

भारतीय प्रौद्योगिकी संस्थान दिल्ली

Indian Institute of Technology Delhi

CLL787: Statistical Methods for Chemical Engineers

Air Quality Index Dataset Analysis

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Understanding Air Quality Trends in India

The project mainly focuses on the following sub parts of the problem:

- 1) Data Preprocessing: Rows having any null or NAN value are deleted.
Further, a newer data is prepared based on needs.
- 2) Dashboard Design and Analysis: Dashboard is created using the AQI data.

Finally a comparison between the cleanest (relatively) and most polluted parts of the country.

An Overall Picture (PM2.5)

The graph for Average Pollutant Levels, for different parts of the country:

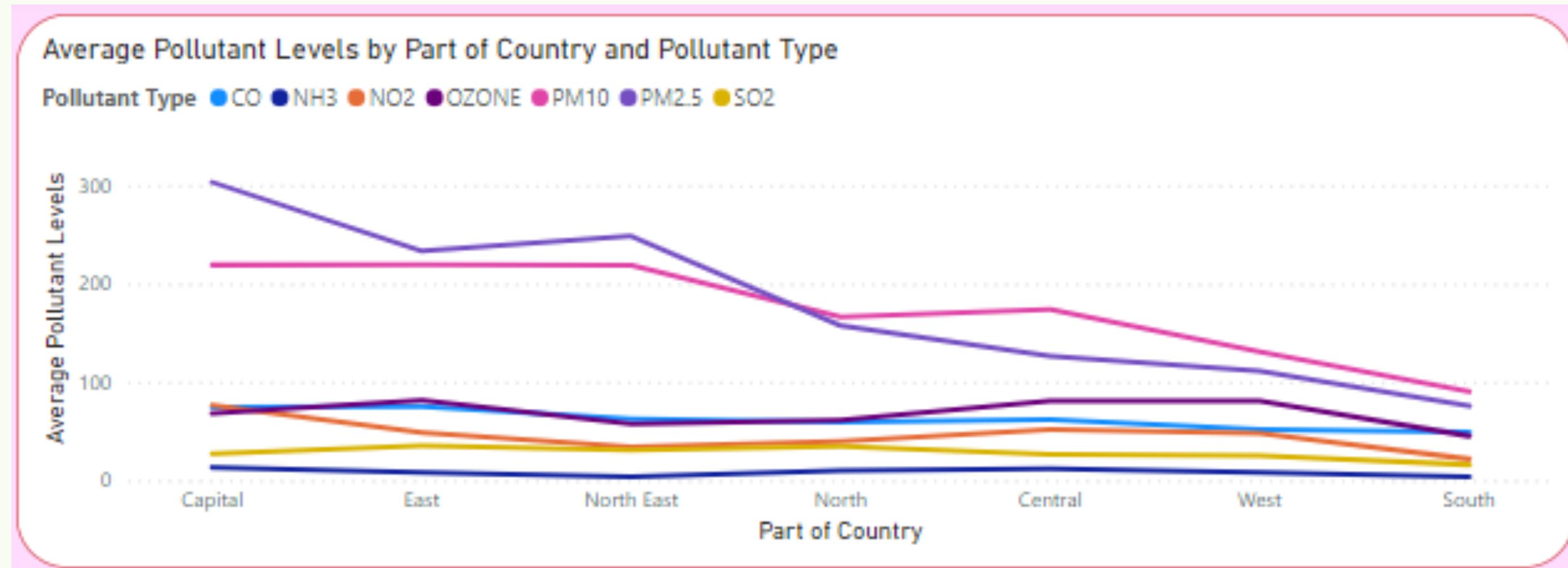


Fig. 1: Average Pollutants Levels of India

Range: 75.68-303.33 Average: 179.46 Median: 157.52 Std. Error: 83.32

From Normalized Data, potential outliers are:

- Capital: +1.5*Std Error from Mean
- South: -1.24*Std Error from Mean

Overview of Capital Region (Most Polluted)

Following graph shows that Capital Region (Delhi) faces highest problem of PM 10 and PM 2.5

Corresponding Statistical Metrics are:

Range: 10.55-121.78

Average: 57.37

Median: 44.65

Std. Error: 44.42

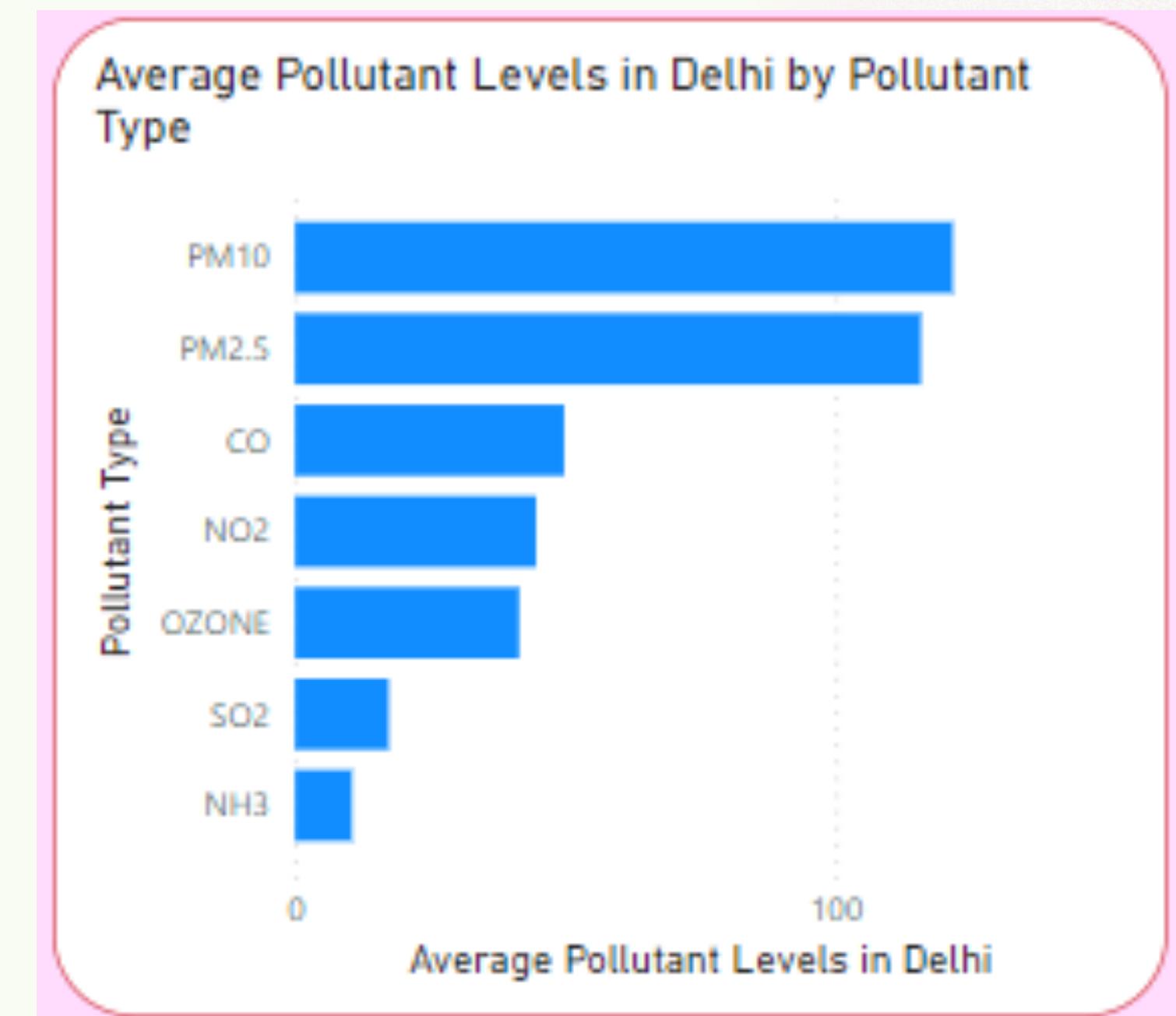


Fig. 2: Average Pollutant Levels of Capital

Normalized Data suggests the following are alarming for Delhi:

- PM10: $+1.45 \times \text{Std Error from Mean}$
- PM2.5: $+1.32 \times \text{Std Error from Mean}$

Overview of South Region (Cleanest)

Following is the graph of Pollutant Data from Southern Part:

Corresponding Statistical Metrics are:

Range: 2.86-59.71

Average: 29.27

Median: 33.4

Std. Error: 20.32

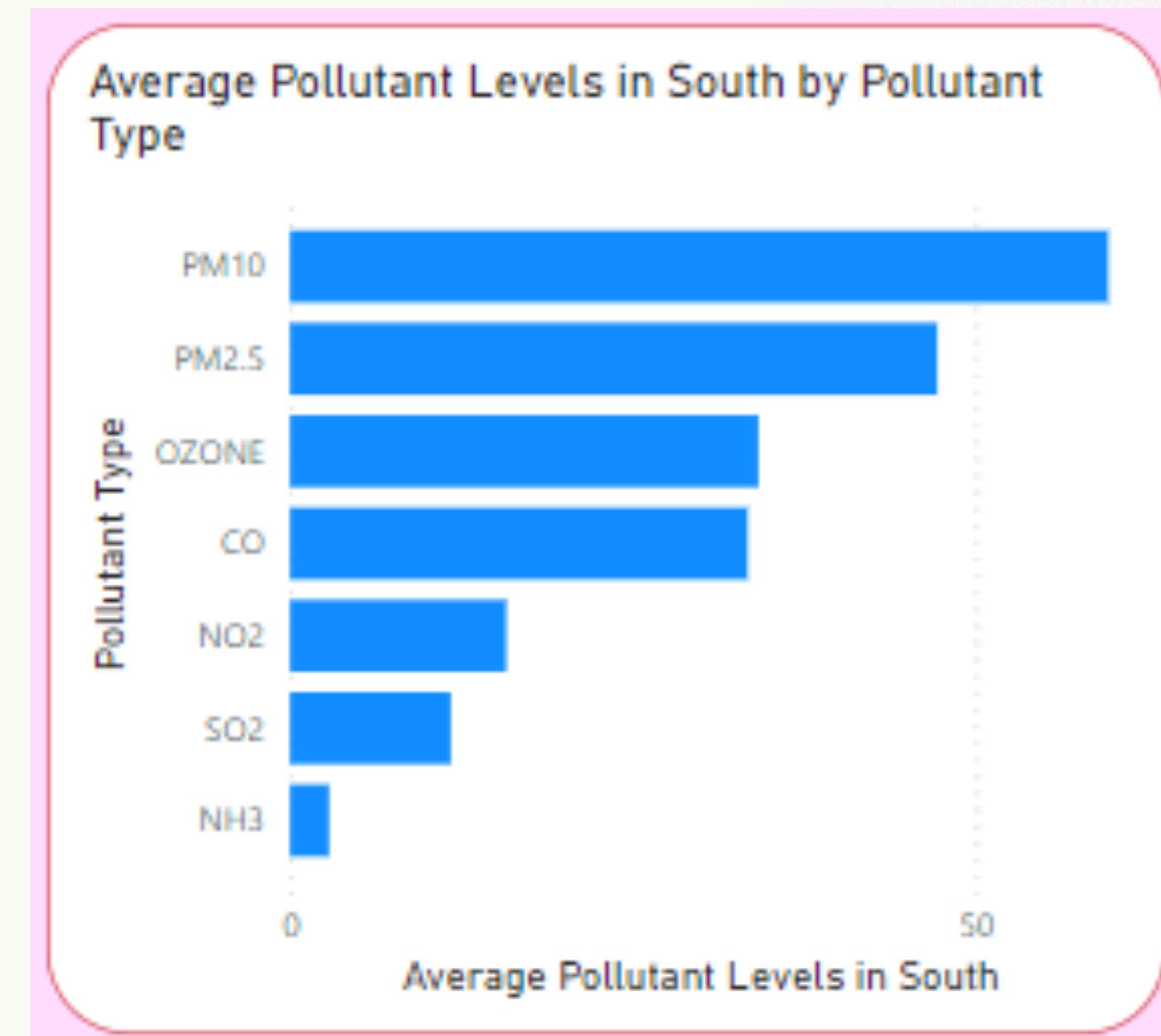


Fig. 3: Average Pollutant Levels of South

Normalized Data findings are:

- Almost Balanced Data (Extreme Z-Scores: -0.595 and 0.685)
- No Pollutant is at alarming levels

Comparison of Capital and Southern Part

For the comparison part, we'll use the
“Normalized Difference Data”

Pollutant	Capital-South
CO	-0.344
Ammonia	-0.91
Nitrogen Dioxide	-0.33
Ozone	-0.41
PM10	0.99
PM2.5	1.78
Sulfur Dioxide	-0.79

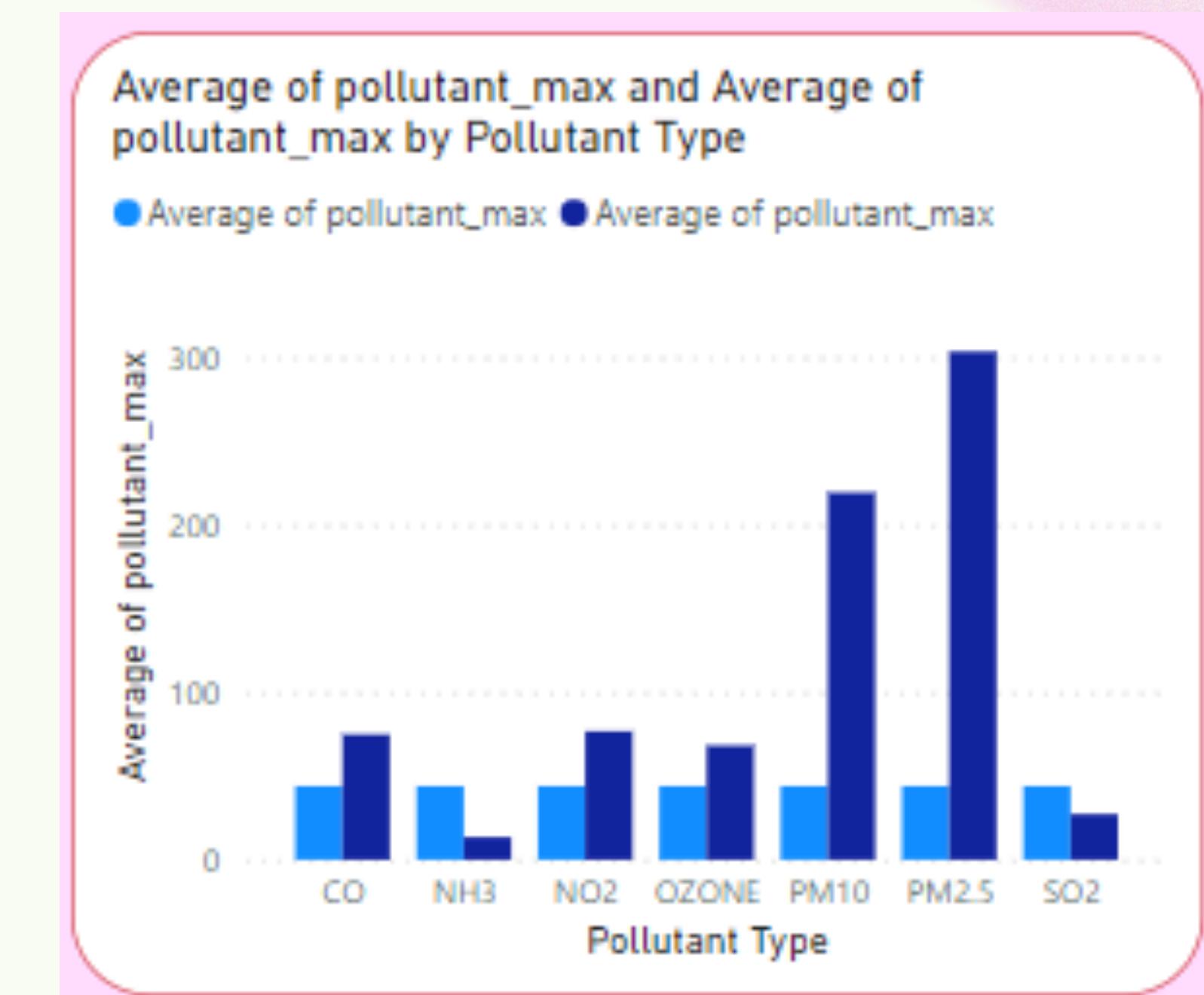


Fig. 4: Comparison of pollutants of Capital and South

Concluding Remarks from Comparison

The comparison from last page helps to conclude:

- Very close pollution levels for most pollutants
- Very high absolute Z for Ammonia, PM2.5 and PM10
- Capital faces high risk of PM2.5, PM 10 (>>recommended, ~50)
- South is almost fine except for Ammonia Levels, ~44.02

Thank you for this opportunity!!