Phase 4 : Development Part 2

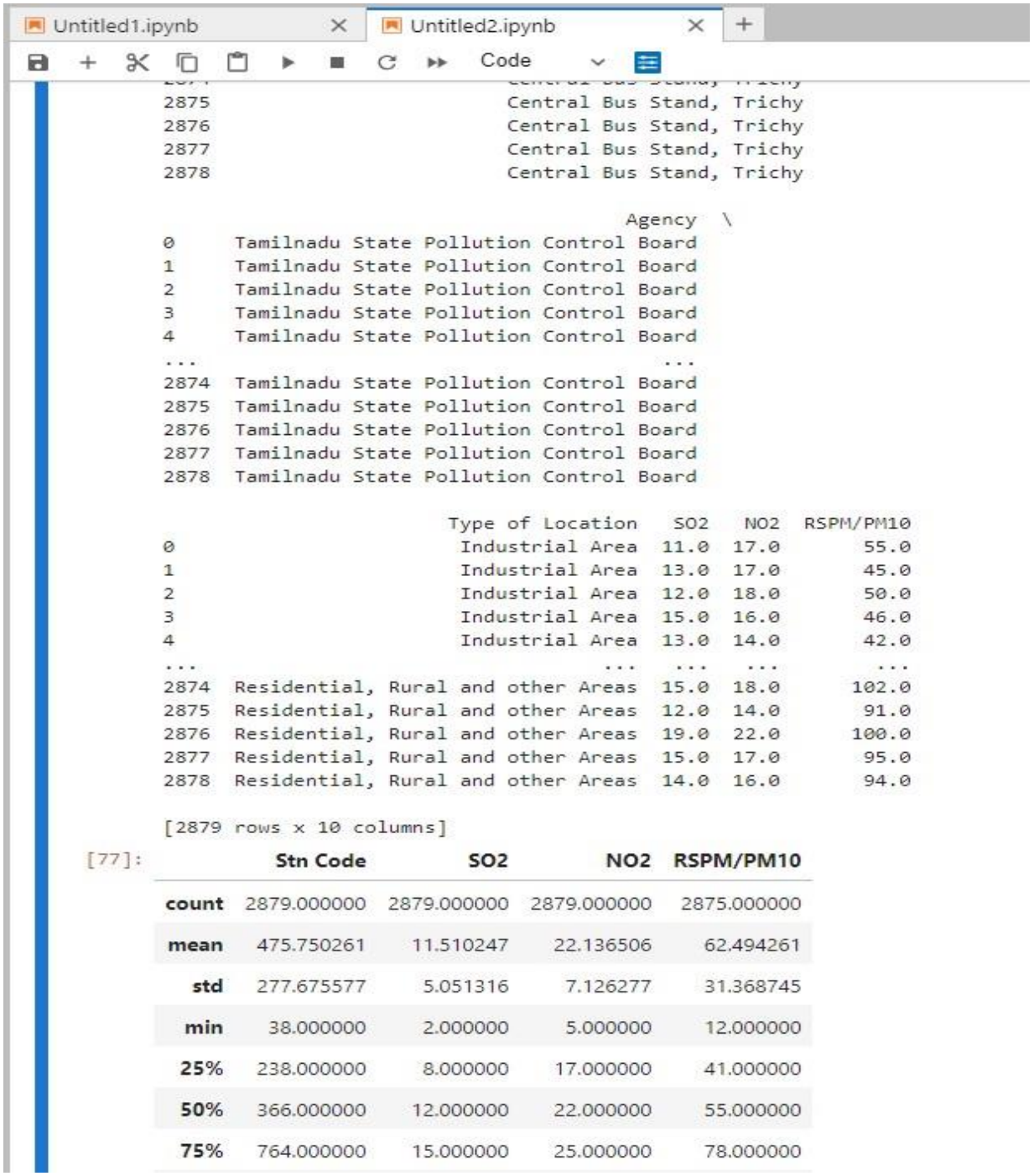
Aim:

To Calculate the average SO2,NO2,RSPM/ PM10 Levels across different monitoring stations ,cities, States.To identify the pollution trends and areas With high pollution levels.To create visualization Using Data Visualization libraries like Seaborn , Matplotlib,etc.

1.Python code:

```
import pandas as pd
df=pd.read_csv(“C:User\admin\Desktop\ibm\air.csv”)
df['SO2']=df['SO2'].interpolate()
df['NO2']=df['NO2'].interpolate()
df=df.drop(columns=df.columns[-1],  axis=1,inplace=False)
print(df)
df.describe()
```

Output:




```
2875                          Central Bus Stand, Trichy
2876                          Central Bus Stand, Trichy
2877                          Central Bus Stand, Trichy
2878                          Central Bus Stand, Trichy

                                                Agency  \
0     Tamilnadu State Pollution Control Board
1     Tamilnadu State Pollution Control Board
2     Tamilnadu State Pollution Control Board
3     Tamilnadu State Pollution Control Board
4     Tamilnadu State Pollution Control Board
...                                                ...
2874  Tamilnadu State Pollution Control Board
2875  Tamilnadu State Pollution Control Board
2876  Tamilnadu State Pollution Control Board
2877  Tamilnadu State Pollution Control Board
2878  Tamilnadu State Pollution Control Board

                          Type of Location   SO2   NO2  RSPM/PM10
0                          Industrial Area  11.0  17.0       55.0
1                          Industrial Area  13.0  17.0       45.0
2                          Industrial Area  12.0  18.0       50.0
3                          Industrial Area  15.0  16.0       46.0
4                          Industrial Area  13.0  14.0       42.0
...                                    ...   ...   ...        ...
2874  Residential, Rural and other Areas  15.0  18.0      102.0
2875  Residential, Rural and other Areas  12.0  14.0       91.0
2876  Residential, Rural and other Areas  19.0  22.0      100.0
2877  Residential, Rural and other Areas  15.0  17.0       95.0
2878  Residential, Rural and other Areas  14.0  16.0       94.0

[2879 rows x 10 columns]
```

[77]:

	Stn Code	SO2	NO2	RSPM/PM10
count	2879.000000	2879.000000	2879.000000	2875.000000
mean	475.750261	11.510247	22.136506	62.494261
std	277.675577	5.051316	7.126277	31.368745
min	38.000000	2.000000	5.000000	12.000000
25%	238.000000	8.000000	17.000000	41.000000
50%	366.000000	12.000000	22.000000	55.000000
75%	764.000000	15.000000	25.000000	78.000000

2.Finding average for SO2,NO2,RSPM/PM10 on different Locations.

Code:

#Average levels in chennai

chennai = df.loc[df['City/Town/Village/Area'] == 'Chennai']

avg_so2_chenn=chennai['SO2'].mean()

avg_no2_chenn=chennai['NO2'].mean()

avg_rspm_chenn=chennai['RSPM/PM10'].mean()

print(avg_so2_chenn)

print(avg_no2_chenn)

print(avg_rspm_chenn)

Output:

```
import matplotlib.pyplot as plt
import seaborn as sns
chennai = df.loc[df['City/Town/Village/Area'] == 'Chennai']
avg_so2_chenn=chennai['SO2'].mean()
avg_no2_chenn=chennai['NO2'].mean()
avg_rspm_chenn=chennai['RSPM/PM10'].mean()
print("Average SO2 in chennai",avg_so2_chenn)
print("Average NO2 in chennai",avg_no2_chenn)
print("Average RSPM in chennai",avg_rspm_chenn)
```

```
Average SO2 in chennai 13.025
Average NO2 in chennai 22.1035
Average RSPM in chennai 58.998
```

#Average levels in Trichy:

```
import matplotlib.pyplot as plt
import seaborn as sns
Trichy = df.loc[df['City/Town/Village/Area'] == 'Trichy']
avg_so2_tri=Trichy['SO2'].mean()
avg_no2_tri=Trichy['NO2'].mean()
avg_rspm_tri=Trichy['RSPM/PM10'].mean()
print("Average SO2 in Trichy",avg_so2_tri)
print("Average NO2 in Trichy",avg_no2_tri)
print("Average RSPM in Trichy",avg_rspm_tri)
```

Output:

```
import matplotlib.pyplot as plt
import seaborn as sns
Trichy = df.loc[df['City/Town/Village/Area'] == 'Trichy']
avg_so2_tri=Trichy['SO2'].mean()
avg_no2_tri=Trichy['NO2'].mean()
avg_rspm_tri=Trichy['RSPM/PM10'].mean()
print("Average SO2 in Trichy",avg_so2_tri)
print("Average NO2 in Trichy",avg_no2_tri)
print("Average RSPM in Trichy",avg_rspm_tri)
```

```
Average SO2 in Trichy 15.279291553133515
Average NO2 in Trichy 18.682561307901906
Average RSPM in Trichy 85.05449591280654
```

#Average levels in Coimbatore

```
import matplotlib.pyplot as plt
import seaborn as sns
coim = df.loc[df['City/Town/Village/Area'] == 'Coimbatore']
avg_so2_coi=coim['SO2'].mean()
avg_no2_coi=coim['NO2'].mean()
avg_rspm_coi=coim['RSPM/PM10'].mean()
print("Average SO2 in Coimbatore ",avg_so2_coi)
print("Average NO2 in Coimbatore",avg_no2_coi)
print("Average RSPM in Coimbatore",avg_rspm_coi)
```

Output:

#Average levels in Mettur

```
import matplotlib.pyplot as plt
import seaborn as sns
mettur= df.loc[df['City/Town/Village/Area'] == 'Mettur']
avg_so2_mett=mettur['SO2'].mean()
avg_no2_mett=mettur['NO2'].mean()
avg_rspm_mett=mettur['RSPM/PM10'].mean()
print("Average SO2 in Mettur ",avg_so2_mett)
print("Average NO2 in Mettur",avg_no2_mett)
print("Average RSPM in Mettur",avg_rspm_mett)
```

Output:

```
Average SO2 in Mettur  8.429268292682927
Average NO2 in Mettur 23.185365853658535
Average RSPM in Mettur 52.72195121951219
```

#Average levels in Thoothukudi

```
import matplotlib.pyplot as plt
import seaborn as sns
thoo= df.loc[df['City/Town/Village/Area'] == 'Thoothukudi']
avg_so2_thoo=thoo['SO2'].mean()
avg_no2_thoo=thoo['NO2'].mean()
avg_rspm_thoo=thoo['RSPM/PM10'].mean()
print("Average SO2 in Thoothukudi ",avg_so2_thoo)
print("Average NO2 in Thoothukudir",avg_no2_thoo)
print("Average RSPM in Thoothukudi",avg_rspm_thoo)
```

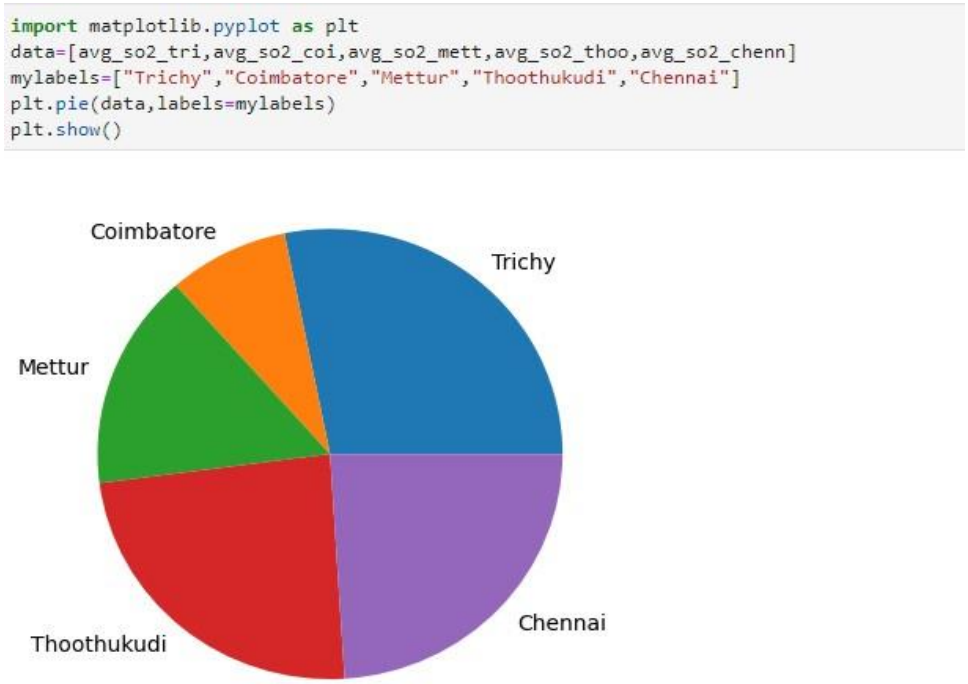
Output:

```
Average SO2 in Thoothukudi  12.988054607508532
Average NO2 in Thoothukudir 18.503412969283275
Average RSPM in Thoothukudi 83.45890410958904
```

Visualization:

```
#For SO2
import matplotlib.pyplot as plt
data=[avg_so2_tri,avg_so2_coi,avg_so2_mett,avg_so2_thoo,
      avg_so2_chenn]
mylabels=["Trichy","Coimbatore","Mettur","Thoothukudi",
          "Chennai"]
plt.pie(data,labels=mylabels)
plt.show()
```

Output:

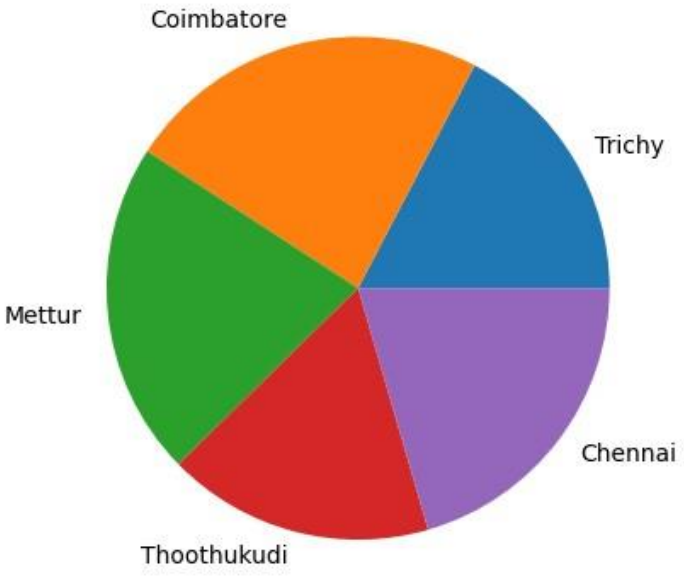


#For NO2

```
import matplotlib.pyplot as plt
data=[avg_no2_tri,avg_no2_coi,avg_no2_mett,avg_no2_thoo,
      avg_no2_chenn]
mylabels=["Trichy","Coimbatore","Mettur","Thoothukudi",
          "Chennai"]
plt.pie(data,labels=mylabels)
plt.show()
```

Output:

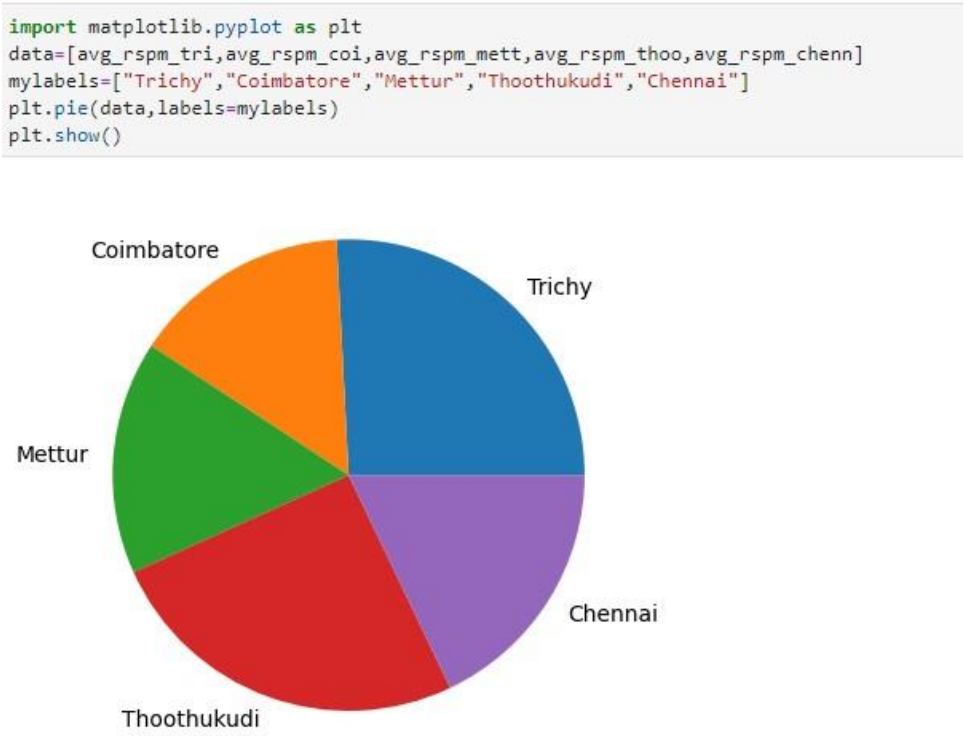
```
import matplotlib.pyplot as plt
data=[avg_no2_tri,avg_no2_coi,avg_no2_mett,avg_no2_thoo,avg_no2_chenn]
mylabels=["Trichy","Coimbatore","Mettur","Thoothukudi","Chennai"]
plt.pie(data,labels=mylabels)
plt.show()
```



#For RSPM/PM10

```
import matplotlib.pyplot as plt
data=[avg_rspm_tri,avg_rspm_coi,avg_rspm_mett,avg_rspm_thoo,
        avg_rspm_chenn]
mylabels=["Trichy","Coimbatore","Mettur","Thoothukudi",
            "Chennai"]
plt.pie(data,labels=mylabels)
plt.show()
```

Output:



Conclusion:

=> By refering to the above pie charts the average RSPM/PM10 level of Trichy and Thoothukudi is nearly same and it is considered as High pollution areas,

=>Also mettur has Low level of RSPM level And it is considered as Low pollution area.