PHASE 4:

AIR QUALITY ANALYSIS

VISUALIZING AND IMPLEMENTING

In this phase we will be visualizing our dataset using python.

```
#The modules we import for the process import pandas as pd import numpy as np import matplotlib.pyplot as plt import seaborn as sb
```

```
Importing our dataset
data = pd.read_csv("cpcb_dly_aq_tamil_nadu-2014.csv")
display(data.head(), data.tail())
```

Stn Code	Sampling Date	State Ci	ty/Town/Village/Area	Location of Monitoring	Station		Agency Type of Location	SO2	NO2	RSPM/PM10	PM 2.5
38	01-02-14	Tamil Nadu	Chennai					11.0	17.0	55.0	NaN
38	01-07-14	Tamil Nadu	Chennai					13.0	17.0	45.0	NaN
38	21-01-14	Tamil Nadu	Chennai					12.0	18.0	50.0	NaN
38	23-01-14	Tamil Nadu	Chennai					15.0	16.0	46.0	NaN
38	28-01-14	Tamil Nadu	Chennai					13.0	14.0	42.0	NaN
Stn Code	Sampling Date	State	City/Town/Village/Area	Location of Monitoring Station		Agency	Type of Location	SO2	NO2	RSPM/PM10	PM 2.5
773	12-03-14	Tamil Nadu	Trichy	Central Bus Stand, Trichy	Tamilna	du State Pollution Control Board	Residential, Rural and other Areas	15.0	18.0	102.0	NaN
773	12-10-14	Tamil Nadu	Trichy	Central Bus Stand, Trichy	Tamilna	du State Pollution Control Board	Residential, Rural and other Areas	12.0	14.0	91.0	NaN
773	17-12-14	Tamil Nadu	Trichy	Central Bus Stand, Trichy	Tamilna	du State Pollution Control Board	Residential, Rural and other Areas	19.0	22.0	100.0	NaN
773	24-12-14	Tamil Nadu	Trichy	Central Bus Stand, Trichy	Tamilnad	du State Pollution Control Board	Residential, Rural and other Areas	15.0	17.0	95.0	NaN
773	31-12-14	Tamil Nadu	Trichy	Central Bus Stand, Trichy	Tamilna	du State Pollution Control Board	Residential, Rural and other Areas	14.0	16.0		ti NaN V
	38 38 38 38 38 38 38 38 38 3773 773	Code Date 38 01-02-14 38 01-07-14 38 21-01-14 38 23-01-14 38 28-01-14 Stn Sampling Date 1 773 12-03-14 3 773 12-10-14 3 773 17-12-14 3 773 24-12-14	Code Date State Cl 38 01-02-14 Tamil Nadu 38 01-07-14 Tamil Nadu 38 21-01-14 Tamil Nadu 38 23-01-14 Tamil Nadu 38 28-01-14 Tamil Nadu Stn Sampling Date State 4 773 12-03-14 Tamil Nadu 5 773 12-10-14 Tamil Nadu 7 773 24-12-14 Tamil Nadu 7 24-12-14 Tamil Nadu	Code Date State City/ Iown/Village/Area 38 01-02-14 Tamil Nadu Chennai 38 01-07-14 Tamil Nadu Chennai 38 21-01-14 Tamil Nadu Chennai 38 23-01-14 Tamil Nadu Chennai 38 28-01-14 Tamil Nadu Chennai 5 Sampling Code State City/Town/Village/Area 1 773 12-03-14 Tamil Nadu Trichy 5 773 12-10-14 Tamil Nadu Trichy 6 773 24-12-14 Tamil Nadu Trichy 7 24-12-14 Tamil Nadu Trichy	Code Date State City/ Town/village/Area Location of Monitoring Mandapam, Madu 38 01-02-14 Tamil Nadu Chennai Kathivakkam, Municipal Mandapam, Mandapam, Madu 38 21-01-14 Tamil Nadu Chennai Kathivakkam, Municipal Mandapam, Mandap	Code Date State City/Town/Village/Area Location of Monitoring Station 38 01-02-14 Tamil Nadu Chennai Kathivakkam, Municipal Kalyana Mandapam, Chennai 38 21-01-14 Tamil Nadu Chennai Kathivakkam, Municipal Kalyana Mandapam, Chennai 38 23-01-14 Tamil Nadu Chennai Kathivakkam, Municipal Kalyana Mandapam, Chennai 38 28-01-14 Tamil Nadu Chennai Kathivakkam, Municipal Kalyana Mandapam, Chennai 38 28-01-14 Tamil Nadu Chennai Kathivakkam, Municipal Kalyana Mandapam, Chennai 5 Sampling Code State City/Town/Village/Area Location of Monitoring Station 4 773 12-03-14 Tamil Nadu Trichy Central Bus Stand, Tamilha Trichy 5 773 12-10-14 Tamil Nadu Trichy Central Bus Stand, Tamilha Trichy 6 773 24-12-14 Tamil Nadu Trichy Central Bus Stand, Tamilha Trichy 773 24-12-14 Tamil Nadu Trichy Central Bus Stand, Tamilha Trichy	Tamil	Code Toate State City own/village Area Location of Monitoring Station Agency Location	State City/Town/Village/Area Cocation of Monitoring Station Control Board Control Bo	State City Town / Willage Area Cocation of Monitoring Station Agency Cocation SU2 NU2	Code Date State City I country liage/Area Location of Monitoring Station Agency Location SUZ RSPMI/PMI 38 01-02-14 Tamil Nadu Chennai Kathivakkam, Municipal Kalyana Mandapam, Chennai Tamilnadu State Pollution Control Board Industrial Area 13.0 17.0 \$5.0 38 21-01-14 Tamil Nadu Chennai Kathivakkam, Municipal Kalyana Mandapam, Chennai Tamilnadu State Pollution Control Board Industrial Area 13.0 17.0 \$5.0 38 23-01-14 Tamil Nadu Chennai Kathivakkam, Municipal Kalyana Mandapam, Chennai Tamilnadu State Pollution Control Board Industrial Area 15.0 16.0 \$6.0 38 28-01-14 Tamil Tamil Chennai Kathivakkam, Municipal Kalyana Mandapam, Chennai Tamilnadu State Pollution Control Board Industrial Area 15.0 16.0 \$6.0 \$\frac{\

In [3]: data.info()

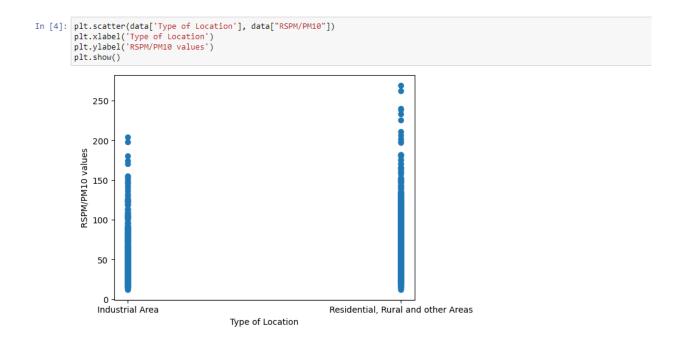
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2879 entries, 0 to 2878
Data columns (total 11 columns):

#	Column	Non-Null Count	Dtype
0	Stn Code	2879 non-null	int64
1	Sampling Date	2879 non-null	object
2	State	2879 non-null	object
3	City/Town/Village/Area	2879 non-null	object
4	Location of Monitoring Station	2879 non-null	object
5	Agency	2879 non-null	object
6	Type of Location	2879 non-null	object
7	502	2868 non-null	float64
8	NO2	2866 non-null	float64
9	RSPM/PM10	2875 non-null	float64
10	PM 2.5	0 non-null	float64

dtypes: float64(4), int64(1), object(6)

memory usage: 247.5+ KB

#Visualizatin



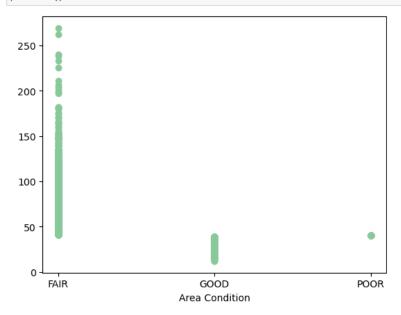
#Code to find the area condition based on the RSPM/PM10 value

```
allConditions = ["GOOD", "FAIR", "POOR", "VERY POOR", "EXTREMELY POOR"]
Condition = "NOT SURE"
mean_value=data['RSPM/PM10'].mean()
data['RSPM/PM10'].fillna(value=mean_value, inplace=True)
Conditionsx = []
g,f,p,vp,ep = 0,0,0,0,0
for i in data["RSPM/PM10"]:
    j = int(i)
    if j < 40:
        Condition = allConditions[0]
        g += 1
    elif j > 40 & j < 80:
        Condition = allConditions[1]
        f += 1
    elif j > 80 & j < 120:
        Condition = allConditions[2]
        p += 1
    elif j > 120 & j < 300:
        Condtion = allConditions[3]
        vp += 1
    else:
        Condition = allConditions[4]
        ep += 1
    Conditionsx.append(str(Condition))
```

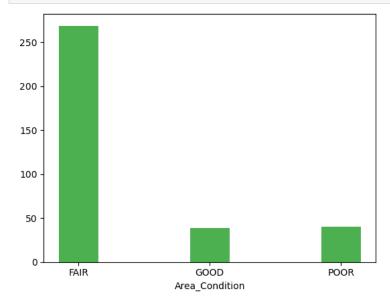
```
#Area_Condition = {"Area_Condition" : Conditionsx}
data['Area_Condition_based on RSPM/PM10'] = Conditionsx
display(data.head())
```

	Stn Code	Sampling Date	State	City/Town/Village/Area	Location of Monitoring Station	Agency	Type of Location	SO2	NO2	RSPM/PM10	PM 2.5	Area_Condition	Area_Condition_based on RSPM/PM10
(38	01-02-14	Tamil Nadu	Chennai	Kathivakkam, Municipal Kalyana Mandapam, Chennai	Tamilnadu State Pollution Control Board	Industrial Area	11.0	17.0	55.0	0.0	FAIR	FAIR
1	38	01-07-14	Tamil Nadu	Chennai	Kathivakkam, Municipal Kalyana Mandapam, Chennai	Tamilnadu State Pollution Control Board	Industrial Area	13.0	17.0	45.0	0.0	FAIR	FAIR
2	! 38	21-01-14	Tamil Nadu	Chennai	Kathivakkam, Municipal Kalyana Mandapam, Chennai	Tamilnadu State Pollution Control Board	Industrial Area	12.0	18.0	50.0	0.0	FAIR	FAIR
3	38	23-01-14	Tamil Nadu	Chennai	Kathivakkam, Municipal Kalyana Mandapam, Chennai	Tamilnadu State Pollution Control Board	Industrial Area	15.0	16.0	46.0	0.0	FAIR	FAIR
4	38	28-01-14	Tamil Nadu	Chennai	Kathivakkam, Municipal Kalyana Mandapam, Chennai	Tamilnadu State Pollution Control Board	Industrial Area	13.0	14.0	42.0	0.0	FAIR	FAIR

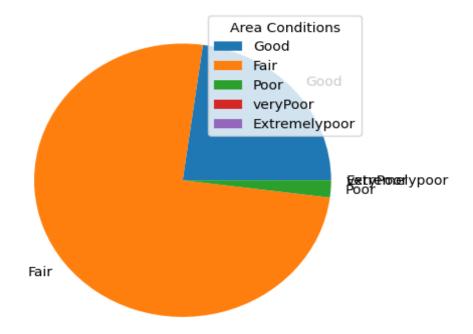
plt.scatter(data['Area_Condition_based on RSPM/PM10'], data["RSPM/PM10"],color = '#88c999')
plt.xlabel("Area Condition")
plt.show()



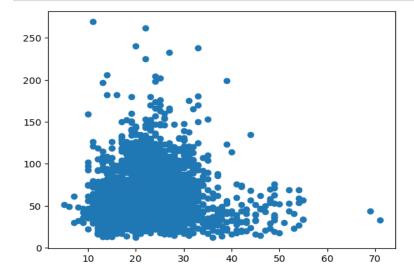
```
plt.bar(data['Area_Condition_based on RSPM/PM10'], data["RSPM/PM10"],width = 0.3, color = "#4CAF50")
plt.xlabel("Area_Condition")
plt.show()
```



```
cnd = np.array([g,f,p,vp,ep])
mylabels = ["Good","Fair","Poor", "veryPoor","Extremelypoor"]
myexp =[0,0,0,0,0]
plt.pie(cnd,labels = mylabels,explode = myexp,startangle = 0)
plt.legend(mylabels, title = "Area Conditions")
plt.show()
```



```
plt.scatter(x = data["NO2"], y = data["RSPM/PM10"])
plt.show()
```



```
plt.scatter(y = data["SO2"], x = data["RSPM/PM10"])
plt.show()
```

