Working On Real Project With Python

A Part Of Big Data Analysis

Submitted by: Fayyas kp

The Weather Dataset

Here, The Weather Dataset is a time-series data set with per-hour information about the weather conditions at a particular location. It records Temperature, Dew Point Temperature, Relative Humidity, Wind Speed, Visibility, Pressure, and Conditions.

This data is available as a CSV file. We are going to analyze this data set using the Pandas DataFrame.

```
import pandas as pd

data = pd.read_csv(r"D:\Project\Python\Weather Data Analysis\Weather
Data Analysis.csv")
data
```

```
              Date/Time  Temp_C  Dew Point Temp_C  Rel Hum_%  Wind
Speed_km/h  \
0         1/1/2012 0:00    -1.8              -3.9         86
4
1         1/1/2012 1:00    -1.8              -3.7         87
4
2         1/1/2012 2:00    -1.8              -3.4         89
7
3         1/1/2012 3:00    -1.5              -3.2         88
6
4         1/1/2012 4:00    -1.5              -3.3         88
7
...                 ...     ...               ...        ...
...
8779  12/31/2012 19:00     0.1              -2.7         81
30
8780  12/31/2012 20:00     0.2              -2.4         83
24
8781  12/31/2012 21:00    -0.5              -1.5         93
28
8782  12/31/2012 22:00    -0.2              -1.8         89
28
8783  12/31/2012 23:00     0.0              -2.1         86
30

      Visibility_km  Press_kPa               Weather
0               8.0     101.24                   Fog
1               8.0     101.24                   Fog
```

```
2               4.0     101.26  Freezing Drizzle,Fog
3               4.0     101.27  Freezing Drizzle,Fog
4               4.8     101.23                   Fog
...             ...        ...                   ...
8779            9.7     100.13                  Snow
8780            9.7     100.03                  Snow
8781            4.8      99.95                  Snow
8782            9.7      99.91                  Snow
8783           11.3      99.89                  Snow

[8784 rows x 8 columns]
```

How to analyze DataFrames?

.Head()

It shows the first N rows in the data (by default, N=5)

```
data.head()
```

```
       Date/Time  Temp_C  Dew Point Temp_C  Rel Hum_%  Wind Speed_km/h
\
0  1/1/2012 0:00    -1.8              -3.9         86                4

1  1/1/2012 1:00    -1.8              -3.7         87                4

2  1/1/2012 2:00    -1.8              -3.4         89                7

3  1/1/2012 3:00    -1.5              -3.2         88                6

4  1/1/2012 4:00    -1.5              -3.3         88                7


   Visibility_km  Press_kPa               Weather
0            8.0     101.24                   Fog
1            8.0     101.24                   Fog
2            4.0     101.26  Freezing Drizzle,Fog
3            4.0     101.27  Freezing Drizzle,Fog
4            4.8     101.23                   Fog
```

.shape

It shows the total number of rows and no. of columns of the dataframe

```
data.shape
```

```
(8784, 8)
```

.index

This attiribute provides the index of the dataframe

```
data.index
```

```
RangeIndex(start=0, stop=8784, step=1)
```

.columns

It shows the name of each column

```
data.columns
```

```
Index(['Date/Time', 'Temp_C', 'Dew Point Temp_C', 'Rel Hum_%',
       'Wind Speed_km/h', 'Visibility_km', 'Press_kPa', 'Weather'],
      dtype='object')
```

.dtypes()

It shows the data-type of each column

```
data.dtypes
```

```
Date/Time            object
Temp_C              float64
Dew Point Temp_C    float64
Rel Hum_%             int64
Wind Speed_km/h       int64
Visibility_km       float64
Press_kPa           float64
Weather              object
dtype: object
```

.unique()

In a column, it shows all the unique values. It can be applied on a single column only, not on the whole dataframe

```
data['Weather'].unique()
```

```
array(['Fog', 'Freezing Drizzle,Fog', 'Mostly Cloudy', 'Cloudy',
'Rain',
       'Rain Showers', 'Mainly Clear', 'Snow Showers', 'Snow',
'Clear',
       'Freezing Rain,Fog', 'Freezing Rain', 'Freezing Drizzle',
       'Rain,Snow', 'Moderate Snow', 'Freezing Drizzle,Snow',
       'Freezing Rain,Snow Grains', 'Snow,Blowing Snow', 'Freezing
Fog',
       'Haze', 'Rain,Fog', 'Drizzle,Fog', 'Drizzle',
       'Freezing Drizzle,Haze', 'Freezing Rain,Haze', 'Snow,Haze',
       'Snow,Fog', 'Snow,Ice Pellets', 'Rain,Haze',
```

```
'Thunderstorms,Rain',
       'Thunderstorms,Rain Showers', 'Thunderstorms,Heavy Rain
Showers',
       'Thunderstorms,Rain Showers,Fog', 'Thunderstorms',
       'Thunderstorms,Rain,Fog',
       'Thunderstorms,Moderate Rain Showers,Fog', 'Rain Showers,Fog',
       'Rain Showers,Snow Showers', 'Snow Pellets', 'Rain,Snow,Fog',
       'Moderate Rain,Fog', 'Freezing Rain,Ice Pellets,Fog',
       'Drizzle,Ice Pellets,Fog', 'Drizzle,Snow', 'Rain,Ice Pellets',
       'Drizzle,Snow,Fog', 'Rain,Snow Grains', 'Rain,Snow,Ice
Pellets',
       'Snow Showers,Fog', 'Moderate Snow,Blowing Snow'],
dtype=object)
```

.nunique

It shows the total no. of unique values in each column. It can be applied on a single column as well as on whole dataframe

```
data.nunique()

Date/Time           8784
Temp_C               533
Dew Point Temp_C     489
Rel Hum_%             83
Wind Speed_km/h       34
Visibility_km         24
Press_kPa            518
Weather               50
dtype: int64
```

.count

It shows the total no. of non-null values in each column. It can be applied on a single column as well as on whole dataframe

```
data.count()

Date/Time           8784
Temp_C              8784
Dew Point Temp_C    8784
Rel Hum_%           8784
Wind Speed_km/h     8784
Visibility_km       8784
Press_kPa           8784
Weather             8784
dtype: int64
```

.value_counts

In a column it shows all the unique values with their count. It can be applied on a single column only.

```
data['Weather'].value_counts()
```

```
Weather
Mainly Clear                                2106
Mostly Cloudy                               2069
Cloudy                                      1728
Clear                                       1326
Snow                                         390
Rain                                         306
Rain Showers                                 188
Fog                                          150
Rain,Fog                                     116
Drizzle,Fog                                   80
Snow Showers                                  60
Drizzle                                       41
Snow,Fog                                      37
Snow,Blowing Snow                             19
Rain,Snow                                     18
Thunderstorms,Rain Showers                    16
Haze                                          16
Drizzle,Snow,Fog                              15
Freezing Rain                                 14
Freezing Drizzle,Snow                         11
Freezing Drizzle                               7
Snow,Ice Pellets                               6
Freezing Drizzle,Fog                           6
Snow,Haze                                      5
Freezing Fog                                   4
Snow Showers,Fog                               4
Moderate Snow                                  4
Rain,Snow,Ice Pellets                          4
Freezing Rain,Fog                              4
Freezing Drizzle,Haze                          3
Rain,Haze                                      3
Thunderstorms,Rain                             3
Thunderstorms,Rain Showers,Fog                 3
Freezing Rain,Haze                             2
Drizzle,Snow                                   2
Rain Showers,Snow Showers                      2
Thunderstorms                                  2
Moderate Snow,Blowing Snow                     2
Rain Showers,Fog                               1
Thunderstorms,Moderate Rain Showers,Fog        1
Snow Pellets                                   1
Rain,Snow,Fog                                  1
Moderate Rain,Fog                              1
```

```
Freezing Rain,Ice Pellets,Fog                 1
Drizzle,Ice Pellets,Fog                       1
Thunderstorms,Rain,Fog                        1
Rain,Ice Pellets                              1
Rain,Snow Grains                              1
Thunderstorms,Heavy Rain Showers              1
Freezing Rain,Snow Grains                     1
Name: count, dtype: int64
```

.info()

Provides basic information about the dtaaframe

```
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 8784 entries, 0 to 8783
Data columns (total 8 columns):
 #   Column            Non-Null Count  Dtype  
---  ------            --------------  -----  
 0   Date/Time         8784 non-null   object 
 1   Temp_C            8784 non-null   float64
 2   Dew Point Temp_C  8784 non-null   float64
 3   Rel Hum_%         8784 non-null   int64  
 4   Wind Speed_km/h   8784 non-null   int64  
 5   Visibility_km     8784 non-null   float64
 6   Press_kPa         8784 non-null   float64
 7   Weather           8784 non-null   object 
dtypes: float64(4), int64(2), object(2)
memory usage: 549.1+ KB
```

Q) 1. Find all the unique 'wind Speed' values in the data

```
data.head(2)
```

```
       Date/Time  Temp_C  Dew Point Temp_C  Rel Hum_%  Wind Speed_km/h
\
0  1/1/2012 0:00    -1.8              -3.9         86                4

1  1/1/2012 1:00    -1.8              -3.7         87                4


   Visibility_km  Press_kPa Weather
0            8.0     101.24     Fog
1            8.0     101.24     Fog
```

```
data.nunique()
```

```
Date/Time           8784
Temp_C               533
```

```
Dew Point Temp_C     489
Rel Hum_%             83
Wind Speed_km/h       34
Visibility_km         24
Press_kPa            518
Weather               50
dtype: int64
```

```
data['Wind Speed_km/h'].nunique()
```

```
34
```

```
data['Wind Speed_km/h'].unique() #Answer
```

```
array([ 4,  7,  6,  9, 15, 13, 20, 22, 19, 24, 30, 35, 39, 32, 33, 26,
44,
       43, 48, 37, 28, 17, 11,  0, 83, 70, 57, 46, 41, 52, 50, 63, 54,
2],
      dtype=int64)
```

Q) 2. Find the number of times when the 'Weather is exactly Clear'

```
data.head(2)
```

```
       Date/Time  Temp_C  Dew Point Temp_C  Rel Hum_%  Wind Speed_km/h
\
0  1/1/2012 0:00    -1.8              -3.9         86                4

1  1/1/2012 1:00    -1.8              -3.7         87                4


   Visibility_km  Press_kPa Weather
0            8.0     101.24     Fog
1            8.0     101.24     Fog
```

```
#value_counts()
data.Weather.value_counts()
```

```
Weather
Mainly Clear                          2106
Mostly Cloudy                         2069
Cloudy                                1728
Clear                                 1326
Snow                                   390
Rain                                   306
Rain Showers                           188
Fog                                    150
Rain,Fog                               116
Drizzle,Fog                             80
```

```
Snow Showers                                  60
Drizzle                                       41
Snow,Fog                                      37
Snow,Blowing Snow                             19
Rain,Snow                                     18
Thunderstorms,Rain Showers                    16
Haze                                          16
Drizzle,Snow,Fog                              15
Freezing Rain                                 14
Freezing Drizzle,Snow                         11
Freezing Drizzle                               7
Snow,Ice Pellets                               6
Freezing Drizzle,Fog                           6
Snow,Haze                                      5
Freezing Fog                                   4
Snow Showers,Fog                               4
Moderate Snow                                  4
Rain,Snow,Ice Pellets                          4
Freezing Rain,Fog                              4
Freezing Drizzle,Haze                          3
Rain,Haze                                      3
Thunderstorms,Rain                             3
Thunderstorms,Rain Showers,Fog                 3
Freezing Rain,Haze                             2
Drizzle,Snow                                   2
Rain Showers,Snow Showers                      2
Thunderstorms                                  2
Moderate Snow,Blowing Snow                     2
Rain Showers,Fog                               1
Thunderstorms,Moderate Rain Showers,Fog        1
Snow Pellets                                   1
Rain,Snow,Fog                                  1
Moderate Rain,Fog                              1
Freezing Rain,Ice Pellets,Fog                  1
Drizzle,Ice Pellets,Fog                        1
Thunderstorms,Rain,Fog                         1
Rain,Ice Pellets                               1
Rain,Snow Grains                               1
Thunderstorms,Heavy Rain Showers               1
Freezing Rain,Snow Grains                      1
Name: count, dtype: int64
```

```
#filtering
#data.head(2)
data[data.Weather=='Clear']
```

```
             Date/Time  Temp_C  Dew Point Temp_C  Rel Hum_%  Wind
Speed_km/h  \
67      1/3/2012 19:00   -16.9             -24.8         50
24
```

```
114     1/5/2012 18:00    -7.1              -14.4          56
11
115     1/5/2012 19:00    -9.2              -15.4          61
7
116     1/5/2012 20:00    -9.8              -15.7          62
9
117     1/5/2012 21:00    -9.0              -14.8          63
13
...                 ...     ...                ...         ...
...
8646   12/26/2012 6:00   -13.4              -14.8          89
4
8698  12/28/2012 10:00    -6.1               -8.6          82
19
8713   12/29/2012 1:00   -11.9              -13.6          87
11
8714   12/29/2012 2:00   -11.8              -13.1          90
13
8756  12/30/2012 20:00   -13.8              -16.5          80
24

      Visibility_km  Press_kPa Weather
67             25.0     101.74   Clear
114            25.0     100.71   Clear
115            25.0     100.80   Clear
116            25.0     100.83   Clear
117            25.0     100.83   Clear
...             ...        ...     ...
8646           25.0     102.47   Clear
8698           24.1     101.27   Clear
8713           25.0     101.31   Clear
8714           25.0     101.33   Clear
8756           25.0     101.52   Clear

[1326 rows x 8 columns]
```

```
#Groupby()
#data.head(2)
data.groupby('Weather').get_group('Clear')
```

```
             Date/Time  Temp_C  Dew Point Temp_C  Rel Hum_%  Wind
Speed_km/h  \
67      1/3/2012 19:00   -16.9              -24.8          50
24
114     1/5/2012 18:00    -7.1              -14.4          56
11
115     1/5/2012 19:00    -9.2              -15.4          61
7
116     1/5/2012 20:00    -9.8              -15.7          62
9
```

```
117     1/5/2012 21:00    -9.0              -14.8          63
13
...                 ...     ...                ...         ...
...
8646   12/26/2012 6:00   -13.4              -14.8          89
4
8698  12/28/2012 10:00    -6.1               -8.6          82
19
8713   12/29/2012 1:00   -11.9              -13.6          87
11
8714   12/29/2012 2:00   -11.8              -13.1          90
13
8756  12/30/2012 20:00   -13.8              -16.5          80
24

      Visibility_km  Press_kPa Weather
67             25.0     101.74   Clear
114            25.0     100.71   Clear
115            25.0     100.80   Clear
116            25.0     100.83   Clear
117            25.0     100.83   Clear
...             ...        ...     ...
8646           25.0     102.47   Clear
8698           24.1     101.27   Clear
8713           25.0     101.31   Clear
8714           25.0     101.33   Clear
8756           25.0     101.52   Clear

[1326 rows x 8 columns]
```

Q) 3. Find the number of times when the 'Wind Speed was exactly 4 Km/h'.

```
data.head(2)
```

```
       Date/Time  Temp_C  Dew Point Temp_C  Rel Hum_%  Wind Speed_km/h
\
0  1/1/2012 0:00    -1.8              -3.9         86                4

1  1/1/2012 1:00    -1.8              -3.7         87                4


   Visibility_km  Press_kPa Weather
0            8.0     101.24     Fog
1            8.0     101.24     Fog
```

```
data[data['Wind Speed_km/h']==4] #Answer
```

```
              Date/Time  Temp_C  Dew Point Temp_C  Rel Hum_%  Wind
Speed_km/h  \
0         1/1/2012 0:00    -1.8              -3.9         86
4
1         1/1/2012 1:00    -1.8              -3.7         87
4
96        1/5/2012 0:00    -8.8             -11.7         79
4
101       1/5/2012 5:00    -7.0              -9.5         82
4
146       1/7/2012 2:00    -8.1             -11.1         79
4
...                  ...     ...               ...        ...
...
8768   12/31/2012 8:00    -8.6             -10.3         87
4
8769   12/31/2012 9:00    -8.1              -9.6         89
4
8770  12/31/2012 10:00    -7.4              -8.9         89
4
8772  12/31/2012 12:00    -5.8              -7.5         88
4
8773  12/31/2012 13:00    -4.6              -6.6         86
4

      Visibility_km  Press_kPa       Weather
0               8.0     101.24           Fog
1               8.0     101.24           Fog
96              9.7     100.32          Snow
101             4.0     100.19          Snow
146            19.3     100.15        Cloudy
...             ...        ...           ...
8768            3.2     101.14  Snow Showers
8769            2.4     101.09          Snow
8770            6.4     101.05      Snow,Fog
8772           12.9     100.78          Snow
8773           12.9     100.63          Snow

[474 rows x 8 columns]
```

Q) 4. Find out all the Null Values in the data

```
data.isnull().sum()
```

```
Date/Time           0
Temp_C              0
Dew Point Temp_C    0
Rel Hum_%           0
Wind Speed_km/h     0
```

```
Visibility_km       0
Press_kPa           0
Weather             0
dtype: int64
```

```
data.notnull().sum()
```

```
Date/Time           8784
Temp_C              8784
Dew Point Temp_C    8784
Rel Hum_%           8784
Wind Speed_km/h     8784
Visibility_km       8784
Press_kPa           8784
Weather             8784
dtype: int64
```

Q) 5. Rename the column name 'Weather' of the dataframe to 'Weather Condition'

```
data.head(2)
```

```
       Date/Time  Temp_C  Dew Point Temp_C  Rel Hum_%  Wind Speed_km/h
\
0  1/1/2012 0:00    -1.8              -3.9         86                4

1  1/1/2012 1:00    -1.8              -3.7         87                4


   Visibility_km  Press_kPa Weather
0            8.0     101.24     Fog
1            8.0     101.24     Fog
```

```
data.rename(columns = {'Weather':'Weather Condition'}, inplace = True)
data.head()
```

```
       Date/Time  Temp_C  Dew Point Temp_C  Rel Hum_%  Wind Speed_km/h
\
0  1/1/2012 0:00    -1.8              -3.9         86                4

1  1/1/2012 1:00    -1.8              -3.7         87                4

2  1/1/2012 2:00    -1.8              -3.4         89                7

3  1/1/2012 3:00    -1.5              -3.2         88                6

4  1/1/2012 4:00    -1.5              -3.3         88                7


   Visibility_km  Press_kPa     Weather Condition
```

```
0             8.0     101.24                     Fog
1             8.0     101.24                     Fog
2             4.0     101.26  Freezing Drizzle,Fog
3             4.0     101.27  Freezing Drizzle,Fog
4             4.8     101.23                     Fog
```

Q) 6. What is the mean 'Visibility'?

```
data.head(2)
```

```
       Date/Time  Temp_C  Dew Point Temp_C  Rel Hum_%  Wind Speed_km/h
\
0  1/1/2012 0:00    -1.8              -3.9         86                4

1  1/1/2012 1:00    -1.8              -3.7         87                4


   Visibility_km  Press_kPa Weather Condition
0            8.0     101.24               Fog
1            8.0     101.24               Fog
```

```
data.Visibility_km.mean()
```

```
27.664446721311478
```

Q) 7. What is the Standard Deviation of 'Pressure' in this data?

```
data.Press_kPa.std()
```

```
0.8440047459486474
```

Q) 8. What is the Varience of 'Relative Humidity' in this data?

```
data['Rel Hum_%'].var()
```

```
286.2485501984998
```

Q) 9. Find all instances when 'Snow' was recorded

```
#value_counts()
data.head(2)
data['Weather Condition'].value_counts()
```

```
Weather Condition
Mainly Clear                                2106
Mostly Cloudy                               2069
```

```
Cloudy                                        1728
Clear                                         1326
Snow                                           390
Rain                                           306
Rain Showers                                   188
Fog                                            150
Rain,Fog                                       116
Drizzle,Fog                                     80
Snow Showers                                    60
Drizzle                                         41
Snow,Fog                                        37
Snow,Blowing Snow                               19
Rain,Snow                                       18
Thunderstorms,Rain Showers                      16
Haze                                            16
Drizzle,Snow,Fog                                15
Freezing Rain                                   14
Freezing Drizzle,Snow                           11
Freezing Drizzle                                 7
Snow,Ice Pellets                                 6
Freezing Drizzle,Fog                             6
Snow,Haze                                        5
Freezing Fog                                     4
Snow Showers,Fog                                 4
Moderate Snow                                    4
Rain,Snow,Ice Pellets                            4
Freezing Rain,Fog                                4
Freezing Drizzle,Haze                            3
Rain,Haze                                        3
Thunderstorms,Rain                               3
Thunderstorms,Rain Showers,Fog                   3
Freezing Rain,Haze                               2
Drizzle,Snow                                     2
Rain Showers,Snow Showers                        2
Thunderstorms                                    2
Moderate Snow,Blowing Snow                       2
Rain Showers,Fog                                 1
Thunderstorms,Moderate Rain Showers,Fog          1
Snow Pellets                                     1
Rain,Snow,Fog                                    1
Moderate Rain,Fog                                1
Freezing Rain,Ice Pellets,Fog                    1
Drizzle,Ice Pellets,Fog                          1
Thunderstorms,Rain,Fog                           1
Rain,Ice Pellets                                 1
Rain,Snow Grains                                 1
Thunderstorms,Heavy Rain Showers                 1
Freezing Rain,Snow Grains                        1
Name: count, dtype: int64
```

```
#Filtering
data[data['Weather Condition']== 'Snow']
```

```
             Date/Time  Temp_C  Dew Point Temp_C  Rel Hum_%  Wind
Speed_km/h  \
55        1/3/2012 7:00   -14.0             -19.5         63
19
84       1/4/2012 12:00   -13.7             -21.7         51
11
86       1/4/2012 14:00   -11.3             -19.0         53
7
87       1/4/2012 15:00   -10.2             -16.3         61
11
88       1/4/2012 16:00    -9.4             -15.5         61
13
...                 ...     ...               ...        ...
...
8779  12/31/2012 19:00     0.1              -2.7         81
30
8780  12/31/2012 20:00     0.2              -2.4         83
24
8781  12/31/2012 21:00    -0.5              -1.5         93
28
8782  12/31/2012 22:00    -0.2              -1.8         89
28
8783  12/31/2012 23:00     0.0              -2.1         86
30

      Visibility_km  Press_kPa Weather Condition
55             25.0     100.95              Snow
84             24.1     101.25              Snow
86             19.3     100.97              Snow
87              9.7     100.89              Snow
88             19.3     100.79              Snow
...             ...        ...               ...
8779            9.7     100.13              Snow
8780            9.7     100.03              Snow
8781            4.8      99.95              Snow
8782            9.7      99.91              Snow
8783           11.3      99.89              Snow

[390 rows x 8 columns]
```

```
#str.contains
data[data['Weather Condition'].str.contains('Snow')].tail(20)
```

```
             Date/Time  Temp_C  Dew Point Temp_C  Rel Hum_%  Wind
Speed_km/h  \
8740   12/30/2012 4:00    -9.3             -10.6         90
13
```

```
8741   12/30/2012 5:00    -9.1             -10.4          90
11
8742   12/30/2012 6:00    -9.3             -10.8          89
17
8767   12/31/2012 7:00    -9.3             -11.3          85
0
8768   12/31/2012 8:00    -8.6             -10.3          87
4
8769   12/31/2012 9:00    -8.1              -9.6          89
4
8770  12/31/2012 10:00    -7.4              -8.9          89
4
8771  12/31/2012 11:00    -6.7              -7.9          91
9
8772  12/31/2012 12:00    -5.8              -7.5          88
4
8773  12/31/2012 13:00    -4.6              -6.6          86
4
8774  12/31/2012 14:00    -3.4              -5.7          84
6
8775  12/31/2012 15:00    -2.3              -4.6          84
9
8776  12/31/2012 16:00    -1.4              -4.0          82
13
8777  12/31/2012 17:00    -1.1              -3.3          85
19
8778  12/31/2012 18:00    -1.3              -3.1          88
17
8779  12/31/2012 19:00     0.1              -2.7          81
30
8780  12/31/2012 20:00     0.2              -2.4          83
24
8781  12/31/2012 21:00    -0.5              -1.5          93
28
8782  12/31/2012 22:00    -0.2              -1.8          89
28
8783  12/31/2012 23:00     0.0              -2.1          86
30

      Visibility_km  Press_kPa Weather Condition
8740            9.7     100.28          Snow,Fog
8741            4.0     100.32          Snow,Fog
8742            8.0     100.39          Snow,Fog
8767           19.3     101.19      Snow Showers
8768            3.2     101.14      Snow Showers
8769            2.4     101.09              Snow
8770            6.4     101.05          Snow,Fog
8771            9.7     100.93              Snow
8772           12.9     100.78              Snow
```

```
8773           12.9     100.63              Snow
8774           11.3     100.57              Snow
8775            9.7     100.47              Snow
8776           12.9     100.40              Snow
8777            9.7     100.30              Snow
8778            9.7     100.19              Snow
8779            9.7     100.13              Snow
8780            9.7     100.03              Snow
8781            4.8      99.95              Snow
8782            9.7      99.91              Snow
8783           11.3      99.89              Snow
```

Q) 10. Find all instances when 'Wind Speed is above 24' and 'visibility is 25'

```
data.head(2)
```

```
       Date/Time  Temp_C  Dew Point Temp_C  Rel Hum_%  Wind Speed_km/h
\
0  1/1/2012 0:00    -1.8              -3.9         86                4

1  1/1/2012 1:00    -1.8              -3.7         87                4


   Visibility_km  Press_kPa Weather Condition
0            8.0     101.24               Fog
1            8.0     101.24               Fog
```

```
data[(data['Wind Speed_km/h'] >24) & (data['Visibility_km'] ==25)]
```

```
              Date/Time  Temp_C  Dew Point Temp_C  Rel Hum_%  Wind
Speed_km/h  \
23      1/1/2012 23:00     5.3               2.0         79
30
24       1/2/2012 0:00     5.2               1.5         77
35
25       1/2/2012 1:00     4.6               0.0         72
39
26       1/2/2012 2:00     3.9              -0.9         71
32
27       1/2/2012 3:00     3.7              -1.5         69
33
...                ...     ...               ...        ...
...
8705  12/28/2012 17:00    -8.6             -12.0         76
26
8753  12/30/2012 17:00   -12.1             -15.8         74
28
8755  12/30/2012 19:00   -13.4             -16.5         77
```

```
26
8759  12/30/2012 23:00   -12.1             -15.1         78
28
8760   12/31/2012 0:00   -11.1             -14.4         77
26

      Visibility_km  Press_kPa Weather Condition
23             25.0      99.31           Cloudy
24             25.0      99.26      Rain Showers
25             25.0      99.26           Cloudy
26             25.0      99.26     Mostly Cloudy
27             25.0      99.30     Mostly Cloudy
...             ...        ...              ...
8705           25.0     101.34      Mainly Clear
8753           25.0     101.26      Mainly Clear
8755           25.0     101.47      Mainly Clear
8759           25.0     101.52     Mostly Cloudy
8760           25.0     101.51           Cloudy

[308 rows x 8 columns]
```

Q) 11. What is the mean value of each column against each 'Weather Condition'?

```
data.head(2)
```

```
       Date/Time  Temp_C  Dew Point Temp_C  Rel Hum_%  Wind Speed_km/h
\
0  1/1/2012 0:00    -1.8              -3.9         86                4

1  1/1/2012 1:00    -1.8              -3.7         87                4


   Visibility_km  Press_kPa Weather Condition
0            8.0     101.24               Fog
1            8.0     101.24               Fog
```

```
data.columns
```

```
Index(['Date/Time', 'Temp_C', 'Dew Point Temp_C', 'Rel Hum_%',
       'Wind Speed_km/h', 'Visibility_km', 'Press_kPa', 'Weather
Condition'],
      dtype='object')
```

```
data.groupby('Weather
Condition').mean(numeric_only=True).reset_index()
```

```
                         Weather Condition     Temp_C  Dew Point
Temp_C  \
0                                   Clear   6.825716
```

```
0.089367
1                                 Cloudy   7.970544
2.375810
2                                Drizzle   7.353659
5.504878
3                           Drizzle,Fog   8.067500
7.033750
4                  Drizzle,Ice Pellets,Fog   0.400000          -
0.700000
5                             Drizzle,Snow   1.050000
0.150000
6                        Drizzle,Snow,Fog   0.693333
0.120000
7                                   Fog   4.303333
3.159333
8                         Freezing Drizzle  -5.657143          -
8.000000
9                    Freezing Drizzle,Fog  -2.533333          -
4.183333
10                  Freezing Drizzle,Haze  -5.433333          -
8.000000
11                  Freezing Drizzle,Snow  -5.109091          -
7.072727
12                           Freezing Fog  -7.575000          -
9.250000
13                          Freezing Rain  -3.885714          -
6.078571
14                       Freezing Rain,Fog  -2.225000          -
3.750000
15                      Freezing Rain,Haze  -4.900000          -
7.450000
16           Freezing Rain,Ice Pellets,Fog  -2.600000          -
3.700000
17               Freezing Rain,Snow Grains  -5.000000          -
7.300000
18                                    Haze  -0.200000          -
2.975000
19                           Mainly Clear  12.558927
4.581671
20                       Moderate Rain,Fog   1.700000
0.800000
21                          Moderate Snow  -5.525000          -
7.250000
22              Moderate Snow,Blowing Snow  -5.450000          -
6.500000
23                          Mostly Cloudy  10.574287
3.131174
24                                   Rain   9.786275
7.042810
```

```
25                                Rain Showers  13.722340
9.187766
26                           Rain Showers,Fog  12.800000
12.100000
27                  Rain Showers,Snow Showers   2.150000          -
1.500000
28                                   Rain,Fog   8.273276
7.219828
29                                  Rain,Haze   4.633333
2.066667
30                           Rain,Ice Pellets   0.600000          -
0.600000
31                                  Rain,Snow   1.055556          -
0.566667
32                           Rain,Snow Grains   1.900000          -
2.100000
33                              Rain,Snow,Fog   0.800000
0.300000
34                     Rain,Snow,Ice Pellets   1.100000          -
0.175000
35                                       Snow  -4.524103          -
7.623333
36                                Snow Pellets   0.700000          -
6.400000
37                                Snow Showers  -3.506667          -
7.866667
38                           Snow Showers,Fog -10.675000         -
11.900000
39                          Snow,Blowing Snow  -5.410526          -
7.621053
40                                   Snow,Fog  -5.075676          -
6.364865
41                                  Snow,Haze  -4.020000          -
6.860000
42                           Snow,Ice Pellets  -1.883333          -
3.666667
43                              Thunderstorms  24.150000
19.750000
44         Thunderstorms,Heavy Rain Showers  10.900000
9.000000
45  Thunderstorms,Moderate Rain Showers,Fog  19.600000
18.500000
46                          Thunderstorms,Rain  20.433333
18.533333
47                Thunderstorms,Rain Showers  20.037500
17.618750
48           Thunderstorms,Rain Showers,Fog  21.600000
18.700000
49                     Thunderstorms,Rain,Fog  20.600000
```

```
18.600000
```

	Rel Hum_%	Wind Speed_km/h	Visibility_km	Press_kPa
0	64.497738	10.557315	30.153243	101.587443
1	69.592593	16.127315	26.625752	100.911441
2	88.243902	16.097561	17.931707	100.435366
3	93.275000	11.862500	5.257500	100.786625
4	92.000000	20.000000	4.000000	100.790000
5	93.500000	14.000000	10.500000	100.890000
6	95.866667	15.533333	5.513333	99.281333
7	92.286667	7.946667	6.248000	101.184067
8	83.571429	16.571429	9.200000	100.202857
9	88.500000	17.000000	5.266667	100.441667
10	82.000000	10.333333	2.666667	100.316667
11	86.090909	16.272727	5.872727	100.520909
12	87.750000	4.750000	0.650000	102.320000
13	84.642857	19.214286	8.242857	99.647143
14	89.500000	15.500000	7.550000	99.945000
15	82.500000	7.500000	2.400000	100.375000
16	92.000000	28.000000	8.000000	100.950000
17	84.000000	32.000000	4.800000	98.560000
18	81.625000	10.437500	7.831250	101.482500
19	60.667142	14.144824	34.264862	101.248832
20	94.000000	17.000000	6.400000	99.980000
21	87.750000	33.750000	0.750000	100.275000
22	92.500000	40.000000	0.600000	100.570000
23	62.102465	15.813920	31.253842	101.025288
24	83.624183	19.254902	18.856536	100.233333
25	75.159574	17.132979	22.816489	100.404043
26	96.000000	13.000000	6.400000	99.830000
27	76.500000	22.500000	21.700000	101.100000
28	93.189655	14.793103	6.873276	100.500862
29	83.333333	11.666667	6.700000	100.540000
30	92.000000	24.000000	9.700000	100.120000
31	89.000000	28.388889	11.672222	99.951111
32	75.000000	26.000000	25.000000	100.600000
33	96.000000	9.000000	6.400000	100.730000
34	91.500000	23.250000	6.000000	100.105000
35	79.307692	20.038462	11.171795	100.536103
36	59.000000	35.000000	2.400000	99.700000
37	72.350000	19.233333	20.158333	100.963500
38	90.750000	13.750000	7.025000	101.292500
39	84.473684	34.842105	4.105263	99.704737
40	90.675676	17.324324	4.537838	100.688649
41	80.600000	5.000000	4.640000	100.782000
42	87.666667	23.833333	7.416667	100.548333
43	77.000000	7.500000	24.550000	100.230000
44	88.000000	9.000000	2.400000	100.260000
45	93.000000	15.000000	3.200000	100.010000

```
46  89.000000        15.666667      19.833333  100.420000
47  86.375000        18.312500      15.893750  100.233750
48  84.000000        19.666667       9.700000  100.063333
49  88.000000        19.000000       4.800000  100.080000
```

Q) 12. What is the Minimum & Maximum value of each columns against 'each weather condition'?

```
data.head(2)
```

```
       Date/Time  Temp_C  Dew Point Temp_C  Rel Hum_%  Wind Speed_km/h
\
0  1/1/2012 0:00    -1.8              -3.9         86                4

1  1/1/2012 1:00    -1.8              -3.7         87                4


   Visibility_km  Press_kPa Weather Condition
0            8.0     101.24               Fog
1            8.0     101.24               Fog
```

```
data.groupby('Weather Condition').min()
```

```
                                          Date/Time  Temp_C  \
Weather Condition
Clear                                  1/11/2012 1:00   -23.3
Cloudy                                 1/1/2012 17:00   -21.4
Drizzle                               1/23/2012 21:00     1.1
Drizzle,Fog                           1/23/2012 20:00     0.0
Drizzle,Ice Pellets,Fog               12/17/2012 9:00     0.4
Drizzle,Snow                         12/17/2012 15:00     0.9
Drizzle,Snow,Fog                     12/18/2012 21:00     0.3
Fog                                     1/1/2012 0:00   -16.0
Freezing Drizzle                      1/13/2012 10:00    -9.0
Freezing Drizzle,Fog                    1/1/2012 2:00    -6.4
Freezing Drizzle,Haze                  2/1/2012 11:00    -5.8
Freezing Drizzle,Snow                  1/13/2012 3:00    -8.3
Freezing Fog                           1/22/2012 6:00   -19.0
Freezing Rain                         1/13/2012 11:00    -6.5
Freezing Rain,Fog                     1/17/2012 23:00    -6.1
Freezing Rain,Haze                     2/1/2012 14:00    -4.9
Freezing Rain,Ice Pellets,Fog         12/17/2012 3:00    -2.6
Freezing Rain,Snow Grains              1/13/2012 9:00    -5.0
Haze                                  1/22/2012 12:00   -11.5
Mainly Clear                          1/10/2012 11:00   -22.8
Moderate Rain,Fog                     12/10/2012 8:00     1.7
Moderate Snow                         1/12/2012 15:00    -6.3
Moderate Snow,Blowing Snow           12/27/2012 10:00    -5.5
Mostly Cloudy                          1/1/2012 16:00   -23.2
```

```
Rain                                        1/1/2012 18:00     0.3
Rain Showers                                1/1/2012 22:00     1.6
Rain Showers,Fog                           10/20/2012 3:00    12.8
Rain Showers,Snow Showers                   11/4/2012 8:00     2.1
Rain,Fog                                   1/23/2012 18:00     0.0
Rain,Haze                                   3/13/2012 7:00     4.0
Rain,Ice Pellets                           12/18/2012 5:00     0.6
Rain,Snow                                   1/10/2012 5:00     0.6
Rain,Snow Grains                           12/21/2012 0:00     1.9
Rain,Snow,Fog                              12/8/2012 21:00     0.8
Rain,Snow,Ice Pellets                      12/21/2012 1:00     0.9
Snow                                        1/10/2012 1:00   -16.7
Snow Pellets                               11/24/2012 15:00     0.7
Snow Showers                                1/12/2012 7:00   -13.3
Snow Showers,Fog                           12/26/2012 9:00   -11.3
Snow,Blowing Snow                          1/13/2012 21:00   -12.0
Snow,Fog                                   12/16/2012 15:00  -10.1
Snow,Haze                                   2/1/2012 17:00    -4.3
Snow,Ice Pellets                           12/10/2012 3:00    -4.3
Thunderstorms                               7/16/2012 1:00    21.6
Thunderstorms,Heavy Rain Showers            5/29/2012 6:00    10.9
Thunderstorms,Moderate Rain Showers,Fog     7/17/2012 6:00    19.6
Thunderstorms,Rain                         5/25/2012 20:00    19.4
Thunderstorms,Rain Showers                 5/29/2012 16:00    11.0
Thunderstorms,Rain Showers,Fog              6/29/2012 3:00    19.5
Thunderstorms,Rain,Fog                      7/17/2012 5:00    20.6

                                           Dew Point Temp_C  Rel Hum_
%  \
Weather Condition

Clear                                                -28.5         20

Cloudy                                               -26.8         18

Drizzle                                               -0.2         74

Drizzle,Fog                                           -1.6         85

Drizzle,Ice Pellets,Fog                               -0.7         92

Drizzle,Snow                                           0.1         92

Drizzle,Snow,Fog                                      -0.1         92

Fog                                                  -17.2         80

Freezing Drizzle                                     -12.2         78

Freezing Drizzle,Fog                                  -9.0         82
```

Freezing Drizzle,Haze	-8.3	81
Freezing Drizzle,Snow	-10.4	79
Freezing Fog	-22.9	71
Freezing Rain	-9.0	81
Freezing Rain,Fog	-8.7	82
Freezing Rain,Haze	-7.5	82
Freezing Rain,Ice Pellets,Fog	-3.7	92
Freezing Rain,Snow Grains	-7.3	84
Haze	-16.0	68
Mainly Clear	-28.0	20
Moderate Rain,Fog	0.8	94
Moderate Snow	-7.6	83
Moderate Snow,Blowing Snow	-6.6	92
Mostly Cloudy	-28.5	18
Rain	-5.7	40
Rain Showers	-7.2	37
Rain Showers,Fog	12.1	96
Rain Showers,Snow Showers	-1.8	75
Rain,Fog	-1.2	83
Rain,Haze	1.0	81
Rain,Ice Pellets	-0.6	92
Rain,Snow	-1.7	81
Rain,Snow Grains	-2.1	75
Rain,Snow,Fog	0.3	96
Rain,Snow,Ice Pellets	-0.7	88
Snow	-24.6	41

Snow Pellets	-6.4	59
Snow Showers	-19.3	52
Snow Showers,Fog	-12.7	89
Snow,Blowing Snow	-16.2	70
Snow,Fog	-12.0	77
Snow,Haze	-7.2	80
Snow,Ice Pellets	-5.9	76
Thunderstorms	19.4	67
Thunderstorms,Heavy Rain Showers	9.0	88
Thunderstorms,Moderate Rain Showers,Fog	18.5	93
Thunderstorms,Rain	18.2	83
Thunderstorms,Rain Showers	7.0	68
Thunderstorms,Rain Showers,Fog	16.1	80
Thunderstorms,Rain,Fog	18.6	88

Weather Condition	Wind Speed_km/h	Visibility_km
Clear	0	11.3
Cloudy	0	11.3
Drizzle	0	6.4
Drizzle,Fog	0	1.0
Drizzle,Ice Pellets,Fog	20	4.0
Drizzle,Snow	9	9.7
Drizzle,Snow,Fog	7	2.4
Fog	0	0.2
Freezing Drizzle	6	

```
4.8
Freezing Drizzle,Fog                                    6
3.6
Freezing Drizzle,Haze                                   9
2.0
Freezing Drizzle,Snow                                   6
2.4
Freezing Fog                                            0
0.2
Freezing Rain                                           7
2.8
Freezing Rain,Fog                                       7
2.8
Freezing Rain,Haze                                      6
2.0
Freezing Rain,Ice Pellets,Fog                          28
8.0
Freezing Rain,Snow Grains                              32
4.8
Haze                                                    0
4.8
Mainly Clear                                            0
12.9
Moderate Rain,Fog                                      17
6.4
Moderate Snow                                          26
0.6
Moderate Snow,Blowing Snow                             39
0.6
Mostly Cloudy                                           0
11.3
Rain                                                    0
4.0
Rain Showers                                            0
6.4
Rain Showers,Fog                                       13
6.4
Rain Showers,Snow Showers                              17
19.3
Rain,Fog                                                0
2.0
Rain,Haze                                               7
4.0
Rain,Ice Pellets                                       24
9.7
Rain,Snow                                              13
2.4
Rain,Snow Grains                                       26
25.0
```

```
Rain,Snow,Fog                                          9
6.4
Rain,Snow,Ice Pellets                                 17
4.8
Snow                                                   0
1.0
Snow Pellets                                          35
2.4
Snow Showers                                           0
2.4
Snow Showers,Fog                                       7
4.0
Snow,Blowing Snow                                     24
0.6
Snow,Fog                                               4
1.2
Snow,Haze                                              0
4.0
Snow,Ice Pellets                                      19
2.8
Thunderstorms                                          0
24.1
Thunderstorms,Heavy Rain Showers                       9
2.4
Thunderstorms,Moderate Rain Showers,Fog               15
3.2
Thunderstorms,Rain                                     4
16.1
Thunderstorms,Rain Showers                             7
6.4
Thunderstorms,Rain Showers,Fog                         7
9.7
Thunderstorms,Rain,Fog                                19
4.8

                                              Press_kPa
Weather Condition
Clear                                             99.52
Cloudy                                            98.39
Drizzle                                           97.84
Drizzle,Fog                                       98.65
Drizzle,Ice Pellets,Fog                          100.79
Drizzle,Snow                                     100.63
Drizzle,Snow,Fog                                  97.79
Fog                                               98.31
Freezing Drizzle                                  98.44
Freezing Drizzle,Fog                              98.74
Freezing Drizzle,Haze                            100.28
Freezing Drizzle,Snow                             99.19
```

```
Freezing Fog                                  101.97
Freezing Rain                                  98.22
Freezing Rain,Fog                              98.32
Freezing Rain,Haze                            100.34
Freezing Rain,Ice Pellets,Fog                 100.95
Freezing Rain,Snow Grains                      98.56
Haze                                          100.35
Mainly Clear                                   98.67
Moderate Rain,Fog                              99.98
Moderate Snow                                  99.88
Moderate Snow,Blowing Snow                    100.50
Mostly Cloudy                                  98.36
Rain                                           97.52
Rain Showers                                   98.51
Rain Showers,Fog                               99.83
Rain Showers,Snow Showers                     101.09
Rain,Fog                                       98.61
Rain,Haze                                     100.50
Rain,Ice Pellets                              100.12
Rain,Snow                                      98.18
Rain,Snow Grains                              100.60
Rain,Snow,Fog                                 100.73
Rain,Snow,Ice Pellets                          99.85
Snow                                           97.75
Snow Pellets                                   99.70
Snow Showers                                   99.49
Snow Showers,Fog                              100.63
Snow,Blowing Snow                              98.11
Snow,Fog                                       99.38
Snow,Haze                                     100.61
Snow,Ice Pellets                               99.40
Thunderstorms                                  99.84
Thunderstorms,Heavy Rain Showers              100.26
Thunderstorms,Moderate Rain Showers,Fog       100.01
Thunderstorms,Rain                            100.19
Thunderstorms,Rain Showers                     99.65
Thunderstorms,Rain Showers,Fog                 99.71
Thunderstorms,Rain,Fog                        100.08
```

```
data.groupby('Weather Condition').max()
```

```
                                          Date/Time  Temp_C  \
Weather Condition
Clear                                  9/9/2012 5:00    32.8
Cloudy                                9/9/2012 23:00    30.5
Drizzle                               9/30/2012 3:00    18.8
Drizzle,Fog                           9/30/2012 2:00    19.9
Drizzle,Ice Pellets,Fog              12/17/2012 9:00     0.4
Drizzle,Snow                        12/19/2012 18:00     1.2
Drizzle,Snow,Fog                     12/22/2012 3:00     1.1
```

```
Fog                                          9/22/2012 0:00    20.8
Freezing Drizzle                              2/1/2012 5:00    -2.3
Freezing Drizzle,Fog                         12/10/2012 5:00    -0.3
Freezing Drizzle,Haze                         2/1/2012 13:00    -5.0
Freezing Drizzle,Snow                         3/2/2012 12:00    -3.3
Freezing Fog                                  3/17/2012 6:00    -0.1
Freezing Rain                                 2/1/2012 7:00      0.3
Freezing Rain,Fog                            12/17/2012 1:00     0.1
Freezing Rain,Haze                            2/1/2012 15:00    -4.9
Freezing Rain,Ice Pellets,Fog                12/17/2012 3:00    -2.6
Freezing Rain,Snow Grains                     1/13/2012 9:00    -5.0
Haze                                         3/13/2012 23:00    14.1
Mainly Clear                                  9/9/2012 9:00     33.0
Moderate Rain,Fog                            12/10/2012 8:00     1.7
Moderate Snow                                12/27/2012 9:00    -4.9
Moderate Snow,Blowing Snow                   12/27/2012 12:00   -5.4
Mostly Cloudy                                 9/9/2012 2:00     32.4
Rain                                          9/5/2012 2:00     22.8
Rain Showers                                  9/8/2012 16:00    26.4
Rain Showers,Fog                             10/20/2012 3:00    12.8
Rain Showers,Snow Showers                    12/5/2012 10:00     2.2
Rain,Fog                                     9/30/2012 23:00    21.7
Rain,Haze                                     3/13/2012 9:00     5.5
Rain,Ice Pellets                             12/18/2012 5:00     0.6
Rain,Snow                                     4/23/2012 3:00     1.7
Rain,Snow Grains                             12/21/2012 0:00     1.9
Rain,Snow,Fog                                12/8/2012 21:00     0.8
Rain,Snow,Ice Pellets                        12/21/2012 5:00     1.3
Snow                                          4/27/2012 9:00     3.7
Snow Pellets                                 11/24/2012 15:00    0.7
Snow Showers                                  3/4/2012 21:00     2.9
Snow Showers,Fog                             12/29/2012 13:00   -10.0
Snow,Blowing Snow                             2/25/2012 9:00    -1.4
Snow,Fog                                     3/14/2012 19:00     1.1
Snow,Haze                                     2/1/2012 21:00    -3.6
Snow,Ice Pellets                              3/3/2012 4:00      0.8
Thunderstorms                                 7/4/2012 16:00    26.7
Thunderstorms,Heavy Rain Showers              5/29/2012 6:00    10.9
Thunderstorms,Moderate Rain Showers,Fog       7/17/2012 6:00    19.6
Thunderstorms,Rain                           7/23/2012 18:00    21.3
Thunderstorms,Rain Showers                    9/8/2012 4:00     25.5
Thunderstorms,Rain Showers,Fog               7/31/2012 20:00    22.9
Thunderstorms,Rain,Fog                        7/17/2012 5:00    20.6

                                          Dew Point Temp_C  Rel Hum_
%  \
Weather Condition

Clear                                                20.4         99
```

Cloudy	22.6	99
Drizzle	17.7	96
Drizzle,Fog	19.1	100
Drizzle,Ice Pellets,Fog	-0.7	92
Drizzle,Snow	0.2	95
Drizzle,Snow,Fog	0.6	98
Fog	19.6	100
Freezing Drizzle	-3.3	93
Freezing Drizzle,Fog	-2.3	94
Freezing Drizzle,Haze	-7.7	83
Freezing Drizzle,Snow	-4.6	94
Freezing Fog	-0.3	99
Freezing Rain	-1.7	92
Freezing Rain,Fog	-0.9	93
Freezing Rain,Haze	-7.4	83
Freezing Rain,Ice Pellets,Fog	-3.7	92
Freezing Rain,Snow Grains	-7.3	84
Haze	11.1	86
Mainly Clear	21.2	99
Moderate Rain,Fog	0.8	94
Moderate Snow	-6.7	93
Moderate Snow,Blowing Snow	-6.4	93
Mostly Cloudy	24.4	100
Rain	20.4	99
Rain Showers	23.0	97
Rain Showers,Fog	12.1	96

Rain Showers,Snow Showers	-1.2	78
Rain,Fog	19.5	100
Rain,Haze	2.9	86
Rain,Ice Pellets	-0.6	92
Rain,Snow	0.5	94
Rain,Snow Grains	-2.1	75
Rain,Snow,Fog	0.3	96
Rain,Snow,Ice Pellets	0.1	94
Snow	0.3	96
Snow Pellets	-6.4	59
Snow Showers	-0.7	94
Snow Showers,Fog	-11.1	92
Snow,Blowing Snow	-2.9	91
Snow,Fog	0.8	99
Snow,Haze	-6.4	81
Snow,Ice Pellets	-1.7	92
Thunderstorms	20.1	87
Thunderstorms,Heavy Rain Showers	9.0	88
Thunderstorms,Moderate Rain Showers,Fog	18.5	93
Thunderstorms,Rain	19.1	93
Thunderstorms,Rain Showers	23.1	98
Thunderstorms,Rain Showers,Fog	21.3	91
Thunderstorms,Rain,Fog	18.6	88

Weather Condition	Wind Speed_km/h	Visibility_km
Clear		33

```
48.3
Cloudy                                                  54
48.3
Drizzle                                                 30
25.0
Drizzle,Fog                                             28
9.7
Drizzle,Ice Pellets,Fog                                 20
4.0
Drizzle,Snow                                            19
11.3
Drizzle,Snow,Fog                                        32
9.7
Fog                                                     22
9.7
Freezing Drizzle                                        26
12.9
Freezing Drizzle,Fog                                    33
8.0
Freezing Drizzle,Haze                                   11
4.0
Freezing Drizzle,Snow                                   24
12.9
Freezing Fog                                             9
0.8
Freezing Rain                                           28
16.1
Freezing Rain,Fog                                       26
9.7
Freezing Rain,Haze                                       9
2.8
Freezing Rain,Ice Pellets,Fog                           28
8.0
Freezing Rain,Snow Grains                               32
4.8
Haze                                                    17
9.7
Mainly Clear                                            63
48.3
Moderate Rain,Fog                                       17
6.4
Moderate Snow                                           39
0.8
Moderate Snow,Blowing Snow                              41
0.6
Mostly Cloudy                                           83
48.3
Rain                                                    52
48.3
```

```
Rain Showers                                          41
48.3
Rain Showers,Fog                                      13
6.4
Rain Showers,Snow Showers                             28
24.1
Rain,Fog                                              46
9.7
Rain,Haze                                             17
9.7
Rain,Ice Pellets                                      24
9.7
Rain,Snow                                             52
25.0
Rain,Snow Grains                                      26
25.0
Rain,Snow,Fog                                          9
6.4
Rain,Snow,Ice Pellets                                 28
6.4
Snow                                                  57
25.0
Snow Pellets                                          35
2.4
Snow Showers                                          37
48.3
Snow Showers,Fog                                      22
9.7
Snow,Blowing Snow                                     48
9.7
Snow,Fog                                              35
9.7
Snow,Haze                                             15
6.4
Snow,Ice Pellets                                      33
11.3
Thunderstorms                                         15
25.0
Thunderstorms,Heavy Rain Showers                       9
2.4
Thunderstorms,Moderate Rain Showers,Fog               15
3.2
Thunderstorms,Rain                                    30
24.1
Thunderstorms,Rain Showers                            32
25.0
Thunderstorms,Rain Showers,Fog                        35
9.7
Thunderstorms,Rain,Fog                                19
```

```
4.8
```

Weather Condition	Press_kPa
Clear	103.63
Cloudy	103.65
Drizzle	101.56
Drizzle,Fog	102.07
Drizzle,Ice Pellets,Fog	100.79
Drizzle,Snow	101.15
Drizzle,Snow,Fog	100.15
Fog	103.04
Freezing Drizzle	101.02
Freezing Drizzle,Fog	101.27
Freezing Drizzle,Haze	100.36
Freezing Drizzle,Snow	101.18
Freezing Fog	102.85
Freezing Rain	101.00
Freezing Rain,Fog	101.01
Freezing Rain,Haze	100.41
Freezing Rain,Ice Pellets,Fog	100.95
Freezing Rain,Snow Grains	98.56
Haze	102.97
Mainly Clear	103.59
Moderate Rain,Fog	99.98
Moderate Snow	100.67
Moderate Snow,Blowing Snow	100.64
Mostly Cloudy	103.65
Rain	102.26
Rain Showers	102.31
Rain Showers,Fog	99.83
Rain Showers,Snow Showers	101.11
Rain,Fog	101.77
Rain,Haze	100.61
Rain,Ice Pellets	100.12
Rain,Snow	101.07
Rain,Snow Grains	100.60
Rain,Snow,Fog	100.73
Rain,Snow,Ice Pellets	100.47
Snow	102.73
Snow Pellets	99.70
Snow Showers	102.50
Snow Showers,Fog	102.52
Snow,Blowing Snow	100.62
Snow,Fog	102.07
Snow,Haze	100.99
Snow,Ice Pellets	100.96
Thunderstorms	100.62
Thunderstorms,Heavy Rain Showers	100.26

```
Thunderstorms,Moderate Rain Showers,Fog     100.01
Thunderstorms,Rain                          100.83
Thunderstorms,Rain Showers                  101.06
Thunderstorms,Rain Showers,Fog              100.64
Thunderstorms,Rain,Fog                      100.08
```

Q) 13. Show all the records where weather condition is Fog.

```
data[data['Weather Condition'] == 'Fog']
```

```
             Date/Time  Temp_C  Dew Point Temp_C  Rel Hum_%  Wind
Speed_km/h  \
0         1/1/2012 0:00    -1.8              -3.9         86
4
1         1/1/2012 1:00    -1.8              -3.7         87
4
4         1/1/2012 4:00    -1.5              -3.3         88
7
5         1/1/2012 5:00    -1.4              -3.3         87
9
6         1/1/2012 6:00    -1.5              -3.1         89
7
...                ...     ...               ...        ...
...
8716   12/29/2012 4:00   -16.0             -17.2         90
6
8717   12/29/2012 5:00   -14.8             -15.9         91
4
8718   12/29/2012 6:00   -13.8             -15.3         88
4
8719   12/29/2012 7:00   -14.8             -16.4         88
7
8722  12/29/2012 10:00   -12.0             -13.3         90
7

      Visibility_km  Press_kPa Weather Condition
0               8.0     101.24               Fog
1               8.0     101.24               Fog
4               4.8     101.23               Fog
5               6.4     101.27               Fog
6               6.4     101.29               Fog
...             ...        ...               ...
8716            9.7     101.25               Fog
8717            6.4     101.25               Fog
8718            9.7     101.25               Fog
8719            8.0     101.22               Fog
8722            6.4     101.15               Fog
```

```
[150 rows x 8 columns]
```

Q) 14. Find the all instances when 'Weather is Clear' or 'Visibility is above 40'.

```
data[(data['Weather Condition'] == 'Clear') | (data['Visibility_km']
>40)].tail(20)
```

```
              Date/Time  Temp_C  Dew Point Temp_C  Rel Hum_%  Wind
Speed_km/h  \
8644   12/26/2012 4:00   -13.1             -14.7         88
6
8645   12/26/2012 5:00   -12.7             -14.1         89
4
8646   12/26/2012 6:00   -13.4             -14.8         89
4
8651  12/26/2012 11:00   -11.3             -14.5         77
20
8652  12/26/2012 12:00   -10.6             -14.3         74
20
8698  12/28/2012 10:00    -6.1              -8.6         82
19
8699  12/28/2012 11:00    -6.2              -8.8         82
24
8700  12/28/2012 12:00    -7.2              -9.9         81
24
8701  12/28/2012 13:00    -6.8              -9.8         79
20
8702  12/28/2012 14:00    -6.5              -9.9         77
22
8703  12/28/2012 15:00    -6.8             -10.3         76
24
8704  12/28/2012 16:00    -7.7             -11.0         77
30
8713   12/29/2012 1:00   -11.9             -13.6         87
11
8714   12/29/2012 2:00   -11.8             -13.1         90
13
8748  12/30/2012 12:00   -12.2             -15.7         75
26
8749  12/30/2012 13:00   -12.4             -16.2         73
37
8750  12/30/2012 14:00   -11.8             -16.1         70
37
8751  12/30/2012 15:00   -11.3             -15.6         70
32
8752  12/30/2012 16:00   -11.4             -15.5         72
26
```

```
8756  12/30/2012 20:00   -13.8             -16.5         80
24

      Visibility_km  Press_kPa Weather Condition
8644           25.0     102.55             Clear
8645           25.0     102.48             Clear
8646           25.0     102.47             Clear
8651           48.3     102.50      Mainly Clear
8652           48.3     102.36      Mainly Clear
8698           24.1     101.27             Clear
8699           48.3     101.24      Mainly Clear
8700           48.3     101.22      Mainly Clear
8701           48.3     101.17      Mainly Clear
8702           48.3     101.17      Mainly Clear
8703           48.3     101.22      Mainly Clear
8704           48.3     101.25      Mainly Clear
8713           25.0     101.31             Clear
8714           25.0     101.33             Clear
8748           48.3     100.91     Mostly Cloudy
8749           48.3     100.92     Mostly Cloudy
8750           48.3     100.96      Mainly Clear
8751           48.3     101.05      Mainly Clear
8752           48.3     101.15      Mainly Clear
8756           25.0     101.52             Clear
```

Q) 15. Find all instances when :

A. 'weather is Clear' and 'Relative Humidity is greater than 50'

B. 'Visibility is above 40'

```
data.head(2)

       Date/Time  Temp_C  Dew Point Temp_C  Rel Hum_%  Wind Speed_km/h
\
0  1/1/2012 0:00    -1.8              -3.9         86                4

1  1/1/2012 1:00    -1.8              -3.7         87                4


   Visibility_km  Press_kPa Weather Condition
0            8.0     101.24               Fog
1            8.0     101.24               Fog

data[(data['Weather Condition'] == 'Clear') & (data['Rel Hum_%'] >50)
| (data['Visibility_km']> 40)]

             Date/Time  Temp_C  Dew Point Temp_C  Rel Hum_%  Wind
Speed_km/h  \
106     1/5/2012 10:00    -6.0             -10.0         73
```

```
17
107     1/5/2012 11:00    -5.6              -10.2          70
22
108     1/5/2012 12:00    -4.7               -9.6          69
20
109     1/5/2012 13:00    -4.4               -9.7          66
26
110     1/5/2012 14:00    -5.1              -10.7          65
22
...                 ...     ...                ...         ...
...
8749  12/30/2012 13:00   -12.4              -16.2          73
37
8750  12/30/2012 14:00   -11.8              -16.1          70
37
8751  12/30/2012 15:00   -11.3              -15.6          70
32
8752  12/30/2012 16:00   -11.4              -15.5          72
26
8756  12/30/2012 20:00   -13.8              -16.5          80
24

      Visibility_km  Press_kPa Weather Condition
106            48.3     100.45      Mainly Clear
107            48.3     100.41      Mainly Clear
108            48.3     100.38      Mainly Clear
109            48.3     100.40      Mainly Clear
110            48.3     100.46      Mainly Clear
...             ...        ...               ...
8749           48.3     100.92     Mostly Cloudy
8750           48.3     100.96      Mainly Clear
8751           48.3     101.05      Mainly Clear
8752           48.3     101.15      Mainly Clear
8756           25.0     101.52             Clear

[2921 rows x 8 columns]
```

Correlation Plots

```
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
```

1) Correlation Heat Map

```
data.head(2)
```

```
       Date/Time  Temp_C  Dew Point Temp_C  Rel Hum_%  Wind Speed_km/h
\
```

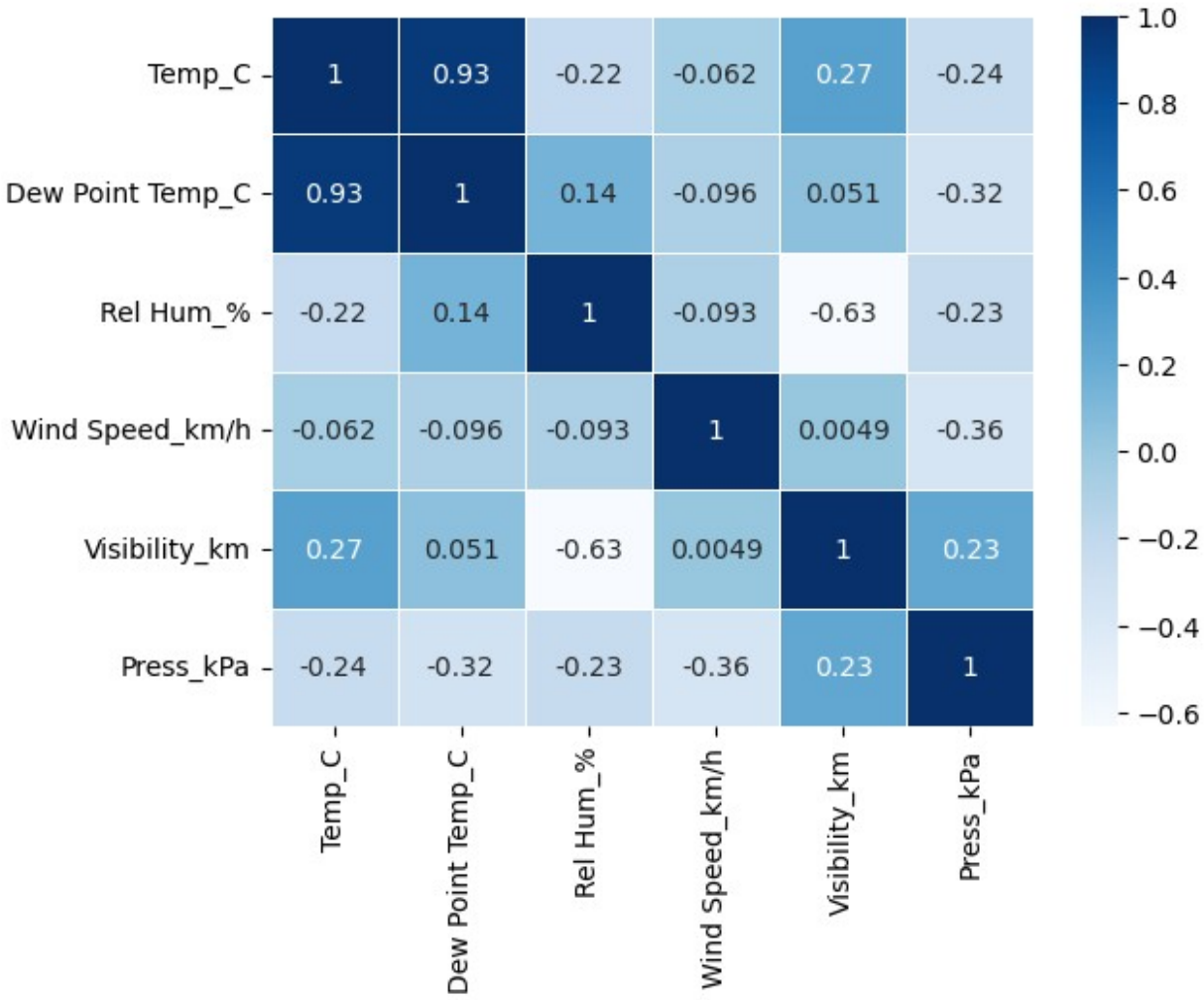
```
0  1/1/2012 0:00    -1.8              -3.9          86                 4

1  1/1/2012 1:00    -1.8              -3.7          87                 4


   Visibility_km  Press_kPa Weather Condition
0            8.0     101.24               Fog
1            8.0     101.24               Fog
```

```
cor_metrix = data[['Temp_C','Dew Point Temp_C','Rel Hum_%','Wind
Speed_km/h','Visibility_km','Press_kPa']].corr()
sns.heatmap(cor_metrix, annot =True, cmap = "Blues", linewidths = .5)
```

```
<Axes: >
```



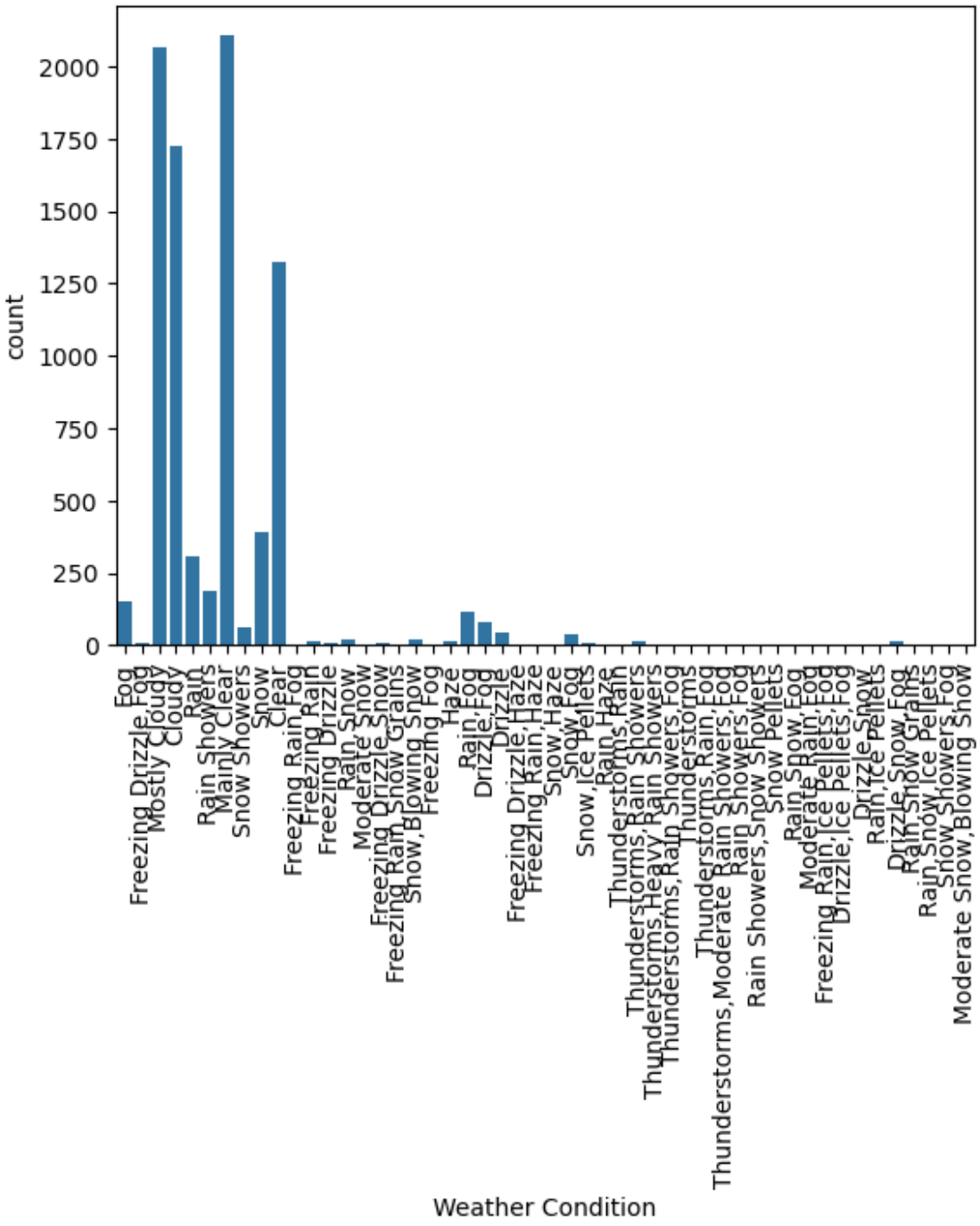
2) Count Plot of Weather Conditions

```
sns.countplot(x='Weather Condition', data =data)
plt.xticks(rotation=90)
```

```
([0,
  1,
  2,
  3,
  4,
  5,
  6,
  7,
  8,
  9,
  10,
  11,
  12,
  13,
  14,
  15,
  16,
  17,
  18,
  19,
  20,
  21,
  22,
  23,
  24,
  25,
  26,
  27,
  28,
  29,
  30,
  31,
  32,
  33,
  34,
  35,
  36,
  37,
  38,
  39,
  40,
  41,
  42,
  43,
  44,
  45,
  46,
  47,
  48,
  49],
```

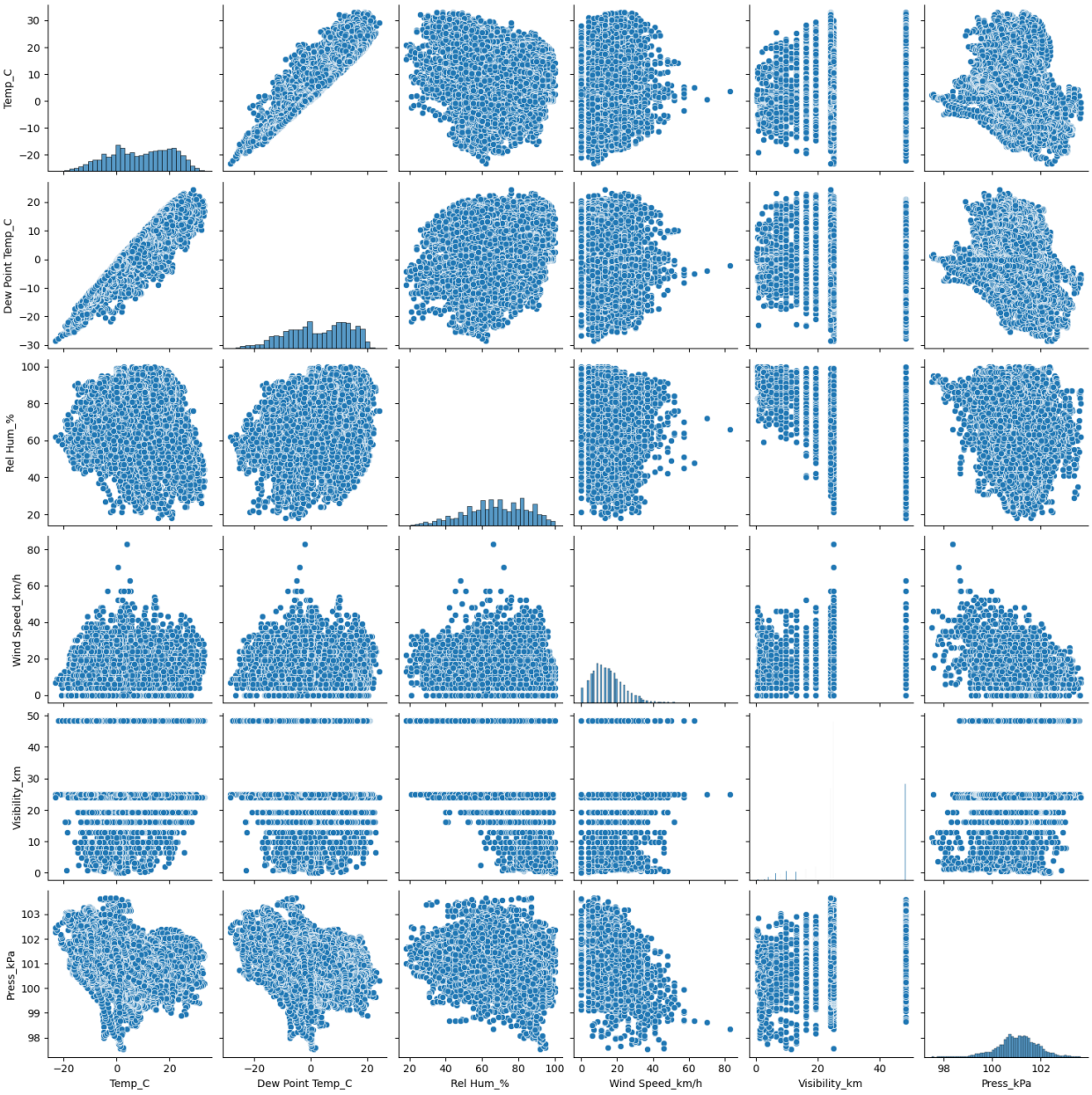
```
[Text(0, 0, 'Fog'),
 Text(1, 0, 'Freezing Drizzle,Fog'),
 Text(2, 0, 'Mostly Cloudy'),
 Text(3, 0, 'Cloudy'),
 Text(4, 0, 'Rain'),
 Text(5, 0, 'Rain Showers'),
 Text(6, 0, 'Mainly Clear'),
 Text(7, 0, 'Snow Showers'),
 Text(8, 0, 'Snow'),
 Text(9, 0, 'Clear'),
 Text(10, 0, 'Freezing Rain,Fog'),
 Text(11, 0, 'Freezing Rain'),
 Text(12, 0, 'Freezing Drizzle'),
 Text(13, 0, 'Rain,Snow'),
 Text(14, 0, 'Moderate Snow'),
 Text(15, 0, 'Freezing Drizzle,Snow'),
 Text(16, 0, 'Freezing Rain,Snow Grains'),
 Text(17, 0, 'Snow,Blowing Snow'),
 Text(18, 0, 'Freezing Fog'),
 Text(19, 0, 'Haze'),
 Text(20, 0, 'Rain,Fog'),
 Text(21, 0, 'Drizzle,Fog'),
 Text(22, 0, 'Drizzle'),
 Text(23, 0, 'Freezing Drizzle,Haze'),
 Text(24, 0, 'Freezing Rain,Haze'),
 Text(25, 0, 'Snow,Haze'),
 Text(26, 0, 'Snow,Fog'),
 Text(27, 0, 'Snow,Ice Pellets'),
 Text(28, 0, 'Rain,Haze'),
 Text(29, 0, 'Thunderstorms,Rain'),
 Text(30, 0, 'Thunderstorms,Rain Showers'),
 Text(31, 0, 'Thunderstorms,Heavy Rain Showers'),
 Text(32, 0, 'Thunderstorms,Rain Showers,Fog'),
 Text(33, 0, 'Thunderstorms'),
 Text(34, 0, 'Thunderstorms,Rain,Fog'),
 Text(35, 0, 'Thunderstorms,Moderate Rain Showers,Fog'),
 Text(36, 0, 'Rain Showers,Fog'),
 Text(37, 0, 'Rain Showers,Snow Showers'),
 Text(38, 0, 'Snow Pellets'),
 Text(39, 0, 'Rain,Snow,Fog'),
 Text(40, 0, 'Moderate Rain,Fog'),
 Text(41, 0, 'Freezing Rain,Ice Pellets,Fog'),
 Text(42, 0, 'Drizzle,Ice Pellets,Fog'),
 Text(43, 0, 'Drizzle,Snow'),
 Text(44, 0, 'Rain,Ice Pellets'),
 Text(45, 0, 'Drizzle,Snow,Fog'),
 Text(46, 0, 'Rain,Snow Grains'),
 Text(47, 0, 'Rain,Snow,Ice Pellets'),
```

```
  Text(48, 0, 'Snow Showers,Fog'),
  Text(49, 0, 'Moderate Snow,Blowing Snow')])
```




```
sns.pairplot(data[['Temp_C','Dew Point Temp_C','Rel Hum_%','Wind
Speed_km/h','Visibility_km','Press_kPa']])
```

```
<seaborn.axisgrid.PairGrid at 0x1f155f8e660>
```


Temp_C
Dew Point Temp_C
Rel Hum_%
Wind Speed_km/h
Visibility_km
Press_kPa