# Internship Report

Shadow Fox Internship

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## Introduction

During my internship at Shadow Fox, I worked on a project related to Delhi Air Quality Index (AQI) analysis. The main purpose of this project was to clean, analyze, and visualize air quality data so that meaningful patterns can be observed.  
  
Air pollution is one of the major issues in Delhi, and studying AQI helps us understand how different pollutants affect the overall air quality. This project involved reading data, calculating AQI, identifying dominant pollutants, and plotting results for better understanding.

## Tools and Libraries Used

1. Pandas – For reading and cleaning data.

2. NumPy – For numerical operations.

3. Matplotlib – For plotting graphs.

4. Pathlib – For managing file paths and directories.

## Project Work

1. The dataset containing Delhi air quality was first read using Pandas.  
2. Columns were cleaned and standardized for easy use.  
3. AQI was calculated using CPCB (Central Pollution Control Board) breakpoints for pollutants like PM2.5, PM10, NO2, SO2, CO, O3, and NH3.  
4. Sub-indices were generated for each pollutant, and the maximum was taken as the AQI value.  
5. The dominant pollutant responsible for AQI was also identified.  
6. Time-based analysis was done by grouping data by hours and dayparts (Morning, Afternoon, Night).  
7. Correlation between pollutants and AQI was calculated to see which pollutant has the highest effect.

## Visualizations

Several graphs were created for better understanding:  
- Line plot showing average AQI by hour of the day.  
- Bar chart for average AQI across different dayparts.  
- Correlation bar chart between pollutants and AQI.

## Conclusion

This project helped me understand how data cleaning, analysis, and visualization can provide insights into real-world problems. By studying AQI, we can see how pollutants change during the day and which ones affect Delhi’s air quality the most. The internship at Shadow Fox gave me valuable practical exposure in data science and environmental analysis.