

Visualizing Air Pollution Data in Seoul, South Korea

Ting Chen

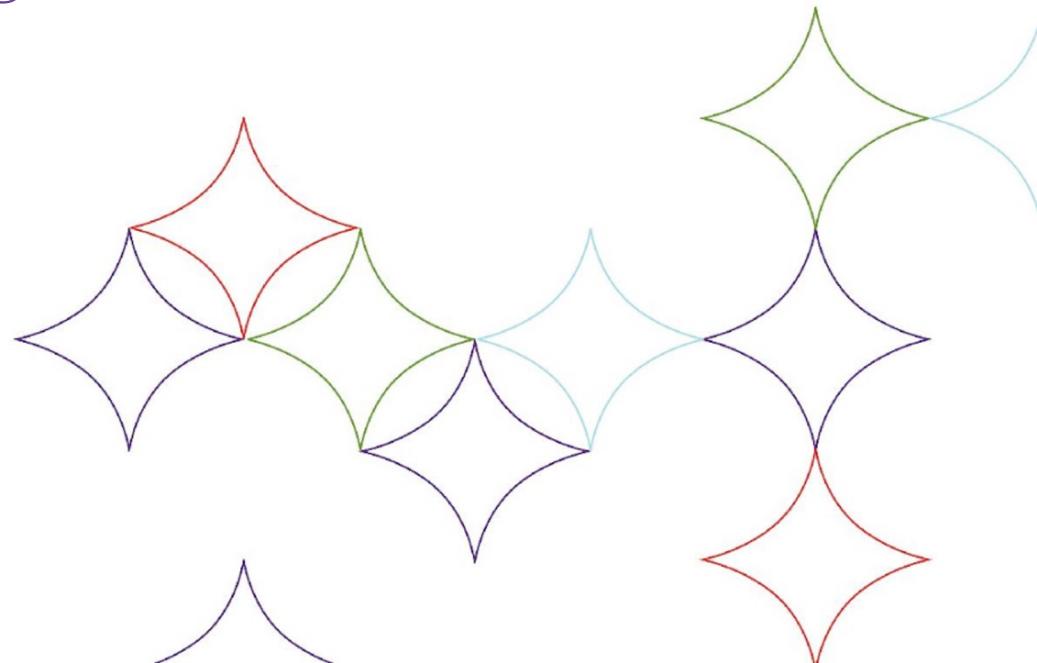
Advisor: Dr. Sultan

December 8th, 2023

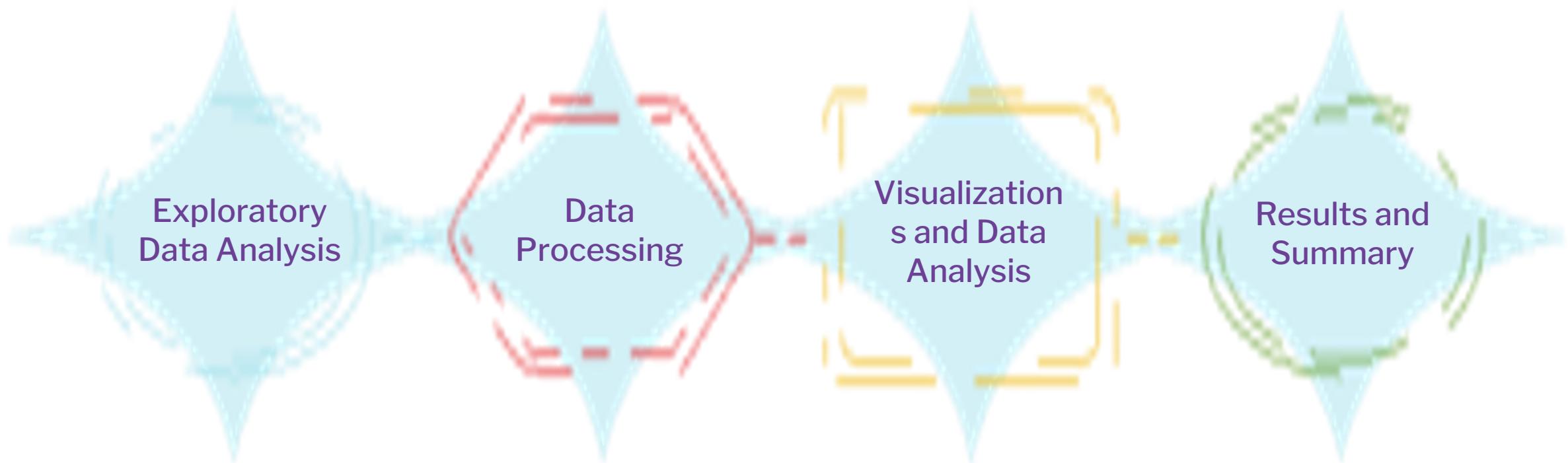


Introduction

- Air pollution is an effect from climate change
- Air Quality Index (AQI) is used to measure air pollution levels
- Raise awareness for climate change
- Power of visualizing data



Process

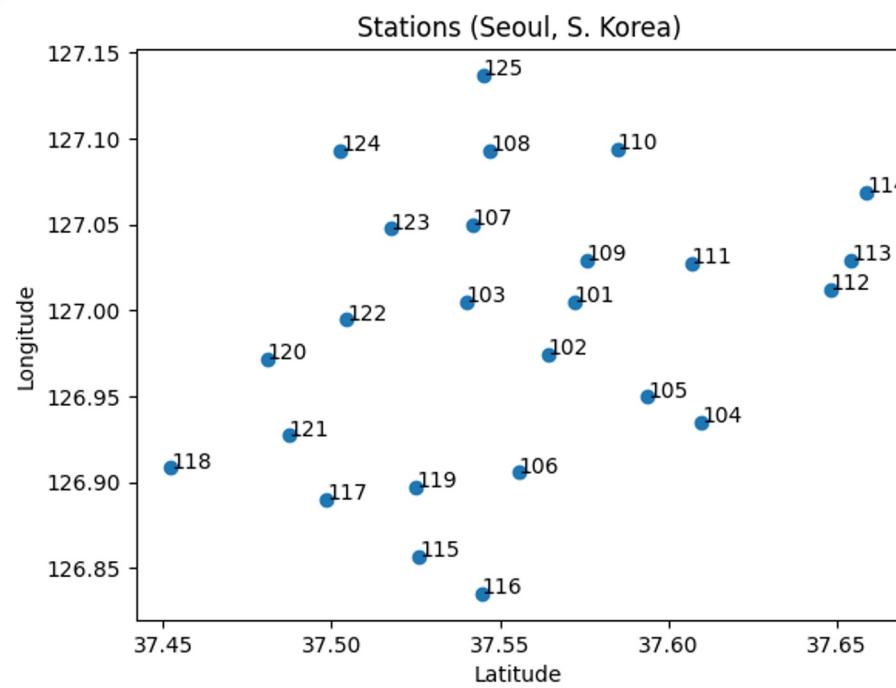


Data

- 647,511 rows
- 13 columns
 - date time
 - location
 - pollutant volume
- 6 pollutants
- 25 stations in Seoul
- measure by each hour between 2017 and 2019

Data (Locations)

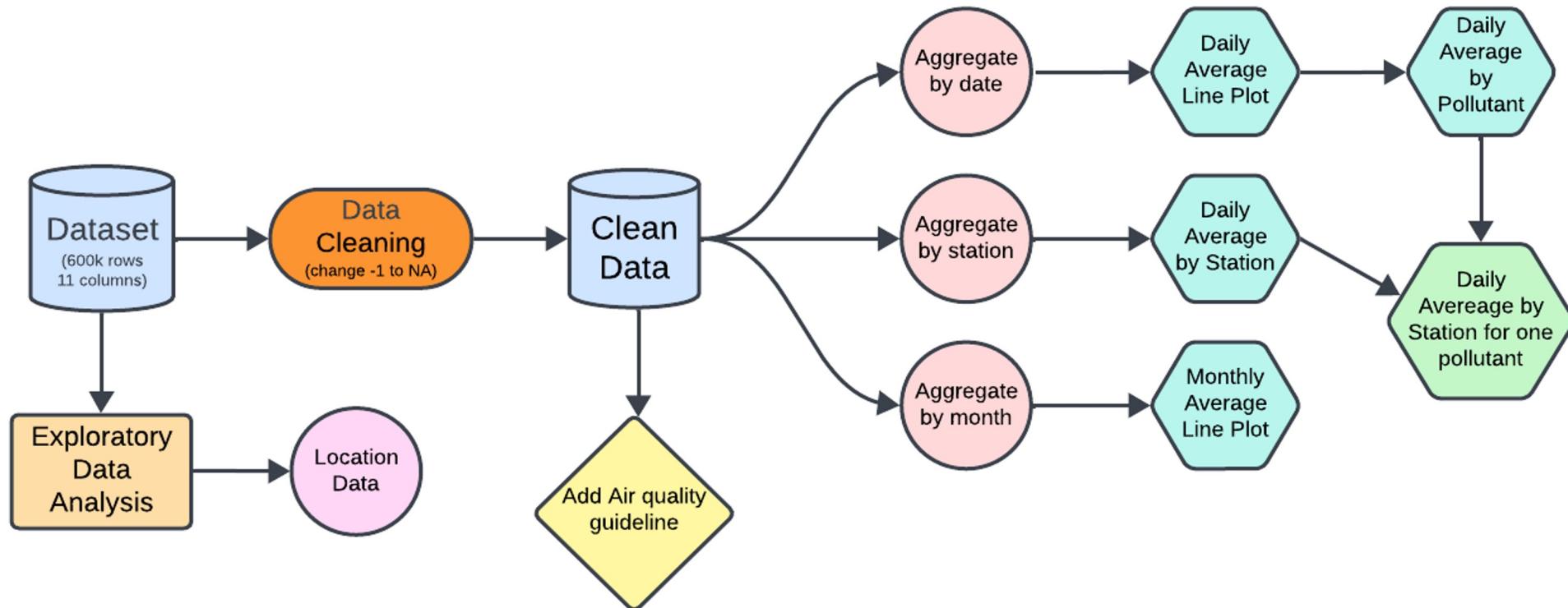
- 25 Districts of Seoul
- capital of South Korea



Data (Pollutant)

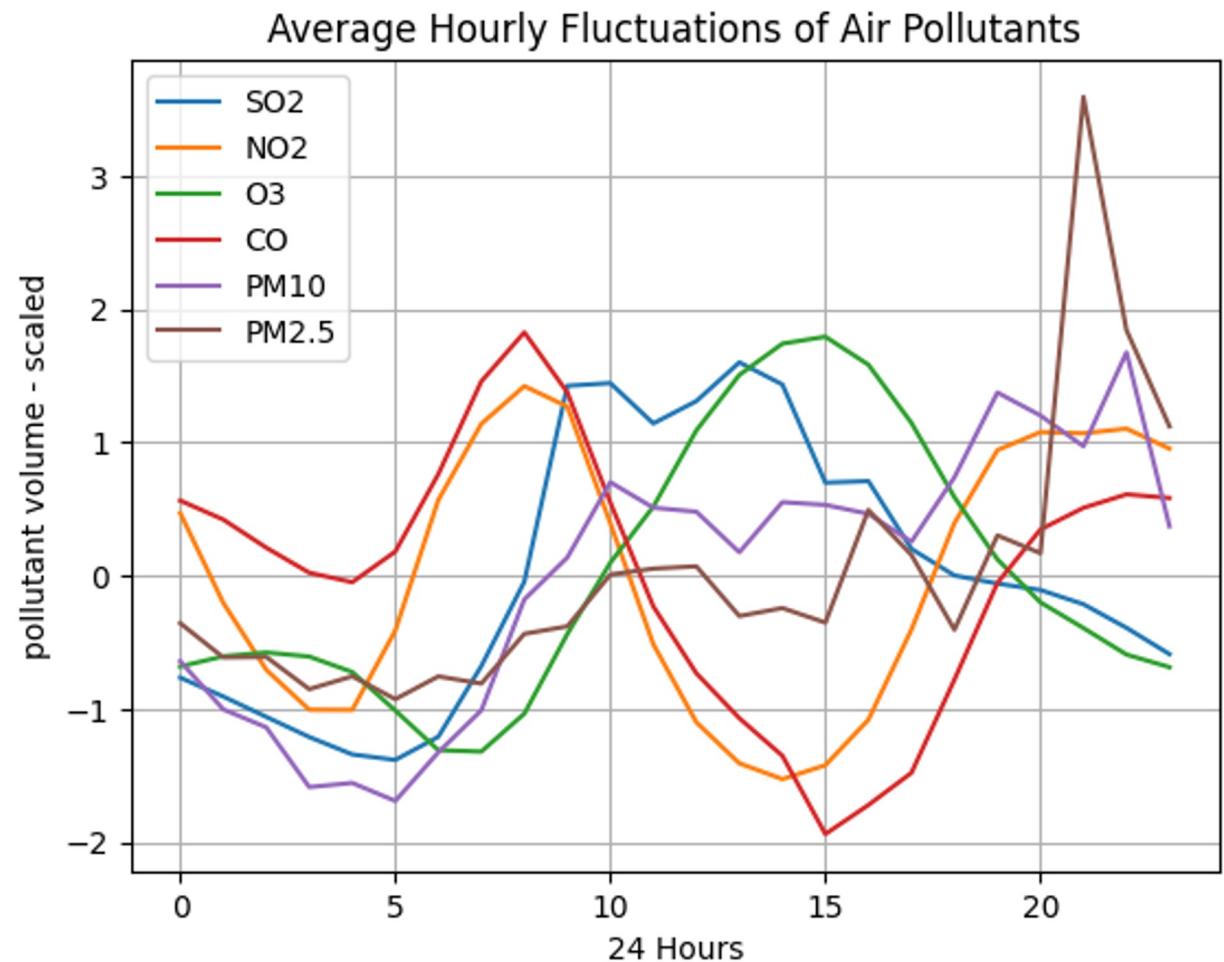
Pollutant	Name	Max	NA	Unhealthy Level
SO ₂	Sulfur Dioxide	3.736	3976	0.15
NO ₂	Nitrogen Dioxide	38.445	3834	0.2
CO	Ozone	33.6	4059	15
O ₃	Carbon Monoxide	71.7	4036	0.15
PM10	Particulate Matter (Particles less than 10 micrometers)	3586	3962	150
PM2.5	Particulate Matter (Particles less than 2.5 micrometers)	6256	3973	75

Data Processing

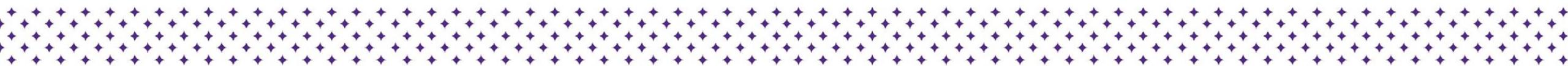
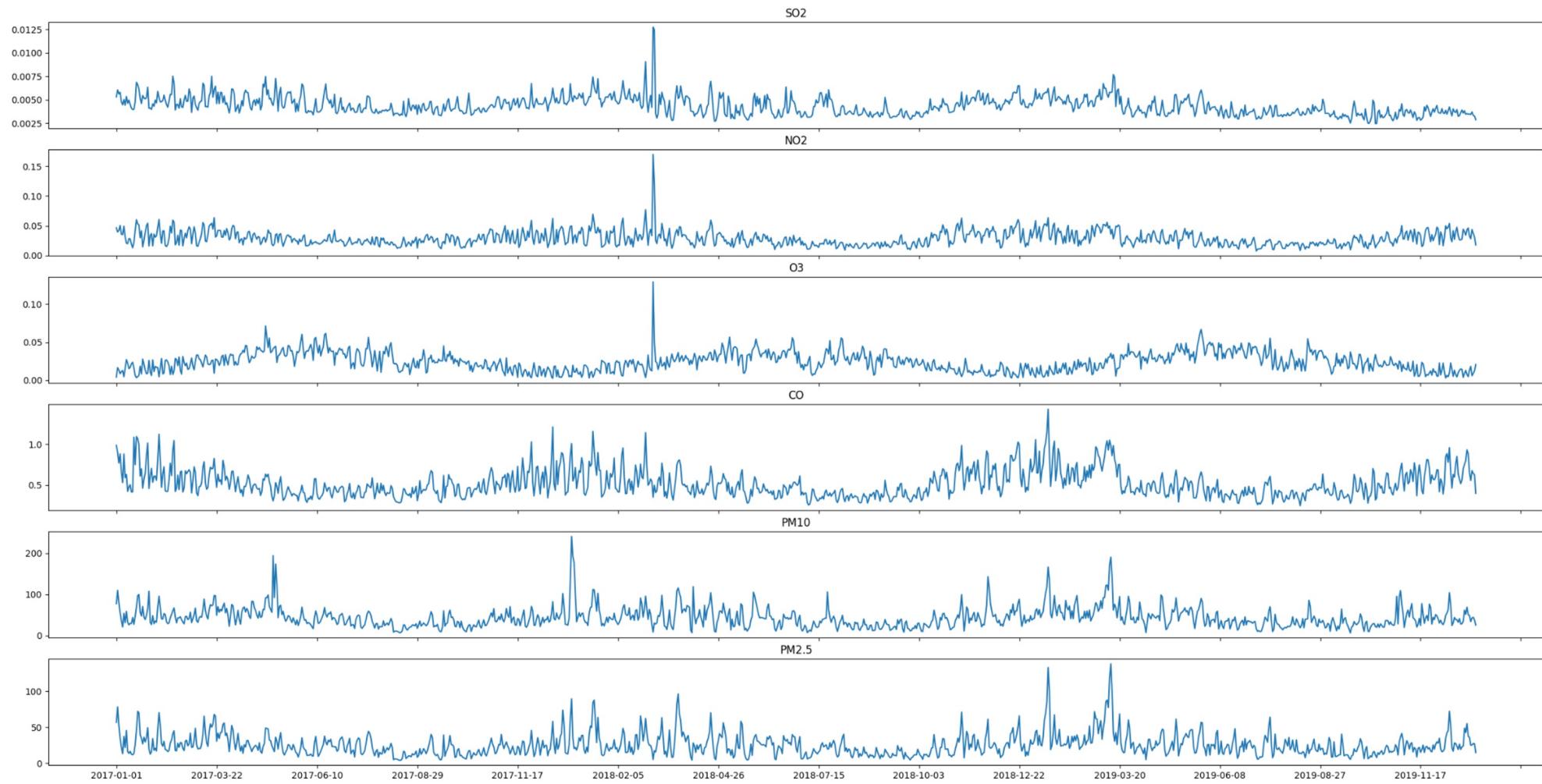


Hourly Averages

- SO₂ and NO₂ follow similar trend
 - peaks in the morning (around 7-9 AM)
 - lowest at 2 to 3 PM
- O₃ peaks at 3 PM
- SO₂, PM10, PM2.5 have most fluctuations
- PM2.5 has the highest peak at 9PM

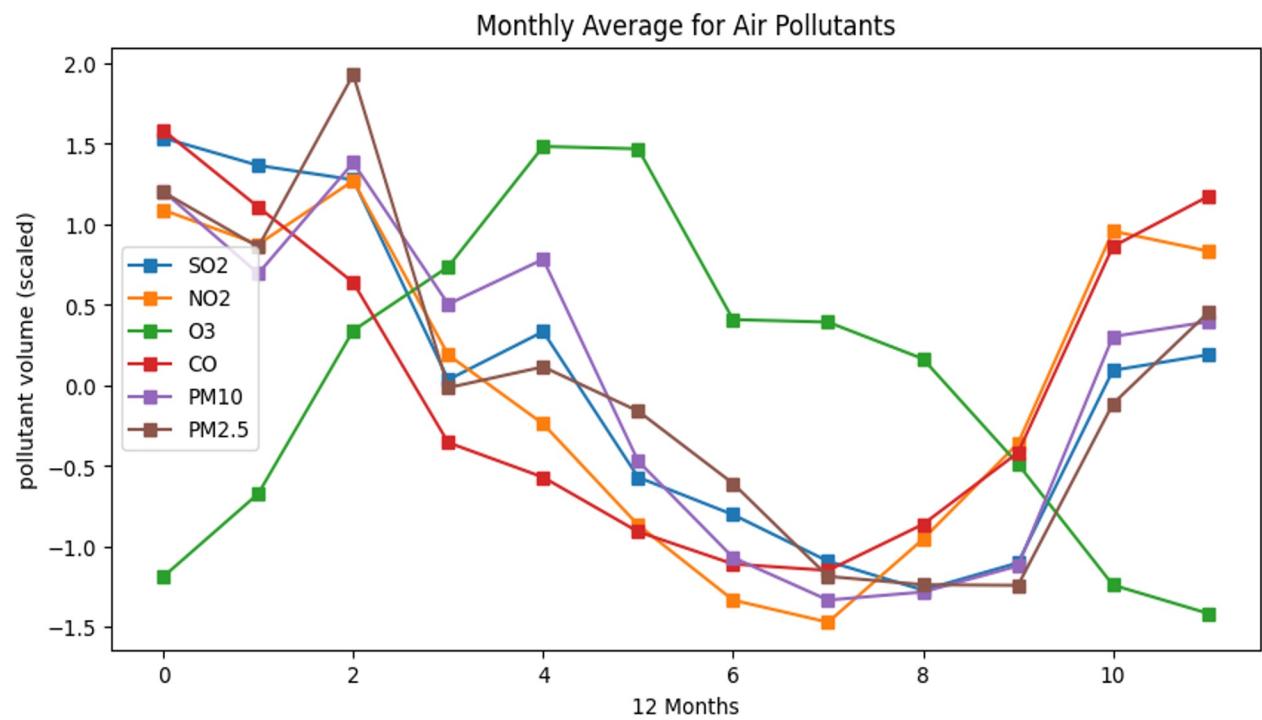


Daily Averages

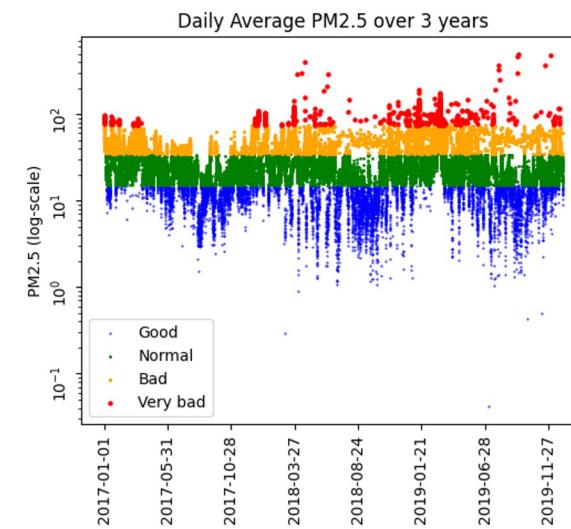
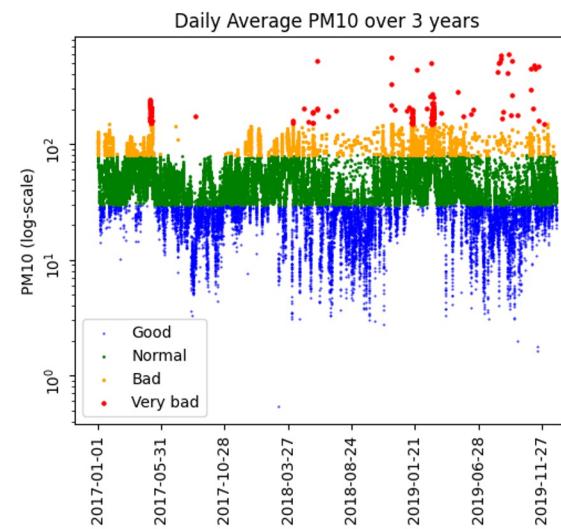
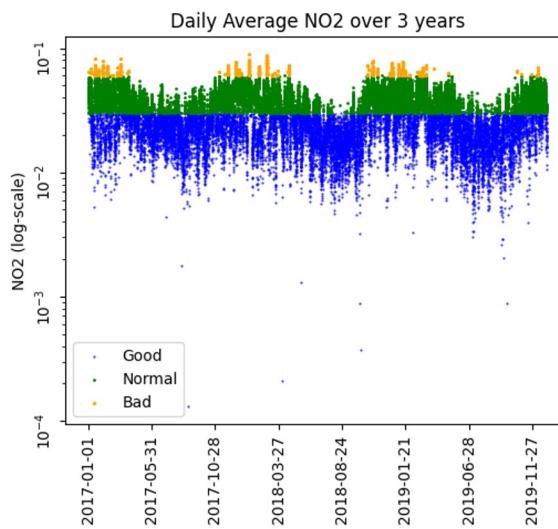
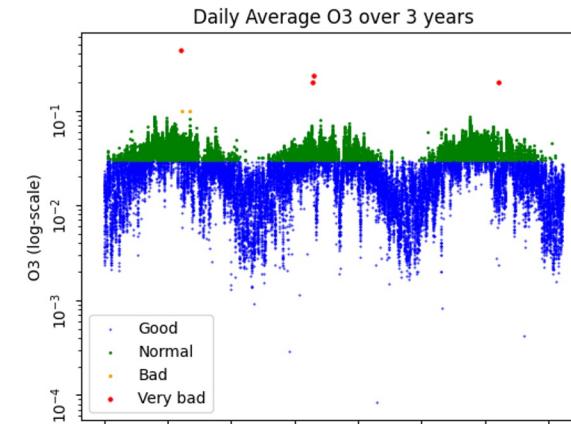
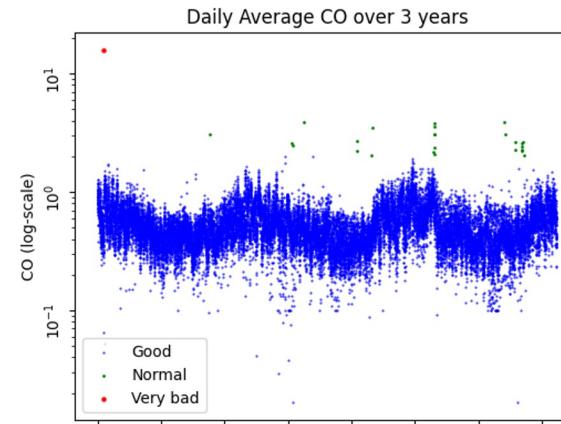
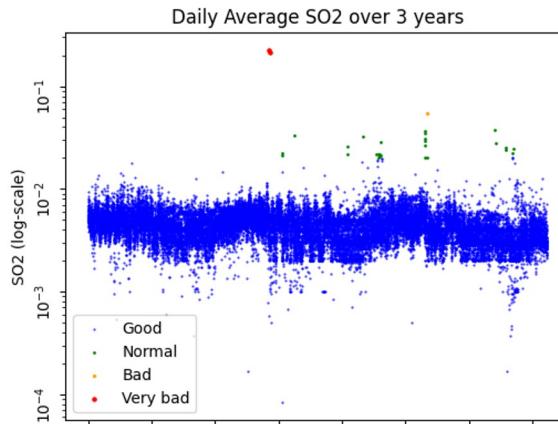


Monthly Averages

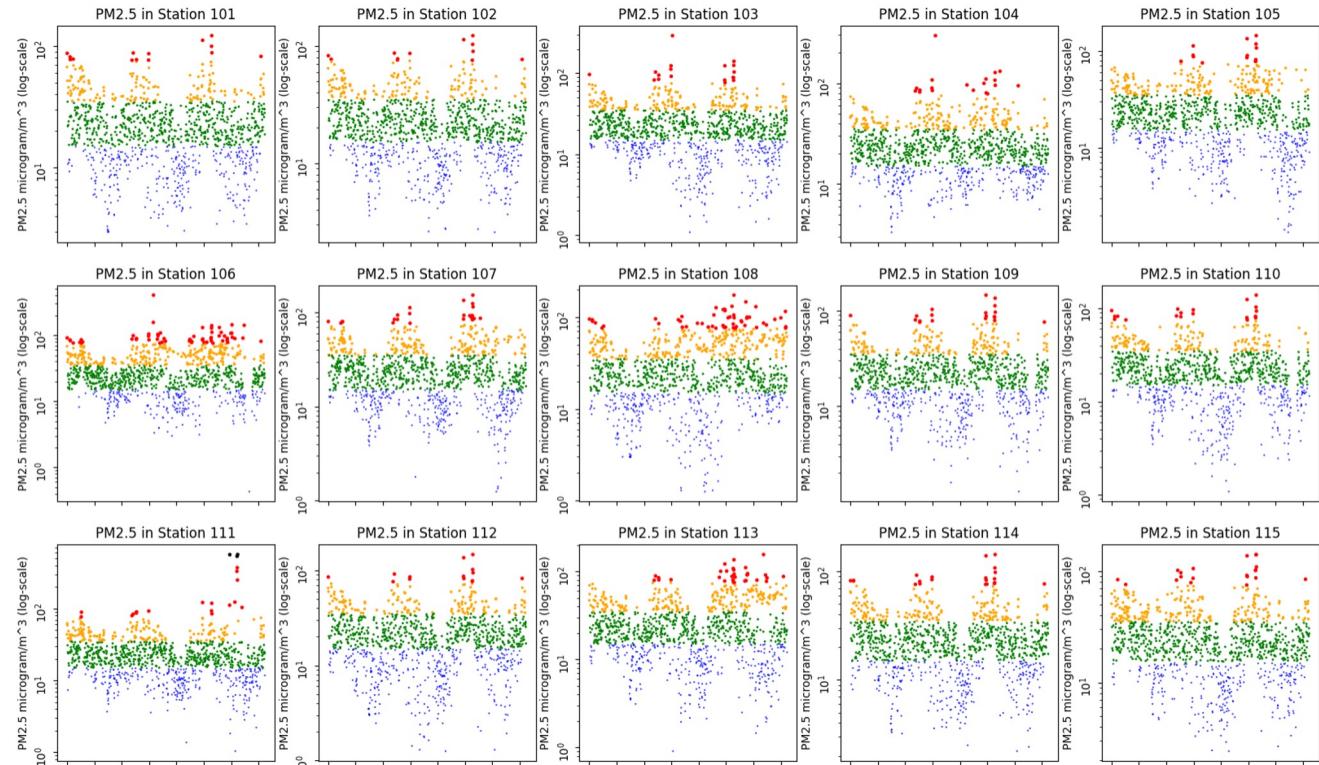
- O_3 has an inverse relationship compared to other pollutants
- SO_2 , NO_2 , CO , $PM10$, and $PM2.5$ starts at high level
 - reaches peak in March
 - gradually decrease until August
 - increase again
- Highest during winter month



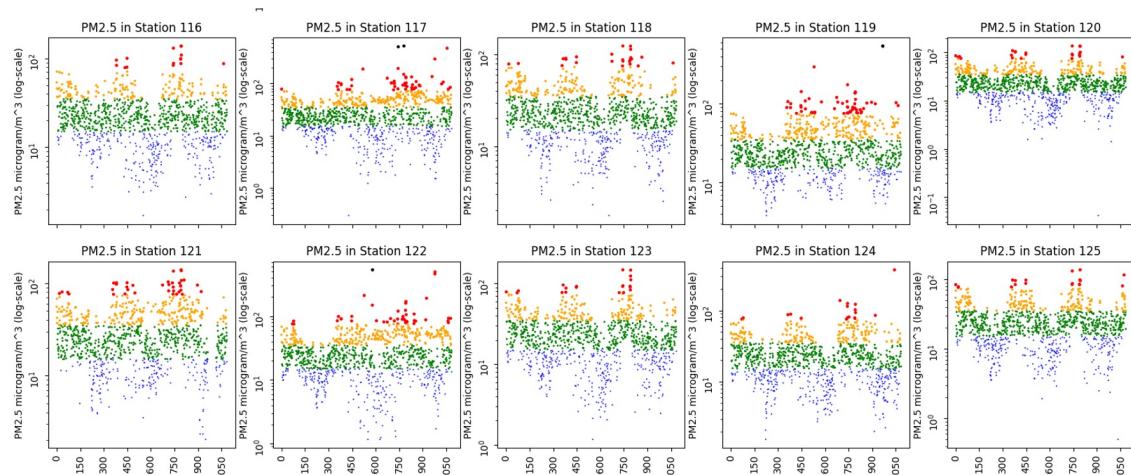
Daily Averages by pollutant



Daily Averages of PM2.5 by station



- 2019 has more unhealthy levels than 2017



Reflection

- Air pollution is a serious problem (small area and short period of time)
- Visualizing changes helps us focus on certain area for reformation
- Further research target small location for explanation of the extreme values
- Independent project is a learning process to learn more about myself and establish new work method

Thank You!

Any Questions?