

## Weather Data Analysis

Here, The Weather Dataset is a time-series dataset 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.

```
In [139...] import pandas as pd
```

```
In [140...] data = pd.read_csv(r"C:\Users\jarug\Downloads\file (1).csv")
```

```
In [141...] data
```

	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h	Visibility_km	Press_kPa	Weather
0	1/1/2012 0:00	-1.8	-3.9	86	4	8.0	101.24	Fog
1	1/1/2012 1:00	-1.8	-3.7	87	4	8.0	101.24	Fog
2	1/1/2012 2:00	-1.8	-3.4	89	7	4.0	101.26	Freezing Drizzle,Fog
3	1/1/2012 3:00	-1.5	-3.2	88	6	4.0	101.27	Freezing Drizzle,Fog
4	1/1/2012 4:00	-1.5	-3.3	88	7	4.8	101.23	Fog
...	...	...	...	...	...	...	...	...
8779	12/31/2012 19:00	0.1	-2.7	81	30	9.7	100.13	Snow
8780	12/31/2012 20:00	0.2	-2.4	83	24	9.7	100.03	Snow
8781	12/31/2012 21:00	-0.5	-1.5	93	28	4.8	99.95	Snow
8782	12/31/2012 22:00	-0.2	-1.8	89	28	9.7	99.91	Snow
8783	12/31/2012 23:00	0.0	-2.1	86	30	11.3	99.89	Snow

8784 rows × 8 columns

### Analysing the Data Frame

```
In [142...] #.head()  
#it shows the n number of rows (by default n=5)  
data.head()
```

	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h	Visibility_km	Press_kPa	Weather
0	1/1/2012 0:00	-1.8	-3.9	86	4	8.0	101.24	Fog
1	1/1/2012 1:00	-1.8	-3.7	87	4	8.0	101.24	Fog
2	1/1/2012 2:00	-1.8	-3.4	89	7	4.0	101.26	Freezing Drizzle,Fog
3	1/1/2012 3:00	-1.5	-3.2	88	6	4.0	101.27	Freezing Drizzle,Fog
4	1/1/2012 4:00	-1.5	-3.3	88	7	4.8	101.23	Fog

```
In [143...] # .shape  
# it shows the total no.of rows and no.of columns of the dataset  
data.shape
```

```
Out[143...] (8784, 8)
```

```
In [144...] # .index  
# Provides the index of the dataset  
data.index
```

```
Out[144...] RangeIndex(start=0, stop=8784, step=1)
```

```
In [145...] #.columns  
# Shows the Column Names  
data.columns
```

```
Out[145...] Index(['Date/Time', 'Temp_C', 'Dew Point Temp_C', 'Rel Hum_%',  
        'Wind Speed_km/h', 'Visibility_km', 'Press_kPa', 'Weather'],  
        dtype='object')
```

```
In [146...] #.dtypes
```

```
# Shows the datatype of each column
data.dtypes
```

```
Out[146.. 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
```

```
In [147.. # .unique()
# it shows all the unique values.it can be applied on a sinle column only,not on the wide dataframe.
data['Weather'].unique()
```

```
Out[147.. 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)
```

```
In [148.. # .nunique()
# it shows the number of unique values
data.nunique()
```

```
Out[148.. 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
```

```
In [149.. # .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 wh
data.count()
```

```
Out[149.. 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
```

# from the above we can confirm that there are no null values because it is giving all 8784,as our data is having 8784 rows only and also as the count() can tell only the non values,so there are 0 null values

```
In [150.. # .value_counts
# In a column.it shows all the unique values with their counts.it can be applied on single column only.
data['Weather'].value_counts()
```

```
Out[150] 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
```

```
In [151] # .info()
# Provides the basic information about the dataset
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
```

Questions

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

```
In [152] data.head(2)
```

Out[152..	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h	Visibility_km	Press_kPa	Weather
0	1/1/2012 0:00	-1.8	-3.9	86	4	8.0	101.24	Fog
1	1/1/2012 1:00	-1.8	-3.7	87	4	8.0	101.24	Fog

```
In [153.. data.nunique() # for overall
```

```
Out[153.. 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
```

```
In [154.. data['Wind Speed_km/h'].nunique() # for the particular column
```

```
Out[154.. 34
```

```
In [155.. data['Wind Speed_km/h'].unique()
```

```
Out[155.. 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)
```

Interpretation: This are showing the unique values present in the 'Wind Speed\_km/h' column,in total there are 34

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

```
In [156.. data.head(2)
```

Out[156..	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h	Visibility_km	Press_kPa	Weather
0	1/1/2012 0:00	-1.8	-3.9	86	4	8.0	101.24	Fog
1	1/1/2012 1:00	-1.8	-3.7	87	4	8.0	101.24	Fog

```
In [157.. #Value_counts()
data.Weather.value_counts()
```

```
Out[157.. 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
```

```
In [158.. # Filtering
data[data['Weather'] == 'Clear']
```

Out[158..

	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h	Visibility_km	Press_kPa	Weather
67	1/3/2012 19:00	-16.9	-24.8	50	24	25.0	101.74	Clear
114	1/5/2012 18:00	-7.1	-14.4	56	11	25.0	100.71	Clear
115	1/5/2012 19:00	-9.2	-15.4	61	7	25.0	100.80	Clear
116	1/5/2012 20:00	-9.8	-15.7	62	9	25.0	100.83	Clear
117	1/5/2012 21:00	-9.0	-14.8	63	13	25.0	100.83	Clear
...	...	...	...	...	...	...	...	...
8646	12/26/2012 6:00	-13.4	-14.8	89	4	25.0	102.47	Clear
8698	12/28/2012 10:00	-6.1	-8.6	82	19	24.1	101.27	Clear
8713	12/29/2012 1:00	-11.9	-13.6	87	11	25.0	101.31	Clear
8714	12/29/2012 2:00	-11.8	-13.1	90	13	25.0	101.33	Clear
8756	12/30/2012 20:00	-13.8	-16.5	80	24	25.0	101.52	Clear

1326 rows × 8 columns

```
In [160.. # groupby()
#data.head(2)
data.groupby('Weather').get_group('Clear')
```

Out[160..

	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h	Visibility_km	Press_kPa	Weather
67	1/3/2012 19:00	-16.9	-24.8	50	24	25.0	101.74	Clear
114	1/5/2012 18:00	-7.1	-14.4	56	11	25.0	100.71	Clear
115	1/5/2012 19:00	-9.2	-15.4	61	7	25.0	100.80	Clear
116	1/5/2012 20:00	-9.8	-15.7	62	9	25.0	100.83	Clear
117	1/5/2012 21:00	-9.0	-14.8	63	13	25.0	100.83	Clear
...	...	...	...	...	...	...	...	...
8646	12/26/2012 6:00	-13.4	-14.8	89	4	25.0	102.47	Clear
8698	12/28/2012 10:00	-6.1	-8.6	82	19	24.1	101.27	Clear
8713	12/29/2012 1:00	-11.9	-13.6	87	11	25.0	101.31	Clear
8714	12/29/2012 2:00	-11.8	-13.1	90	13	25.0	101.33	Clear
8756	12/30/2012 20:00	-13.8	-16.5	80	24	25.0	101.52	Clear

1326 rows × 8 columns

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

In [161..

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

Out[161..

	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h	Visibility_km	Press_kPa	Weather
0	1/1/2012 0:00	-1.8	-3.9	86	4	8.0	101.24	Fog
1	1/1/2012 1:00	-1.8	-3.7	87	4	8.0	101.24	Fog

In [162..

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

Out[162..

	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h	Visibility_km	Press_kPa	Weather
0	1/1/2012 0:00	-1.8	-3.9	86	4	8.0	101.24	Fog
1	1/1/2012 1:00	-1.8	-3.7	87	4	8.0	101.24	Fog
96	1/5/2012 0:00	-8.8	-11.7	79	4	9.7	100.32	Snow
101	1/5/2012 5:00	-7.0	-9.5	82	4	4.0	100.19	Snow
146	1/7/2012 2:00	-8.1	-11.1	79	4	19.3	100.15	Cloudy
...	...	...	...	...	...	...	...	...
8768	12/31/2012 8:00	-8.6	-10.3	87	4	3.2	101.14	Snow Showers
8769	12/31/2012 9:00	-8.1	-9.6	89	4	2.4	101.09	Snow
8770	12/31/2012 10:00	-7.4	-8.9	89	4	6.4	101.05	Snow,Fog
8772	12/31/2012 12:00	-5.8	-7.5	88	4	12.9	100.78	Snow
8773	12/31/2012 13:00	-4.6	-6.6	86	4	12.9	100.63	Snow

474 rows × 8 columns

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

In [163..

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

Out[163..

```
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
```

In [164..

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

```
Out[164.. Date/Time      8784
Temp_C      8784
Dew Point Temp_C 8784
Rel Hum_%    8784
Wind Speed_kmh 8784
Visibility_km 8784
Press_kPa    8784
Weather      8784
dtype: int64
```

Interpretation : So,there are no null values in our dataset

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

```
In [165.. data.head(2)
```

```
Out[165..      Date/Time  Temp_C  Dew Point Temp_C  Rel Hum_%  Wind Speed_kmh  Visibility_km  Press_kPa  Weather
0  1/1/2012 0:00    -1.8          -3.9        86           4           8.0       101.24    Fog
1  1/1/2012 1:00    -1.8          -3.7        87           4           8.0       101.24    Fog
```

```
In [166.. data.rename(columns = {'Weather':'Weather_Condition'}) # is will not stay permanently ,to make this stay perman
```

```
Out[166..      Date/Time  Temp_C  Dew Point Temp_C  Rel Hum_%  Wind Speed_kmh  Visibility_km  Press_kPa  Weather_Condition
0  1/1/2012 0:00    -1.8          -3.9        86           4           8.0       101.24    Fog
1  1/1/2012 1:00    -1.8          -3.7        87           4           8.0       101.24    Fog
2  1/1/2012 2:00    -1.8          -3.4        89           7           4.0       101.26    Freezing Drizzle,Fog
3  1/1/2012 3:00    -1.5          -3.2        88           6           4.0       101.27    Freezing Drizzle,Fog
4  1/1/2012 4:00    -1.5          -3.3        88           7           4.8       101.23    Fog
...      ...      ...      ...      ...      ...      ...      ...      ...
8779  12/31/2012 19:00    0.1          -2.7        81          30           9.7       100.13    Snow
8780  12/31/2012 20:00    0.2          -2.4        83          24           9.7       100.03    Snow
8781  12/31/2012 21:00   -0.5          -1.5        93          28           4.8       99.95     Snow
8782  12/31/2012 22:00   -0.2          -1.8        89          28           9.7       99.91     Snow
8783  12/31/2012 23:00    0.0          -2.1        86          30          11.3       99.89     Snow
```

8784 rows × 8 columns

```
In [167.. data.head(2) # here,we can see the column name remained same as we didn't used inplace = True
```

```
Out[167..      Date/Time  Temp_C  Dew Point Temp_C  Rel Hum_%  Wind Speed_kmh  Visibility_km  Press_kPa  Weather
0  1/1/2012 0:00    -1.8          -3.9        86           4           8.0       101.24    Fog
1  1/1/2012 1:00    -1.8          -3.7        87           4           8.0       101.24    Fog
```

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

```
In [168.. data.head(2)
```

```
Out[168..      Date/Time  Temp_C  Dew Point Temp_C  Rel Hum_%  Wind Speed_kmh  Visibility_km  Press_kPa  Weather
0  1/1/2012 0:00    -1.8          -3.9        86           4           8.0       101.24    Fog
1  1/1/2012 1:00    -1.8          -3.7        87           4           8.0       101.24    Fog
```

```
In [169.. data.Visibility_km.mean()
```

```
Out[169.. 27.664446721311478
```

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

```
In [170.. data.Press_kPa.std()
```

```
Out[170.. 0.8440047459486474
```

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

```
In [171...] data['Rel Hum_%'].var()
```

```
Out[171...] 286.2485501984998
```

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

```
In [174...] # value_counts()
data.head(2)
data['Weather'].value_counts()
```

```
Out[174...] 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
```

```
In [175...] # Filtering
data[data['Weather']=='Snow']
```



Out [175...

	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h	Visibility_km	Press_kPa	Weather
55	1/3/2012 7:00	-14.0	-19.5	63	19	25.0	100.95	Snow
84	1/4/2012 12:00	-13.7	-21.7	51	11	24.1	101.25	Snow
86	1/4/2012 14:00	-11.3	-19.0	53	7	19.3	100.97	Snow
87	1/4/2012 15:00	-10.2	-16.3	61	11	9.7	100.89	Snow
88	1/4/2012 16:00	-9.4	-15.5	61	13	19.3	100.79	Snow
...	...	...	...	...	...	...	...	...
8779	12/31/2012 19:00	0.1	-2.7	81	30	9.7	100.13	Snow
8780	12/31/2012 20:00	0.2	-2.4	83	24	9.7	100.03	Snow
8781	12/31/2012 21:00	-0.5	-1.5	93	28	4.8	99.95	Snow
8782	12/31/2012 22:00	-0.2	-1.8	89	28	9.7	99.91	Snow
8783	12/31/2012 23:00	0.0	-2.1	86	30	11.3	99.89	Snow

390 rows × 8 columns

In [176...

```
#str.contains
data[data['Weather'].str.contains('Snow')].tail(50)
```

Out [176...

	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h	Visibility_km	Press_kPa	Weather
8680	12/27/2012 16:00	-4.5	-6.2	88	37	2.0	100.44	Snow,Blowing Snow
8681	12/27/2012 17:00	-4.2	-5.9	88	32	3.2	100.47	Snow,Blowing Snow
8682	12/27/2012 18:00	-4.0	-5.7	88	28	8.0	100.49	Snow,Blowing Snow
8683	12/27/2012 19:00	-3.9	-5.6	88	26	9.7	100.52	Snow,Blowing Snow
8684	12/27/2012 20:00	-3.7	-5.3	89	37	16.1	100.58	Snow
8685	12/27/2012 21:00	-3.7	-4.8	92	24	4.8	100.62	Freezing Drizzle,Snow
8686	12/27/2012 22:00	-3.8	-4.6	94	20	4.8	100.65	Freezing Drizzle,Snow
8687	12/27/2012 23:00	-4.0	-5.6	89	24	9.7	100.70	Snow
8688	12/28/2012 0:00	-4.2	-5.7	89	19	8.0	100.78	Freezing Drizzle,Snow
8689	12/28/2012 1:00	-4.4	-6.6	85	15	6.4	100.83	Freezing Drizzle,Snow
8690	12/28/2012 2:00	-4.3	-6.3	86	11	12.9	100.93	Freezing Drizzle,Snow
8691	12/28/2012 3:00	-4.6	-5.9	91	13	4.0	101.01	Snow
8692	12/28/2012 4:00	-4.9	-5.9	93	9	9.7	101.00	Snow
8723	12/29/2012 11:00	-10.9	-12.2	90	7	6.4	101.09	Snow Showers,Fog
8724	12/29/2012 12:00	-10.5	-11.6	92	11	8.0	100.93	Snow Showers,Fog
8725	12/29/2012 13:00	-10.0	-11.1	92	22	9.7	100.63	Snow Showers,Fog
8726	12/29/2012 14:00	-9.3	-10.5	91	22	4.8	100.60	Snow,Fog
8727	12/29/2012 15:00	-8.8	-10.0	91	20	1.2	100.55	Snow,Fog
8728	12/29/2012 16:00	-8.5	-9.9	90	24	1.2	100.49	Snow,Fog
8729	12/29/2012 17:00	-9.0	-10.4	90	19	2.4	100.46	Snow,Fog
8730	12/29/2012 18:00	-9.3	-10.9	88	26	6.4	100.38	Snow,Fog
8731	12/29/2012 19:00	-9.5	-11.2	87	26	3.2	100.33	Snow,Fog
8732	12/29/2012 20:00	-9.7	-11.6	86	24	3.2	100.25	Snow,Fog

8732	12/29/2012 20:00	-9.7	-11.6	86	24	9.7	100.23	Snow,Fog
8733	12/29/2012 21:00	-9.8	-11.8	85	24	8.0	100.24	Snow,Fog
8734	12/29/2012 22:00	-10.1	-11.6	89	15	2.4	100.20	Snow,Fog
8735	12/29/2012 23:00	-10.0	-12.0	85	20	6.4	100.19	Snow,Fog
8736	12/30/2012 0:00	-9.6	-11.3	87	13	3.2	100.23	Snow,Fog
8737	12/30/2012 1:00	-9.4	-10.5	92	9	2.4	100.22	Snow,Fog
8738	12/30/2012 2:00	-9.3	-10.4	92	9	4.0	100.28	Snow,Fog
8739	12/30/2012 3:00	-9.1	-10.4	90	11	3.6	100.30	Snow,Fog
8740	12/30/2012 4:00	-9.3	-10.6	90	13	9.7	100.28	Snow,Fog
8741	12/30/2012 5:00	-9.1	-10.4	90	11	4.0	100.32	Snow,Fog
8742	12/30/2012 6:00	-9.3	-10.8	89	17	8.0	100.39	Snow,Fog
8767	12/31/2012 7:00	-9.3	-11.3	85	0	19.3	101.19	Snow Showers
8768	12/31/2012 8:00	-8.6	-10.3	87	4	3.2	101.14	Snow Showers
8769	12/31/2012 9:00	-8.1	-9.6	89	4	2.4	101.09	Snow
8770	12/31/2012 10:00	-7.4	-8.9	89	4	6.4	101.05	Snow,Fog
8771	12/31/2012 11:00	-6.7	-7.9	91	9	9.7	100.93	Snow
8772	12/31/2012 12:00	-5.8	-7.5	88	4	12.9	100.78	Snow
8773	12/31/2012 13:00	-4.6	-6.6	86	4	12.9	100.63	Snow
8774	12/31/2012 14:00	-3.4	-5.7	84	6	11.3	100.57	Snow
8775	12/31/2012 15:00	-2.3	-4.6	84	9	9.7	100.47	Snow
8776	12/31/2012 16:00	-1.4	-4.0	82	13	12.9	100.40	Snow
8777	12/31/2012 17:00	-1.1	-3.3	85	19	9.7	100.30	Snow
8778	12/31/2012 18:00	-1.3	-3.1	88	17	9.7	100.19	Snow
8779	12/31/2012 19:00	0.1	-2.7	81	30	9.7	100.13	Snow
8780	12/31/2012 20:00	0.2	-2.4	83	24	9.7	100.03	Snow
8781	12/31/2012 21:00	-0.5	-1.5	93	28	4.8	99.95	Snow
8782	12/31/2012 22:00	-0.2	-1.8	89	28	9.7	99.91	Snow
8783	12/31/2012 23:00	0.0	-2.1	86	30	11.3	99.89	Snow

Q) 1.Find all instances when 'Wind Speed is above 24' and 'Visibility is 25'.

In [116]: data.head(2)

```
Out[116]:
```

	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h	Visibility_km	Press_kPa	Weather
0	1/1/2012 0:00	-1.8	-3.9	86	4	8.0	101.24	Fog
1	1/1/2012 1:00	-1.8	-3.7	87	4	8.0	101.24	Fog

In [136]: data[(data['Wind Speed\_km/h']>24) & (data['Visibility\_km']==25)]

Out[136..

	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h	Visibility_km	Press_kPa	Weather
23	1/1/2012 23:00	5.3	2.0	79	30	25.0	99.31	Cloudy
24	1/2/2012 0:00	5.2	1.5	77	35	25.0	99.26	Rain Showers
25	1/2/2012 1:00	4.6	0.0	72	39	25.0	99.26	Cloudy
26	1/2/2012 2:00	3.9	-0.9	71	32	25.0	99.26	Mostly Cloudy
27	1/2/2012 3:00	3.7	-1.5	69	33	25.0	99.30	Mostly Cloudy
...	...	...	...	...	...	...	...	...
8705	12/28/2012 17:00	-8.6	-12.0	76	26	25.0	101.34	Mainly Clear
8753	12/30/2012 17:00	-12.1	-15.8	74	28	25.0	101.26	Mainly Clear
8755	12/30/2012 19:00	-13.4	-16.5	77	26	25.0	101.47	Mainly Clear
8759	12/30/2012 23:00	-12.1	-15.1	78	28	25.0	101.52	Mostly Cloudy
8760	12/31/2012 0:00	-11.1	-14.4	77	26	25.0	101.51	Cloudy

308 rows × 8 columns

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

In [209..

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

Out[209..

	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h	Visibility_km	Press_kPa	Weather
0	1/1/2012 0:00	-1.8	-3.9	86	4	8.0	101.24	Fog
1	1/1/2012 1:00	-1.8	-3.7	87	4	8.0	101.24	Fog

In [207..

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

Out[207..

	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h	Visibility_km	Press_kPa
Weather						
Clear	6.825716	0.089367	64.497738	10.557315	30.153243	101.587443
Cloudy	7.970544	2.375810	69.592593	16.127315	26.625752	100.911441
Drizzle	7.353659	5.504878	88.243902	16.097561	17.931707	100.435366
Drizzle,Fog	8.067500	7.033750	93.275000	11.862500	5.257500	100.786625
Drizzle,Ice Pellets,Fog	0.400000	-0.700000	92.000000	20.000000	4.000000	100.790000
Drizzle,Snow	1.050000	0.150000	93.500000	14.000000	10.500000	100.890000
Drizzle,Snow,Fog	0.693333	0.120000	95.866667	15.533333	5.513333	99.281333
Fog	4.303333	3.159333	92.286667	7.946667	6.248000	101.184067
Freezing Drizzle	-5.657143	-8.000000	83.571429	16.571429	9.200000	100.202857
Freezing Drizzle,Fog	-2.533333	-4.183333	88.500000	17.000000	5.266667	100.441667
Freezing Drizzle,Haze	-5.433333	-8.000000	82.000000	10.333333	2.666667	100.316667
Freezing Drizzle,Snow	-5.109091	-7.072727	86.090909	16.272727	5.872727	100.520909
Freezing Fog	-7.575000	-9.250000	87.750000	4.750000	0.650000	102.320000
Freezing Rain	-3.885714	-6.078571	84.642857	19.214286	8.242857	99.647143
Freezing Rain,Fog	-2.225000	-3.750000	89.500000	15.500000	7.550000	99.945000
Freezing Rain,Haze	-4.900000	-7.450000	82.500000	7.500000	2.400000	100.375000
Freezing Rain,Ice Pellets,Fog	-2.600000	-3.700000	92.000000	28.000000	8.000000	100.950000
Freezing Rain,Snow Grains	-5.000000	-7.300000	84.000000	32.000000	4.800000	98.560000
Haze	-0.200000	-2.975000	81.625000	10.437500	7.831250	101.482500
Mainly Clear	12.558927	4.581671	60.667142	14.144824	34.264862	101.248832
Moderate Rain,Fog	1.700000	0.800000	94.000000	17.000000	6.400000	99.980000
Moderate Snow	-5.525000	-7.250000	87.750000	33.750000	0.750000	100.275000
Moderate Snow,Blowing Snow	-5.450000	-6.500000	92.500000	40.000000	0.600000	100.570000
Mostly Cloudy	10.574287	3.131174	62.102465	15.813920	31.253842	101.025288
Rain	9.786275	7.042810	83.624183	19.254902	18.856536	100.233333
Rain Showers	13.722340	9.187766	75.159574	17.132979	22.816489	100.404043
Rain Showers,Fog	12.800000	12.100000	96.000000	13.000000	6.400000	99.830000

Rain Showers,Snow Showers	2.150000	-1.500000	76.500000	22.500000	21.700000	101.100000
Rain,Fog	8.273276	7.219828	93.189655	14.793103	6.873276	100.500862
Rain,Haze	4.633333	2.066667	83.333333	11.666667	6.700000	100.540000
Rain,Ice Pellets	0.600000	-0.600000	92.000000	24.000000	9.700000	100.120000
Rain,Snow	1.055556	-0.566667	89.000000	28.388889	11.672222	99.951111
Rain,Snow Grains	1.900000	-2.100000	75.000000	26.000000	25.000000	100.600000
Rain,Snow,Fog	0.800000	0.300000	96.000000	9.000000	6.400000	100.730000
Rain,Snow,Ice Pellets	1.100000	-0.175000	91.500000	23.250000	6.000000	100.105000
Snow	-4.524103	-7.623333	79.307692	20.038462	11.171795	100.536103
Snow Pellets	0.700000	-6.400000	59.000000	35.000000	2.400000	99.700000
Snow Showers	-3.506667	-7.866667	72.350000	19.233333	20.158333	100.963500
Snow Showers,Fog	-10.675000	-11.900000	90.750000	13.750000	7.025000	101.292500
Snow,Blowing Snow	-5.410526	-7.621053	84.473684	34.842105	4.105263	99.704737
Snow,Fog	-5.075676	-6.364865	90.675676	17.324324	4.537838	100.688649
Snow,Haze	-4.020000	-6.860000	80.600000	5.000000	4.640000	100.782000
Snow,Ice Pellets	-1.883333	-3.666667	87.666667	23.833333	7.416667	100.548333
Thunderstorms	24.150000	19.750000	77.000000	7.500000	24.550000	100.230000
Thunderstorms,Heavy Rain Showers	10.900000	9.000000	88.000000	9.000000	2.400000	100.260000
Thunderstorms,Moderate Rain Showers,Fog	19.600000	18.500000	93.000000	15.000000	3.200000	100.010000
Thunderstorms,Rain	20.433333	18.533333	89.000000	15.666667	19.833333	100.420000
Thunderstorms,Rain Showers	20.037500	17.618750	86.375000	18.312500	15.893750	100.233750
Thunderstorms,Rain Showers,Fog	21.600000	18.700000	84.000000	19.666667	9.700000	100.063333
Thunderstorms,Rain,Fog	20.600000	18.600000	88.000000	19.000000	4.800000	100.080000

Q) 12.What is the Minimum and Maximum value of each column against each "Weather"?

In [210..

data.groupby("Weather").min()

Out[210..

	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h	Visibility_km	Press_kPa
Weather							
Clear	1/11/2012 1:00	-23.3	-28.5	20	0	11.3	99.52
Cloudy	1/1/2012 17:00	-21.4	-26.8	18	0	11.3	98.39
Drizzle	1/23/2012 21:00	1.1	-0.2	74	0	6.4	97.84
Drizzle,Fog	1/23/2012 20:00	0.0	-1.6	85	0	1.0	98.65
Drizzle,Ice Pellets,Fog	12/17/2012 9:00	0.4	-0.7	92	20	4.0	100.79
Drizzle,Snow	12/17/2012 15:00	0.9	0.1	92	9	9.7	100.63
Drizzle,Snow,Fog	12/18/2012 21:00	0.3	-0.1	92	7	2.4	97.79
Fog	1/1/2012 0:00	-16.0	-17.2	80	0	0.2	98.31
Freezing Drizzle	1/13/2012 10:00	-9.0	-12.2	78	6	4.8	98.44
Freezing Drizzle,Fog	1/1/2012 2:00	-6.4	-9.0	82	6	3.6	98.74
Freezing Drizzle,Haze	2/1/2012 11:00	-5.8	-8.3	81	9	2.0	100.28
Freezing Drizzle,Snow	1/13/2012 3:00	-8.3	-10.4	79	6	2.4	99.19
Freezing Fog	1/22/2012 6:00	-19.0	-22.9	71	0	0.2	101.97
Freezing Rain	1/13/2012 11:00	-6.5	-9.0	81	7	2.8	98.22
Freezing Rain,Fog	1/17/2012 23:00	-6.1	-8.7	82	7	2.8	98.32

Freezing Rain,Haze	2/1/2012 14:00	-4.9	-7.5	82	6	2.0	100.34
Freezing Rain,Ice Pellets,Fog	12/17/2012 3:00	-2.6	-3.7	92	28	8.0	100.95
Freezing Rain,Snow Grains	1/13/2012 9:00	-5.0	-7.3	84	32	4.8	98.56
Haze	1/22/2012 12:00	-11.5	-16.0	68	0	4.8	100.35
Mainly Clear	1/10/2012 11:00	-22.8	-28.0	20	0	12.9	98.67
Moderate Rain,Fog	12/10/2012 8:00	1.7	0.8	94	17	6.4	99.98
Moderate Snow	1/12/2012 15:00	-6.3	-7.6	83	26	0.6	99.88
Moderate Snow,Blowing Snow	12/27/2012 10:00	-5.5	-6.6	92	39	0.6	100.50
Mostly Cloudy	1/1/2012 16:00	-23.2	-28.5	18	0	11.3	98.36
Rain	1/1/2012 18:00	0.3	-5.7	40	0	4.0	97.52
Rain Showers	1/1/2012 22:00	1.6	-7.2	37	0	6.4	98.51
Rain Showers,Fog	10/20/2012 3:00	12.8	12.1	96	13	6.4	99.83
Rain Showers,Snow Showers	11/4/2012 8:00	2.1	-1.8	75	17	19.3	101.09
Rain,Fog	1/23/2012 18:00	0.0	-1.2	83	0	2.0	98.61
Rain,Haze	3/13/2012 7:00	4.0	1.0	81	7	4.0	100.50
Rain,Ice Pellets	12/18/2012 5:00	0.6	-0.6	92	24	9.7	100.12
Rain,Snow	1/10/2012 5:00	0.6	-1.7	81	13	2.4	98.18
Rain,Snow Grains	12/21/2012 0:00	1.9	-2.1	75	26	25.0	100.60
Rain,Snow,Fog	12/8/2012 21:00	0.8	0.3	96	9	6.4	100.73
Rain,Snow,Ice Pellets	12/21/2012 1:00	0.9	-0.7	88	17	4.8	99.85
Snow	1/10/2012 1:00	-16.7	-24.6	41	0	1.0	97.75
Snow Pellets	11/24/2012 15:00	0.7	-6.4	59	35	2.4	99.70
Snow Showers	1/12/2012 7:00	-13.3	-19.3	52	0	2.4	99.49
Snow Showers,Fog	12/26/2012 9:00	-11.3	-12.7	89	7	4.0	100.63
Snow,Blowing Snow	1/13/2012 21:00	-12.0	-16.2	70	24	0.6	98.11
Snow,Fog	12/16/2012 15:00	-10.1	-12.0	77	4	1.2	99.38
Snow,Haze	2/1/2012 17:00	-4.3	-7.2	80	0	4.0	100.61
Snow,Ice Pellets	12/10/2012 3:00	-4.3	-5.9	76	19	2.8	99.40
Thunderstorms	7/16/2012 1:00	21.6	19.4	67	0	24.1	99.84
Thunderstorms,Heavy Rain Showers	5/29/2012 6:00	10.9	9.0	88	9	2.4	100.26
Thunderstorms,Moderate Rain Showers,Fog	7/17/2012 6:00	19.6	18.5	93	15	3.2	100.01
Thunderstorms,Rain	5/25/2012 20:00	19.4	18.2	83	4	16.1	100.19
Thunderstorms,Rain Showers	5/29/2012 16:00	11.0	7.0	68	7	6.4	99.65

10:00							
Thunderstorms,Rain Showers,Fog	6/29/2012 3:00	19.5	16.1	80	7	9.7	99.71
Thunderstorms,Rain,Fog	7/17/2012 5:00	20.6	18.6	88	19	4.8	100.08

In [211...data.groupby("Weather").max()

		Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h	Visibility_km	Press_kPa
Weather								
	Clear	9/9/2012 5:00	32.8	20.4	99	33	48.3	103.63
	Cloudy	9/9/2012 23:00	30.5	22.6	99	54	48.3	103.65
	Drizzle	9/30/2012 3:00	18.8	17.7	96	30	25.0	101.56
	Drizzle,Fog	9/30/2012 2:00	19.9	19.1	100	28	9.7	102.07
	Drizzle,Ice Pellets,Fog	12/17/2012 9:00	0.4	-0.7	92	20	4.0	100.79
	Drizzle,Snow	12/19/2012 18:00	1.2	0.2	95	19	11.3	101.15
	Drizzle,Snow,Fog	12/22/2012 3:00	1.1	0.6	98	32	9.7	100.15
	Fog	9/22/2012 0:00	20.8	19.6	100	22	9.7	103.04
	Freezing Drizzle	2/1/2012 5:00	-2.3	-3.3	93	26	12.9	101.02
	Freezing Drizzle,Fog	12/10/2012 5:00	-0.3	-2.3	94	33	8.0	101.27
	Freezing Drizzle,Haze	2/1/2012 13:00	-5.0	-7.7	83	11	4.0	100.36
	Freezing Drizzle,Snow	3/2/2012 12:00	-3.3	-4.6	94	24	12.9	101.18
	Freezing Fog	3/17/2012 6:00	-0.1	-0.3	99	9	0.8	102.85
	Freezing Rain	2/1/2012 7:00	0.3	-1.7	92	28	16.1	101.00
	Freezing Rain,Fog	12/17/2012 1:00	0.1	-0.9	93	26	9.7	101.01
	Freezing Rain,Haze	2/1/2012 15:00	-4.9	-7.4	83	9	2.8	100.41
	Freezing Rain,Ice Pellets,Fog	12/17/2012 3:00	-2.6	-3.7	92	28	8.0	100.95
	Freezing Rain,Snow Grains	1/13/2012 9:00	-5.0	-7.3	84	32	4.8	98.56
	Haze	3/13/2012 23:00	14.1	11.1	86	17	9.7	102.97
	Mainly Clear	9/9/2012 9:00	33.0	21.2	99	63	48.3	103.59
	Moderate Rain,Fog	12/10/2012 8:00	1.7	0.8	94	17	6.4	99.98
	Moderate Snow	12/27/2012 9:00	-4.9	-6.7	93	39	0.8	100.67
	Moderate Snow,Blowing Snow	12/27/2012 12:00	-5.4	-6.4	93	41	0.6	100.64
	Mostly Cloudy	9/9/2012 2:00	32.4	24.4	100	83	48.3	103.65
	Rain	9/5/2012 2:00	22.8	20.4	99	52	48.3	102.26
	Rain Showers	9/8/2012 16:00	26.4	23.0	97	41	48.3	102.31
	Rain Showers,Fog	10/20/2012 3:00	12.8	12.1	96	13	6.4	99.83
	Rain Showers,Snow Showers	12/5/2012 10:00	2.2	-1.2	78	28	24.1	101.11
	Rain,Fog	9/30/2012 23:00	21.7	19.5	100	46	9.7	101.77
	Rain,Haze	3/13/2012 9:00	5.5	2.9	86	17	9.7	100.61

		0.00						
	Rain,Ice Pellets	12/18/2012 5:00	0.6	-0.6	92	24	9.7	100.12
	Rain,Snow	4/23/2012 3:00	1.7	0.5	94	52	25.0	101.07
	Rain,Snow Grains	12/21/2012 0:00	1.9	-2.1	75	26	25.0	100.60
	Rain,Snow,Fog	12/8/2012 21:00	0.8	0.3	96	9	6.4	100.73
	Rain,Snow,Ice Pellets	12/21/2012 5:00	1.3	0.1	94	28	6.4	100.47
	Snow	4/27/2012 9:00	3.7	0.3	96	57	25.0	102.73
	Snow Pellets	11/24/2012 15:00	0.7	-6.4	59	35	2.4	99.70
	Snow Showers	3/4/2012 21:00	2.9	-0.7	94	37	48.3	102.50
	Snow Showers,Fog	12/29/2012 13:00	-10.0	-11.1	92	22	9.7	102.52
	Snow,Blowing Snow	2/25/2012 9:00	-1.4	-2.9	91	48	9.7	100.62
	Snow,Fog	3/14/2012 19:00	1.1	0.8	99	35	9.7	102.07
	Snow,Haze	2/1/2012 21:00	-3.6	-6.4	81	15	6.4	100.99
	Snow,Ice Pellets	3/3/2012 4:00	0.8	-1.7	92	33	11.3	100.96
	Thunderstorms	7/4/2012 16:00	26.7	20.1	87	15	25.0	100.62
	Thunderstorms,Heavy Rain Showers	5/29/2012 6:00	10.9	9.0	88	9	2.4	100.26
	Thunderstorms,Moderate Rain Showers,Fog	7/17/2012 6:00	19.6	18.5	93	15	3.2	100.01
	Thunderstorms,Rain	7/23/2012 18:00	21.3	19.1	93	30	24.1	100.83
	Thunderstorms,Rain Showers	9/8/2012 4:00	25.5	23.1	98	32	25.0	101.06
	Thunderstorms,Rain Showers,Fog	7/31/2012 20:00	22.9	21.3	91	35	9.7	100.64
	Thunderstorms,Rain,Fog	7/17/2012 5:00	20.6	18.6	88	19	4.8	100.08

Q) 13.Show all the Records where Weather is Fog

In [215.. data[data['Weather']=='Fog']

Out[215..

	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h	Visibility_km	Press_kPa	Weather
0	1/1/2012 0:00	-1.8	-3.9	86	4	8.0	101.24	Fog
1	1/1/2012 1:00	-1.8	-3.7	87	4	8.0	101.24	Fog
4	1/1/2012 4:00	-1.5	-3.3	88	7	4.8	101.23	Fog
5	1/1/2012 5:00	-1.4	-3.3	87	9	6.4	101.27	Fog
6	1/1/2012 6:00	-1.5	-3.1	89	7	6.4	101.29	Fog
...	...	...	...	...	...	...	...	...
8716	12/29/2012 4:00	-16.0	-17.2	90	6	9.7	101.25	Fog
8717	12/29/2012 5:00	-14.8	-15.9	91	4	6.4	101.25	Fog
8718	12/29/2012 6:00	-13.8	-15.3	88	4	9.7	101.25	Fog
8719	12/29/2012 7:00	-14.8	-16.4	88	7	8.0	101.22	Fog
8722	12/29/2012 10:00	-12.0	-13.3	90	7	6.4	101.15	Fog

150 rows × 8 columns

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

In [219.. data[(data['Weather']=='Clear')|(data['Visibility\_km']>40)]

Out[219...

	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h	Visibility_km	Press_kPa	Weather
67	1/3/2012 19:00	-16.9	-24.8	50	24	25.0	101.74	Clear
106	1/5/2012 10:00	-6.0	-10.0	73	17	48.3	100.45	Mainly Clear
107	1/5/2012 11:00	-5.6	-10.2	70	22	48.3	100.41	Mainly Clear
108	1/5/2012 12:00	-4.7	-9.6	69	20	48.3	100.38	Mainly Clear
109	1/5/2012 13:00	-4.4	-9.7	66	26	48.3	100.40	Mainly Clear
...	...	...	...	...	...	...	...	...
8749	12/30/2012 13:00	-12.4	-16.2	73	37	48.3	100.92	Mostly Cloudy
8750	12/30/2012 14:00	-11.8	-16.1	70	37	48.3	100.96	Mainly Clear
8751	12/30/2012 15:00	-11.3	-15.6	70	32	48.3	101.05	Mainly Clear
8752	12/30/2012 16:00	-11.4	-15.5	72	26	48.3	101.15	Mainly Clear
8756	12/30/2012 20:00	-13.8	-16.5	80	24	25.0	101.52	Clear

3027 rows × 8 columns

Q) 15.Find all the instances when : a) 'Weather' is 'Clear' and'Relative Humidity is greater than 50' or b) 'Visibility is above 40'

In [224...

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

Out[224...

	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h	Visibility_km	Press_kPa	Weather
0	1/1/2012 0:00	-1.8	-3.9	86	4	8.0	101.24	Fog
1	1/1/2012 1:00	-1.8	-3.7	87	4	8.0	101.24	Fog

In [223...

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

Out[223...

	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h	Visibility_km	Press_kPa	Weather
114	1/5/2012 18:00	-7.1	-14.4	56	11	25.0	100.71	Clear
115	1/5/2012 19:00	-9.2	-15.4	61	7	25.0	100.80	Clear
116	1/5/2012 20:00	-9.8	-15.7	62	9	25.0	100.83	Clear
117	1/5/2012 21:00	-9.0	-14.8	63	13	25.0	100.83	Clear
241	1/11/2012 1:00	-10.7	-17.8	56	17	25.0	101.49	Clear
...	...	...	...	...	...	...	...	...
8646	12/26/2012 6:00	-13.4	-14.8	89	4	25.0	102.47	Clear
8698	12/28/2012 10:00	-6.1	-8.6	82	19	24.1	101.27	Clear
8713	12/29/2012 1:00	-11.9	-13.6	87	11	25.0	101.31	Clear
8714	12/29/2012 2:00	-11.8	-13.1	90	13	25.0	101.33	Clear
8756	12/30/2012 20:00	-13.8	-16.5	80	24	25.0	101.52	Clear

1220 rows × 8 columns

Visualizations

In [231...

```
import matplotlib.pyplot as plt
import seaborn as sns
# Convert 'Date/Time' to datetime format
data['Date/Time'] = pd.to_datetime(data['Date/Time'])

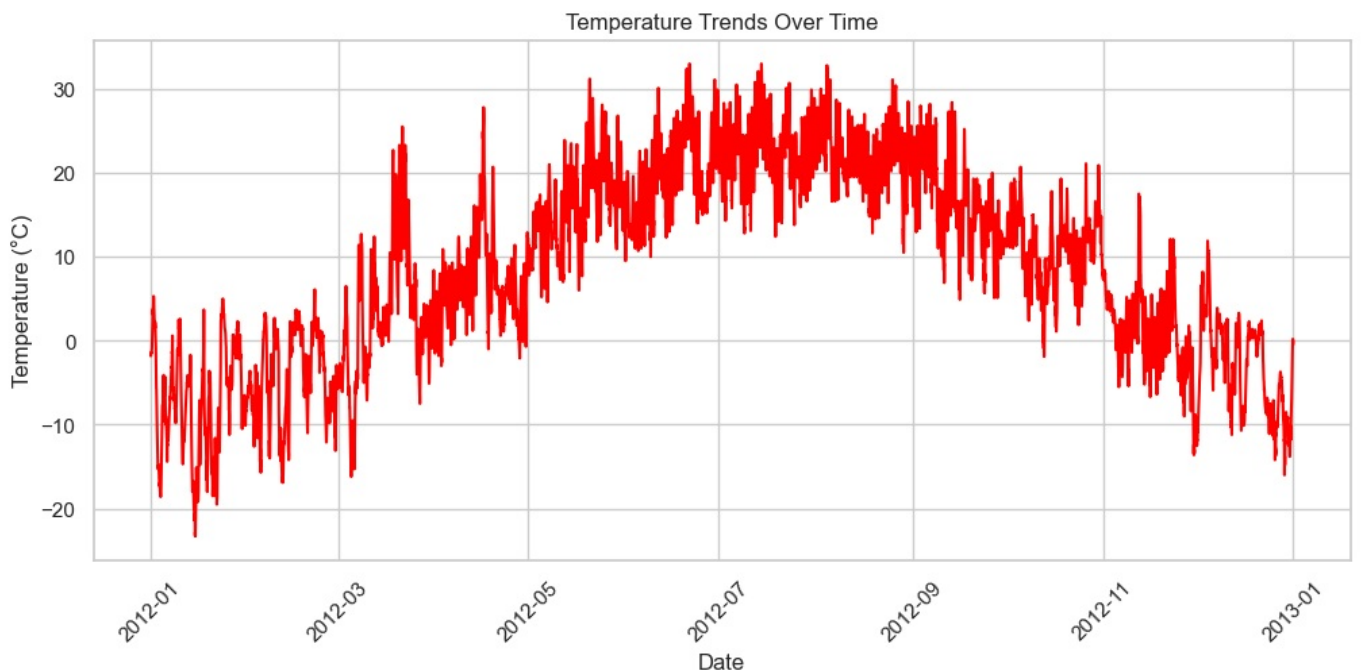
# Set seaborn style
sns.set(style="whitegrid")
```

1. Temperature Trends Over Time

In [234...

```
plt.figure(figsize=(12, 5))
sns.lineplot(x=data['Date/Time'], y=data['Temp_C'], color='red')
plt.title('Temperature Trends Over Time')
plt.xlabel('Date')
plt.ylabel('Temperature (°C)')
plt.xticks(rotation=45)
plt.show()
```

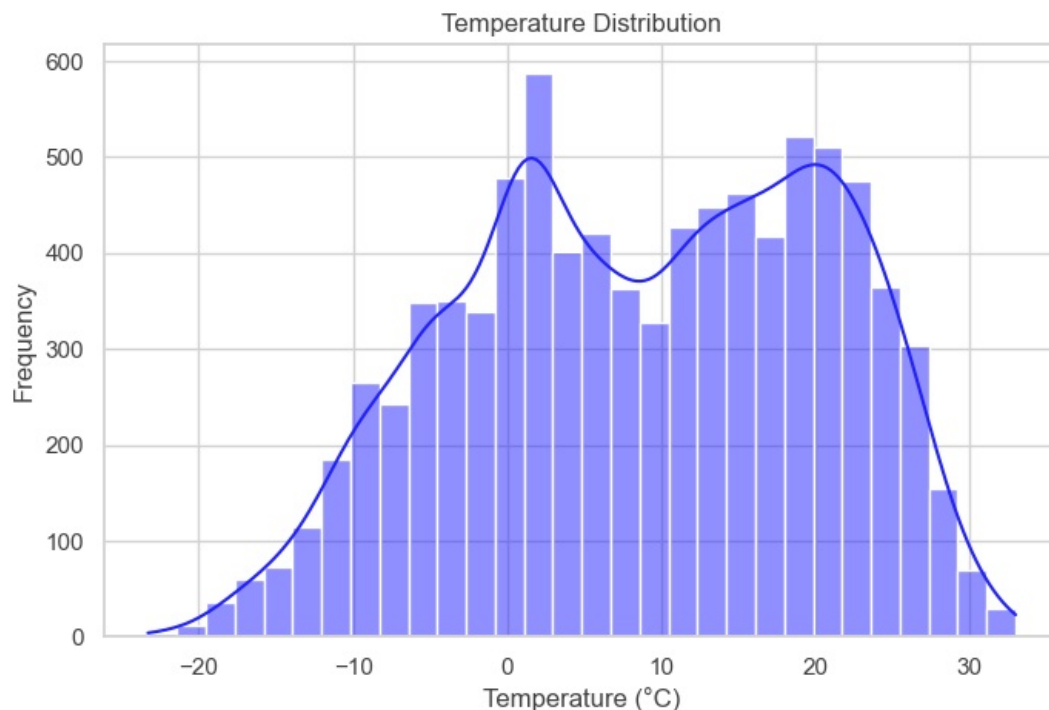




Interpretation : The temperature trend graph shows a clear seasonal pattern, with cold winters (January & December) dropping below -20°C and hot summers (June to August) peaking above 30°C. Temperature fluctuations are more pronounced in colder months, while summers exhibit a smoother trend. The gradual rise from winter to mid-year, followed by a steady decline, highlights the strong seasonal influence on temperature variations. This pattern suggests a typical annual climate cycle, which could be analyzed further for historical trends or climate change impacts.

## 2. Histogram of Temperature Distribution

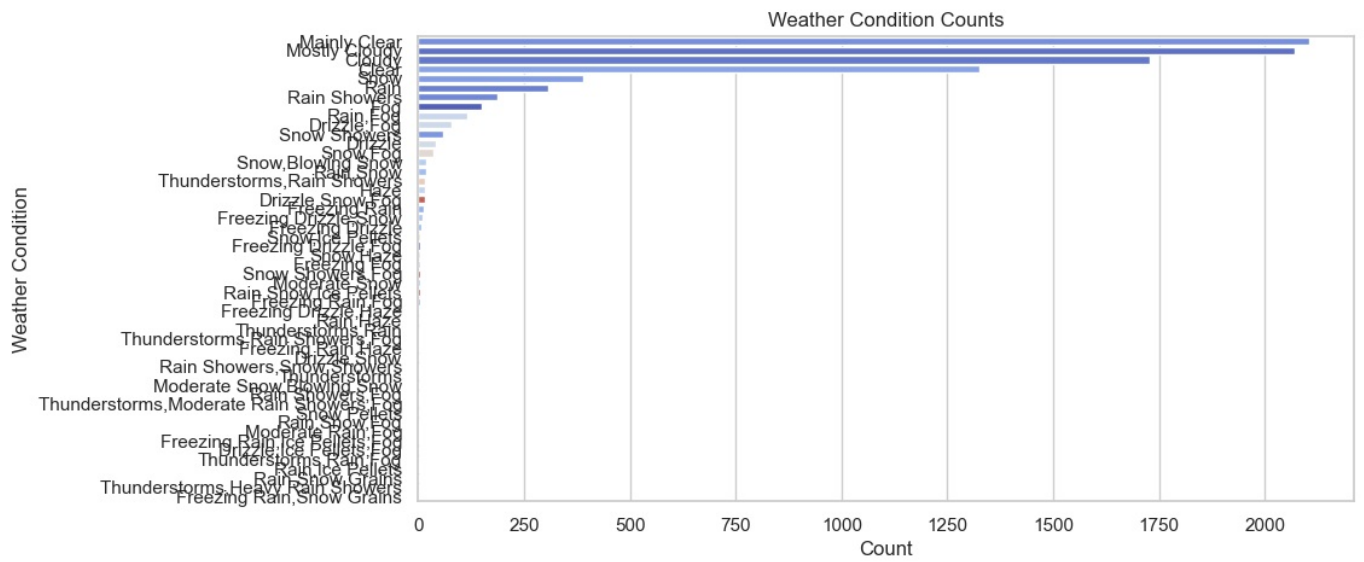
```
In [235]: plt.figure(figsize=(8, 5))
sns.histplot(data['Temp_C'], bins=30, kde=True, color='blue')
plt.title('Temperature Distribution')
plt.xlabel('Temperature (°C)')
plt.ylabel('Frequency')
plt.show()
```



Interpretation : "Temperature Distribution," displays a frequency distribution of temperatures ranging from -20°C to 30°C. The frequency axis indicates how often each temperature occurs, with a peak at 600 occurrences. This suggests that the most common temperature in the dataset is around the middle of this range.

## 3. Weather Condition Counts (Bar Chart)

```
In [240]: plt.figure(figsize=(10, 5))
sns.countplot(y=data['Weather'], hue=data['Weather'], order=data['Weather'].value_counts().index, palette='cool')
plt.title('Weather Condition Counts')
plt.xlabel('Count')
plt.ylabel('Weather Condition')
plt.show()
```



Interpretation : Weather Condition, shows counts of different weather conditions, with the counts ranging from 0 to 2000. The highest count reaches up to 1750-2000, indicating that certain weather conditions are significantly more prevalent than others. Together, these visualizations provide insights into the typical temperature ranges and the frequency of various weather conditions in the dataset.

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