommendations

Incorporate Temporal Data: Include time-series data to facilitate the analysis of seasonal and diurnal pollution trends. **Source Identification:** Integrate emission source data to enable targeted and efficient interventions.

Reference: Kaggle.com