



**GRT INSTITUTE OF
ENGINEERING AND
TECHNOLOGY, TIRUTTANI - 631209**

Approved by AICTE, New Delhi Affiliated to Anna University, Chennai



DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Phase4

PROJECT TITLE

Air quality analysis and prediction in tamilnadu

COLLEGE CODE:1103

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3rd yr, 5th sem

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Program:

```
# Import necessary libraries
import pandas as pd
import matplotlib.pyplot as plt

# Load the air quality data into a DataFrame
dtype = {
    'stn_code': str,
    'sampling_date': str,
    'state': str,
    'location': str,
    'agency': str,
    'type': str,
    'so2': float,
    'no2': float,
    'rspm': float,
    'spm': float,
    'location_monitoring_station': str,
    'date': str
}

data = pd.read_csv('C:/project/data.csv', sep=',', encoding='ISO-8859-1',
dtype=dtype)
data = data.sample(500)
print(data)

# Calculate average levels
average_so2 = data['so2'].mean()
average_no2 = data['no2'].mean()
average_rspm = data['rspm'].mean()

# Identify pollution trends
# You may want to add more analysis here

# Create visualizations
plt.figure(figsize=(10, 6))
plt.bar(['so2', 'no2', 'rspm'], [average_so2, average_no2, average_rspm])
plt.xlabel('Pollutant')
plt.ylabel('Average Level')
plt.title('Average Air Quality Levels')
plt.show()

# Create a bar chart to visualize the averages
pollutants = ['SO2', 'NO2', 'RSPM']
averages = [average_so2, average_no2, average_rspm]
plt.bar(pollutants, averages)
plt.xlabel('Pollutant')
plt.ylabel('Average Level')
plt.title('Average Air Quality Levels')
plt.show()

# Calculate average levels for SO2, NO2, and RSPM/PM10
average_so2 = data['so2'].mean()
average_no2 = data['no2'].mean()
average_rspm_pm10 = data['rspm'].mean()

print(f"Average SO2 level: {average_so2}")
print(f"Average NO2 level: {average_no2}")
print(f"Average RSPM/PM10 level: {average_rspm}")
```

```

plt.figure(figsize=(12, 6))
plt.plot(data['sampling_date'], data['so2'], label='SO2 Levels',
color='blue')
plt.xlabel('sampling_date')
plt.ylabel('SO2 Levels')
plt.title('SO2 Levels in Tamil Nadu')
plt.legend()
plt.grid()
plt.show()

plt.figure(figsize=(12, 6))
plt.plot(data['sampling_date'], data['no2'], label='no2 Levels',
color='violet')
plt.xlabel('sampling_date')
plt.ylabel('no2 Levels')
plt.title('no2 Levels in Tamil Nadu')
plt.legend()
plt.grid()
plt.show()

plt.figure(figsize=(12, 6))
plt.plot(data['sampling_date'], data['rspm'], label='rspm Levels',
color='black')
plt.xlabel('sampling_date')
plt.ylabel('rspm Levels')
plt.title('rspm Levels in Tamil Nadu')
plt.legend()
plt.grid()
plt.show()

import seaborn as sns
# Basic histograms for SO2, NO2, and RSPM/PM10
plt.figure(figsize=(12, 6))
plt.subplot(131)
sns.histplot(data['so2'], bins=20, kde=True)
plt.title('SO2 Distribution')

plt.subplot(132)
sns.histplot(data['no2'], bins=20, kde=True)
plt.title('NO2 Distribution')

plt.subplot(133)
sns.histplot(data['rspm'], bins=20, kde=True)
plt.title('RSPM/PM10 Distribution')
plt.tight_layout()
plt.show()

# Calculate average levels for SO2, NO2, and RSPM/PM10
average_so2 = data.groupby('location_monitoring_station')['so2'].mean()
average_no2 = data.groupby('location_monitoring_station')['no2'].mean()
average_rspm_pm10 =
data.groupby('location_monitoring_station')['rspm'].mean()

# Create visualizations
# Example: Bar chart to visualize average SO2 levels by city
plt.figure(figsize=(10, 6))
plt.bar(average_so2.index, average_so2.values)
plt.xlabel('City')
plt.ylabel('Average SO2 Level')

```

```

plt.title('Average SO2 Levels by City')
plt.xticks(rotation=45)
plt.show()

# Calculate average SO2, NO2, and RSPM/PM10 levels
avg_so2 = data.groupby('location_monitoring_station')['so2'].mean()
avg_no2 = data.groupby('location_monitoring_station')['no2'].mean()
avg_rspm_pm10 = data.groupby('location_monitoring_station')['rspm'].mean()

# Identify areas with high pollution levels
high_so2_areas = avg_so2[avg_so2 > 2] # Replace 'threshold' with your
desired threshold value
high_no2_areas = avg_no2[avg_no2 > 200]
high_rspm_pm10_areas = avg_rspm_pm10[avg_rspm_pm10 > 60 ]
# Print or visualize the results
print("Average SO2 levels by location:")
print(avg_so2)
print("\nAverage NO2 levels by location:")
print(avg_no2)
print("\nAverage RSPM/PM10 levels by location:")
print(avg_rspm_pm10)

print("\nAreas with high SO2 levels:")
print(high_so2_areas)
print("\nAreas with high NO2 levels:")
print(high_no2_areas)
print("\nAreas with high RSPM/PM10 levels:")
print(high_rspm_pm10_areas)

# Visualize pollution trends over time
import matplotlib.pyplot as plt
plt.figure(figsize=(12, 6))
plt.plot(high_so2_areas.index, high_so2_areas.values, label='SO2')
plt.plot(high_no2_areas.index, high_no2_areas.values, label='NO2')
plt.plot(high_rspm_pm10_areas.index, high_rspm_pm10_areas.values,
label='RSPM/PM10')
plt.xlabel('Time')
plt.ylabel('Average Levels')
plt.title('Air Quality Trends Over Time')
plt.legend()
plt.show()

```

Output:

stn_code	sampling_date	...	Unnamed: 11	date
10031	NaN	17/4/2009	...	NaN 4/17/2009
227291	165	18/03/2011	...	NaN 3/18/2011
367294	581	1/1/2015	...	NaN 1/1/2015
21563	742	4/9/2014	...	NaN 9/4/2014
72170	144	20/10/2011	...	NaN 10/20/2011

351040	NaN	22/5/2009	...	NaN	5/22/2009
395146	6	17/02/2012	...	NaN	2/17/2012
275222	NaN	7/12/2007	...	NaN	12/7/2007
398317	1	14-03-13	...	NaN	3/14/2013
107544	NaN	27-10-05	...	NaN	10/27/2005

[500 rows x 13 columns]

Figure 1

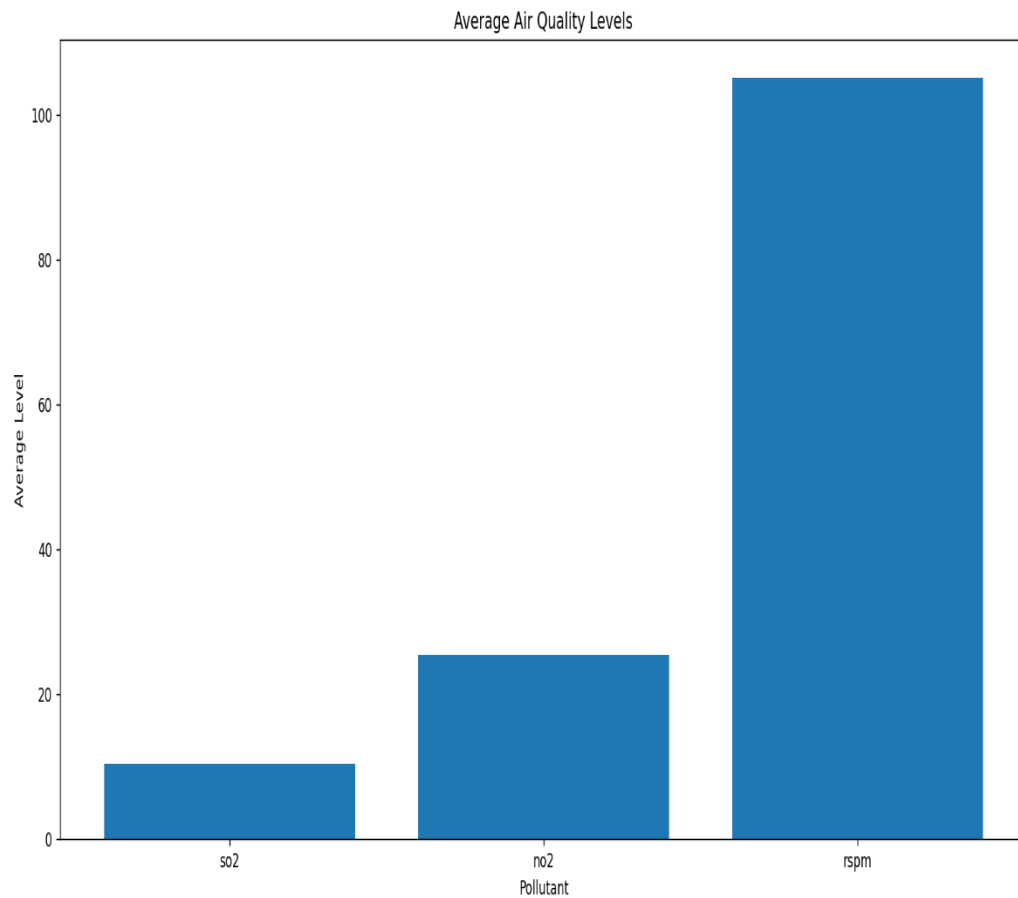
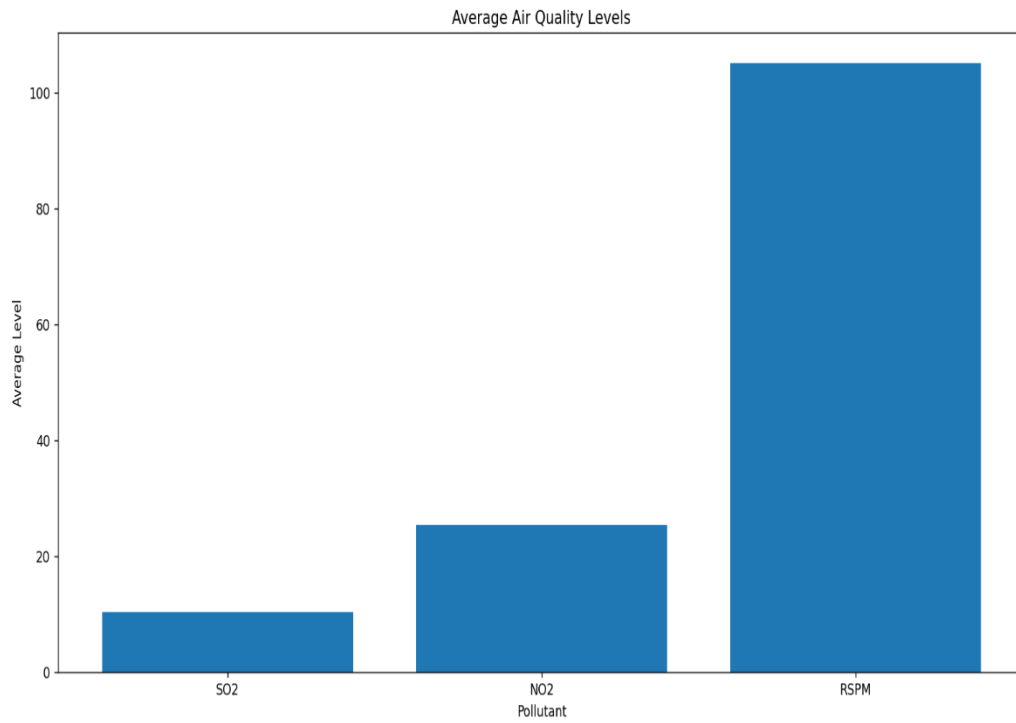


Figure 1



Average SO2 level: 10.347529112074236

Average NO2 level: 25.39095238093789

Average RSPM/PM10 level: 105.0656695780131

Figure 1

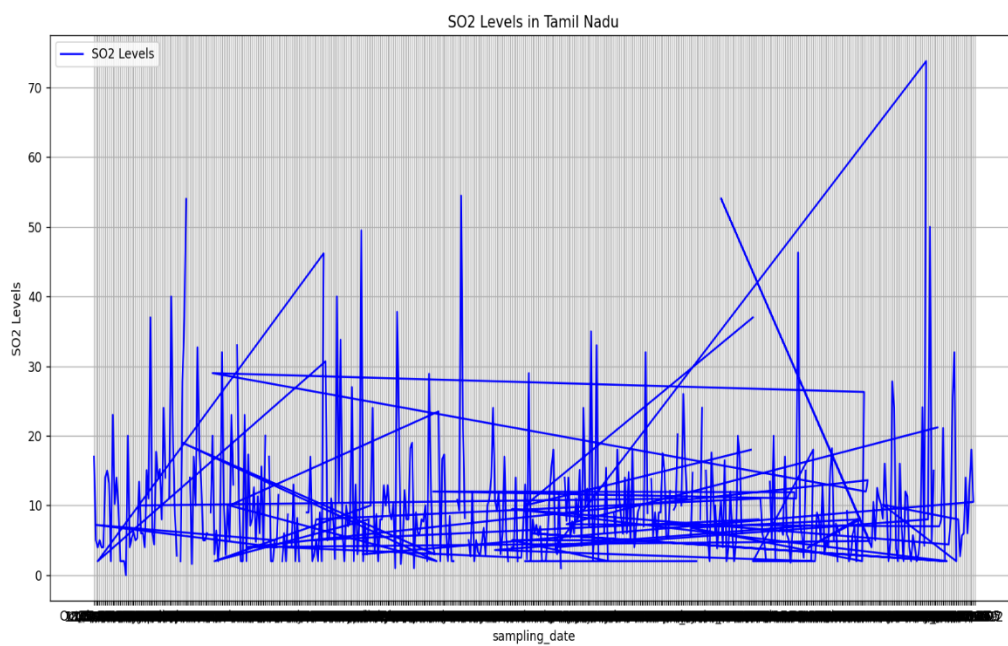


Figure 1

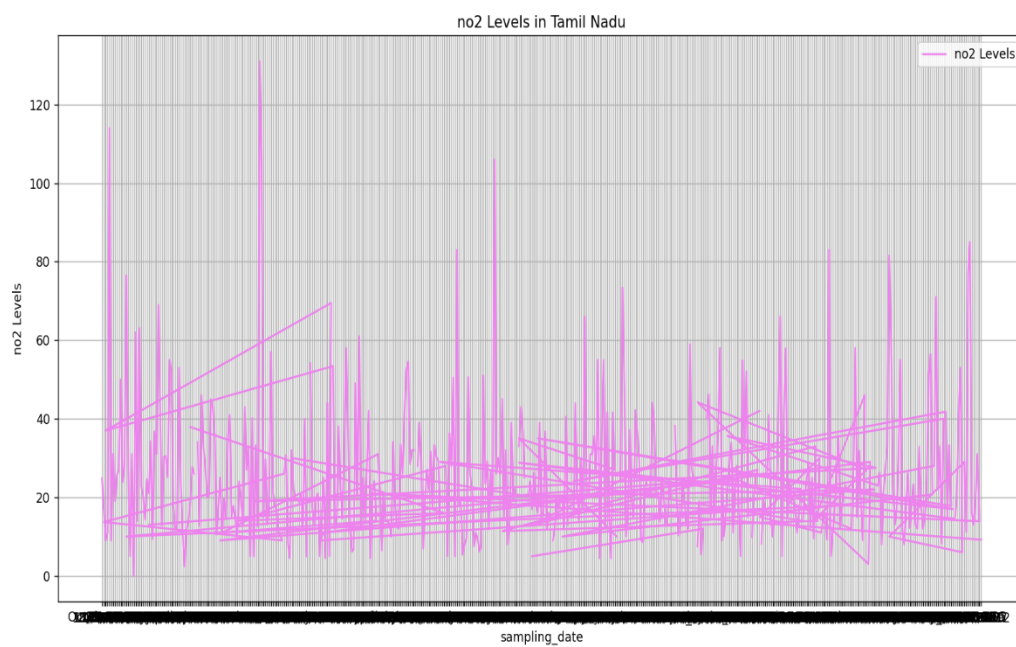


Figure 1

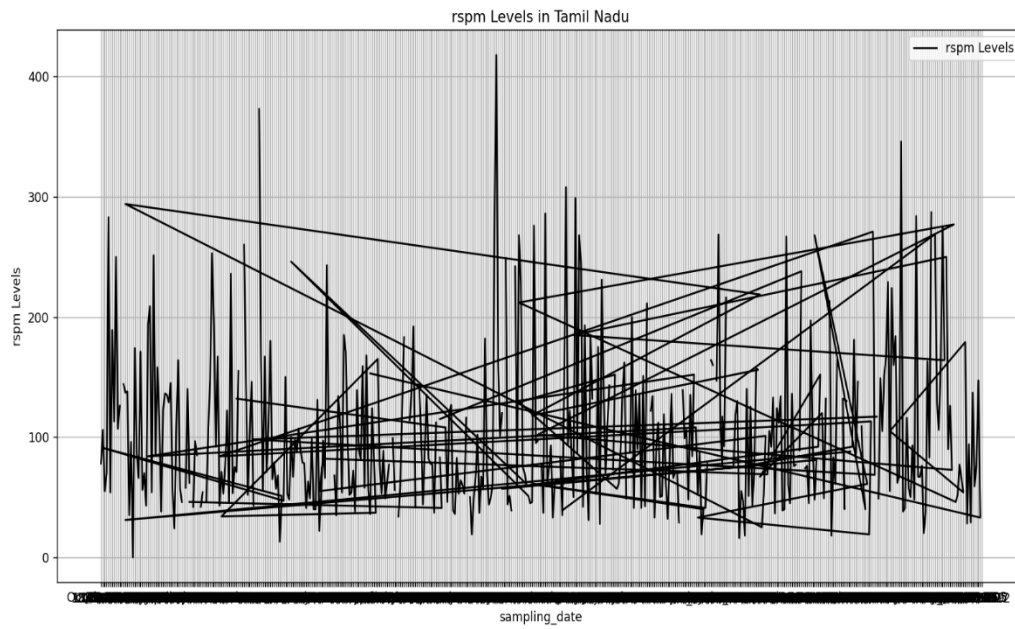


Figure 1

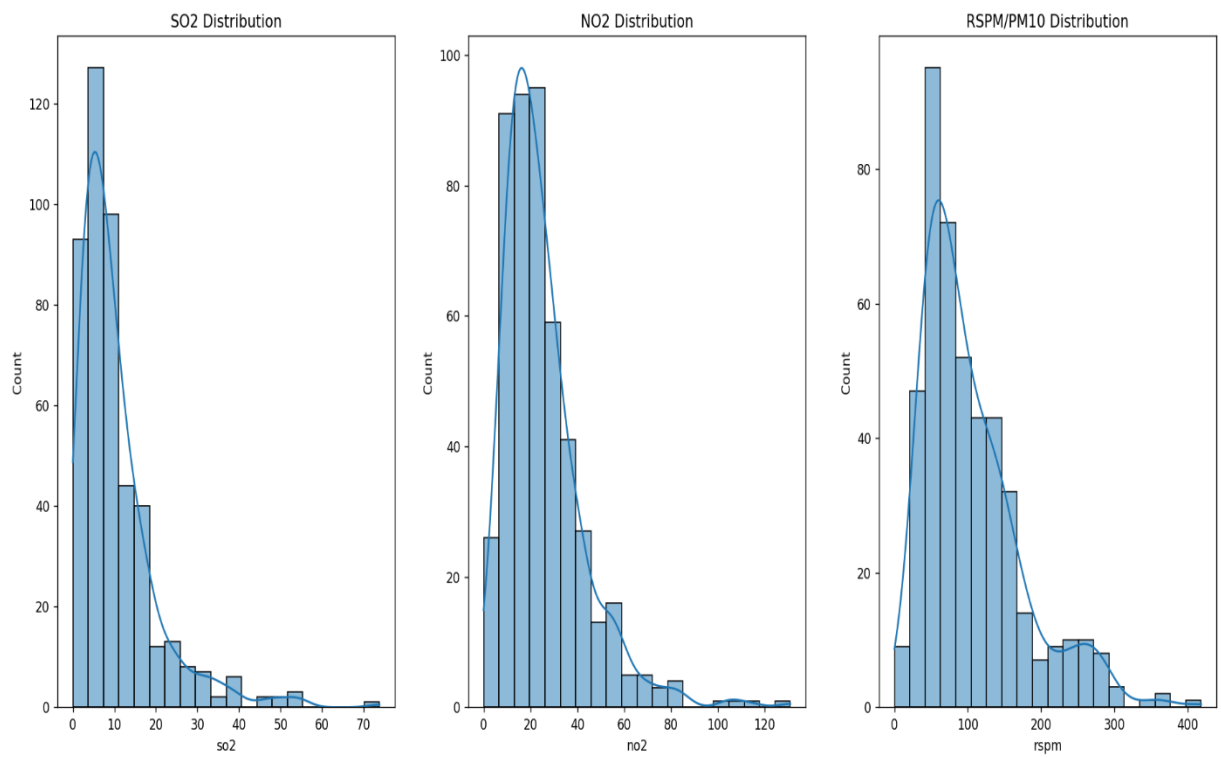
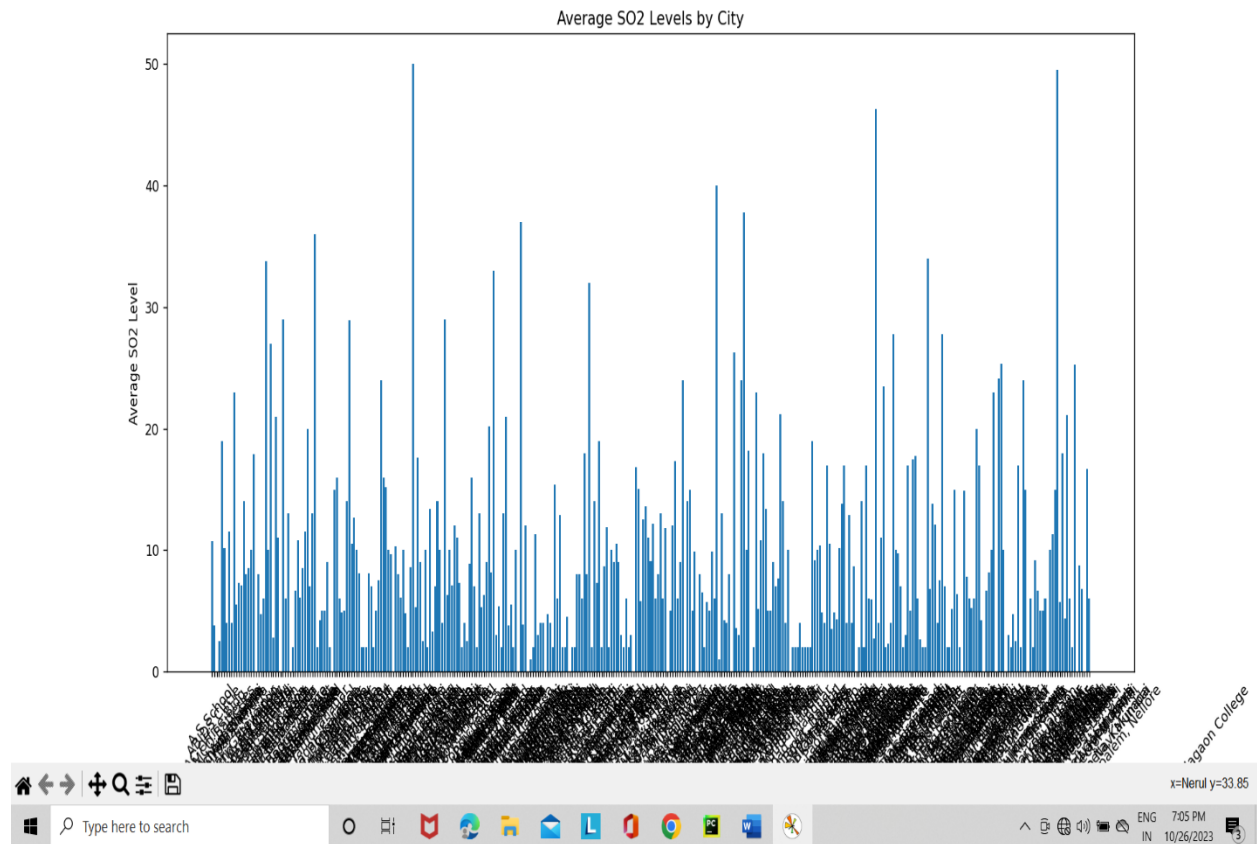


Figure 1



Average SO2 levels by location:

location_monitoring_station

A S School	10.75
ABIDS Circle	3.80
AC Office Bldg.	NaN
AC Office Building, Parwanoo	2.50
AMCO Batteries	19.00
...	
Visak Hostel, Sector-4, Bhilai	8.75
WBIIDC	6.80
WBIIDC, Haldia	NaN
WIT Campus	16.70

Water Resources Division Office Campus, Christian Patty, near Nagaon College 6.00

Name: so2, Length: 359, dtype: float64

Average NO2 levels by location:

location_monitoring_station

A S School	30.35
ABIDS Circle	54.10
AC Office Bldg.	7.50
AC Office Building, Parwanoo	13.34
AMCO Batteries	37.90

...

Visak Hostel, Sector-4, Bhilai	21.25
WBIIDC	44.20
WBIIDC, Haldia	29.60
WIT Campus	36.30

Water Resources Division Office Campus, Christian Patty, near Nagaon College 21.00

Name: no2, Length: 359, dtype: float64

Average RSPM/PM10 levels by location:

location_monitoring_station

A S School	240.50
ABIDS Circle	49.00
AC Office Bldg.	50.00
AC Office Building, Parwanoo	71.00
AMCO Batteries	46.00

...

Visak Hostel, Sector-4, Bhilai	88.64
WBIIDC	33.00
WBIIDC, Haldia	73.40

WIT Campus 121.00
Water Resources Division Office Campus, Christian Patty, near Nagaon College 194.00
Name: rspm, Length: 359, dtype: float64

Areas with high SO2 levels:

location_monitoring_station

A S School	10.75
ABIDS Circle	3.80
AC Office Building, Parwanoo	2.50
AMCO Batteries	19.00
AS School, Khanna	10.20

...

Victoria Hospital	25.30
Visak Hostel, Sector-4, Bhilai	8.75
WBIIDC	6.80
WIT Campus	16.70
Water Resources Division Office Campus, Christian Patty, near Nagaon College	6.00

Name: so2, Length: 285, dtype: float64

Areas with high NO2 levels:

Series([], Name: no2, dtype: float64)

Areas with high RSPM/PM10 levels:

location_monitoring_station

A S School	240.50
AC Office Building, Parwanoo	71.00
AS School, Khanna	229.00
ASRAM Diagnostic Center, Eluru	88.00
AZL Behrampura, Ahmadabad	66.50

Vijay Nagar

157.00

Visak Hostel, Sector-4, Bhilai

88.64

WBIIDC, Haldia

73.40

WIT Campus

121.00

Water Resources Division Office Campus, Christian Patty, near Nagaon College 194.00

Name: rspm, Length: 247, dtype: float64

Figure 1

