Air Quality Analysis In TamilNadu

In this part to begin building our project by loading and preprocessing the dataset. Begin the analysis by loading and preprocessing the air quality dataset.

To begin our analysis and development project by loading and preprocessing an air quality dataset, I can follow these steps using Python and the Pandas library. In this example, I'll assume the given CSV file containing the air quality data. I can adapt the code to your specific dataset format.

LOADING AND PREPROCESSING METHODS:

- IMPORT LIBRARIES
- LOAD THE DATASET
- EXPLORE THE DATASET
- HANDLING MISSING DATA
- DATA CLEANING
- DATA TRANSFORMATION
- FEATURE ENGINEERING
- EXPLORATORY DATA ANALYSIS (EDA)
- SAVE PREPROCESSED DATASET

FROM THE GIVEN DATASET:

In this section I Use The Csv File Air Quality Analysis In Tamil Nadu Dataset From IBM Naan Mudhalvan

Dataset Link: https://tn.data.gov.in/resource/location-wise-daily-ambient-air-quality-tamil-nadu-year-2014

IMPORT LIBRARIES:

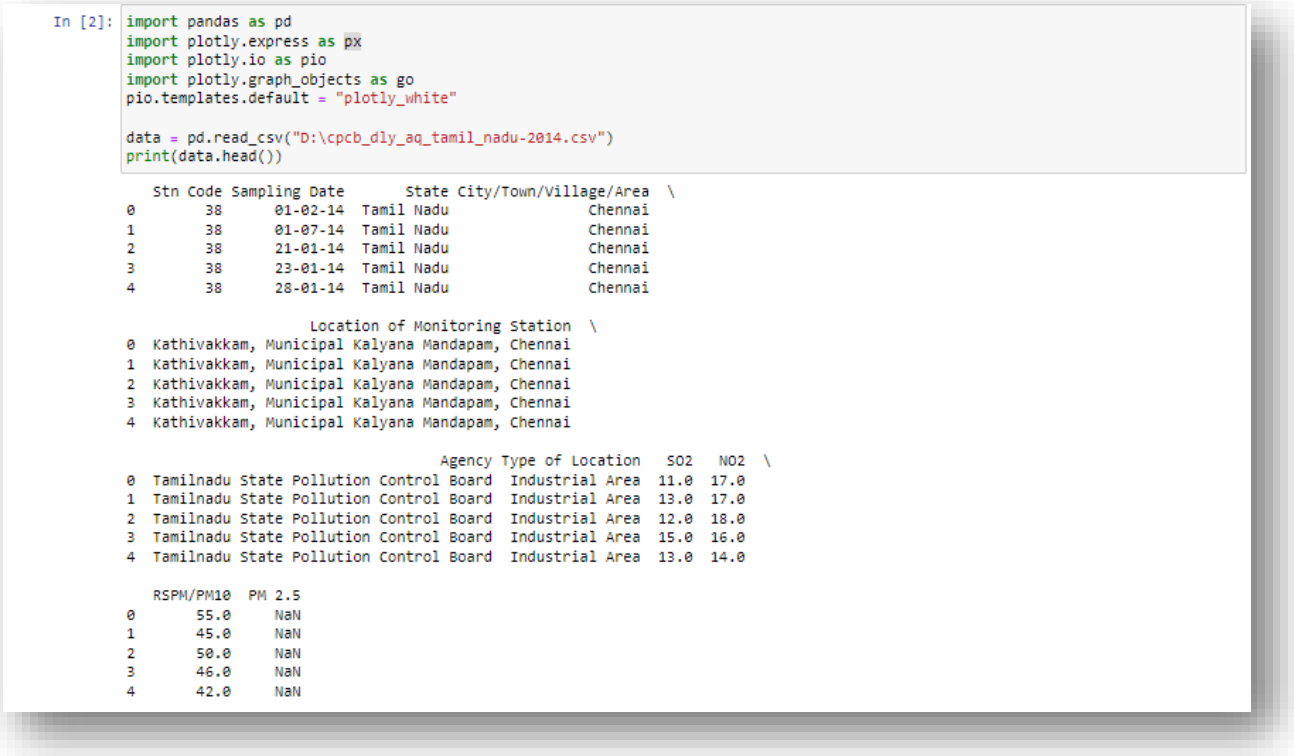
Import the necessary libraries, primarily Pandas for data manipulation and NumPy for numerical operations. You may also need other libraries based on the specifics of your dataset.

- *IMPORT PANDAS AS PD*
- *IMPORT NUMPY AS NP*

LOAD THE DATASET:

Load your dataset into a Pandas DataFrame. Replace 'your_dataset.csv' with the actual file path or URL of your dataset.

data = pd.read_csv('Example.csv')
If you have a different format (e.g., Excel, JSON), you can use appropriate Pandas functions like pd.read_excel() or pd.read_json().



```
In [2]: import pandas as pd
        import plotly.express as px
        import plotly.io as pio
        import plotly.graph_objects as go
        pio.templates.default = "plotly_white"

        data = pd.read_csv("D:\cpcb_dly_aq_tamil_nadu-2014.csv")
        print(data.head())

           Stn Code Sampling Date       State City/Town/Village/Area  \
        0        38      01-02-14  Tamil Nadu                Chennai
        1        38      01-07-14  Tamil Nadu                Chennai
        2        38      21-01-14  Tamil Nadu                Chennai
        3        38      23-01-14  Tamil Nadu                Chennai
        4        38      28-01-14  Tamil Nadu                Chennai

                            Location of Monitoring Station  \
        0  Kathivakkam, Municipal Kalyana Mandapam, Chennai
        1  Kathivakkam, Municipal Kalyana Mandapam, Chennai
        2  Kathivakkam, Municipal Kalyana Mandapam, Chennai
        3  Kathivakkam, Municipal Kalyana Mandapam, Chennai
        4  Kathivakkam, Municipal Kalyana Mandapam, Chennai

                                          Agency Type of Location   SO2   NO2  \
        0  Tamilnadu State Pollution Control Board  Industrial Area  11.0  17.0
        1  Tamilnadu State Pollution Control Board  Industrial Area  13.0  17.0
        2  Tamilnadu State Pollution Control Board  Industrial Area  12.0  18.0
        3  Tamilnadu State Pollution Control Board  Industrial Area  15.0  16.0
        4  Tamilnadu State Pollution Control Board  Industrial Area  13.0  14.0

           RSPM/PM10  PM 2.5
        0       55.0     NaN
        1       45.0     NaN
        2       50.0     NaN
        3       46.0     NaN
        4       42.0     NaN
```

Explore the Dataset:

Begin by getting an overview of your dataset. Check the first few rows, column names, and data types.

Ex:

- print(df.head()) # Display the first few rows

```
In [3]: print(data.describe())
```

	Stn Code	SO2	NO2	RSPM/PM10	PM 2.5
count	2879.000000	2879.000000	2879.000000	2879.000000	0.0
mean	475.750261	11.515109	22.136158	62.511289	NaN
std	277.675577	5.071178	7.123029	31.393031	NaN
min	38.000000	2.000000	5.000000	12.000000	NaN
25%	238.000000	8.000000	17.000000	41.000000	NaN
50%	366.000000	12.000000	22.000000	55.000000	NaN
75%	764.000000	15.000000	25.000000	78.000000	NaN
max	773.000000	49.000000	71.000000	269.000000	NaN

- print(df.columns) # List of column names

```
print(data.columns)
```

```
Index(['Stn Code', 'Sampling Date', 'State', 'City/Town/Village/Area',
       'Location of Monitoring Station', 'Agency', 'Type of Location', 'SO2',
       'NO2', 'RSPM/PM10', 'PM 2.5'],
      dtype='object')
```

- print(df.dtypes) # Data types of each column

```
print(data.dtypes)
```

```
Stn Code                          int64
Sampling Date                    object
State                            object
City/Town/Village/Area           object
Location of Monitoring Station   object
Agency                           object
Type of Location                 object
SO2                             float64
NO2                             float64
RSPM/PM10                       float64
PM 2.5                          float64
dtype: object
```

HANDLING MISSING DATA:

Identify and handle missing data, which could involve removing rows with missing values or imputing missing values.

# Check for missing values
print(df.isnull().sum())
# Handle missing values (example: impute with mean)
df['column_name'].fillna(df['column_name'].mean(), inplace=True)

```
# Check for missing values
print(data.isnull().sum())

# Handle missing values (example: impute with mean)
data['PM 2.5'].fillna(data['PM 2.5'].mean(), inplace=True)
```

```
Stn Code                            0
Sampling Date                       0
State                               0
City/Town/Village/Area              0
Location of Monitoring Station      0
Agency                              0
Type of Location                    0
SO2                                 0
NO2                                 0
RSPM/PM10                           0
PM 2.5                           2879
dtype: int64
```

Data Cleaning:

Clean the data by addressing any data anomalies, inconsistencies, or outliers.

Data Transformation:

Depending on your project's requirements, you may need to transform the data. This could include converting date columns to datetime objects, encoding categorical variables, or scaling numerical features.

import matplotlib.pyplot as plt
from pandas.api.types import is_string_dtype, is_numeric_dtype

df = pd.read_csv("../input/marketing-data/marketing_data.csv")
df.head()

```
import matplotlib.pyplot as plt
from pandas.api.types import is_string_dtype, is_numeric_dtype

df = pd.read_csv("D:\cpcb_dly_aq_tamil_nadu-2014.csv")
df.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
0	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	NaN
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	NaN
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	NaN
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	NaN
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	NaN

Feature Engineering:

Create new features or modify existing ones to improve your dataset's quality.

Exploratory Data Analysis (EDA):

Perform exploratory data analysis using visualizations (e.g., Matplotlib or Seaborn) to gain insights into your data.

Save Preprocessed Dataset:

Once you've completed preprocessing, save the cleaned and transformed dataset to a new file for future use.

df.to_csv('preprocessed_dataset.csv', index=False)

```
df.to_csv('cpcb_dly_aq_tamil_nadu-2014.csv', index=False)
```

These steps provide a general guideline for loading and preprocessing a dataset. The specifics may vary depending on your dataset, project goals, and data quality

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