The Weather Dataset

Here, The Weather Dataset is a time-series 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 a available as a CSV file. I am going to analyze this dataset using the Pandas DataFrame.

In [52]:

```
import pandas as pd
```

In [53]:

```
data = pd.read_csv(r'C:\Users\harsh\Desktop\Projects\Python\Weather Dataset Analysis\Wea
```

In [54]:

```
data
```

Out[54]:

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

8784 rows × 8 columns

In [55]:

```
data.head()
```

Out[55]:

	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 [56]:

```
data.shape
```

Out[56]:

```
(8784, 8)
```

In [57]:

```
data.index
```

Out[57]:

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

In [58]:

```
data.columns
```

Out[58]:

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

In [59]:

```
data.dtypes
```

Out[59]:

```
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 [60]:

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

Out[60]:

```
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 [61]:

```
data.nunique()
```

Out[61]:

```
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 [62]:

```
data.count()
```

Out[62]:

```
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
```

In [63]:

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

Out[63]:

```
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: Weather, dtype: int64
```

In [64]:

```
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
```

Q1) Find all the unique 'Wind Speed' values in the data.

In [65]:

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

Out[65]:

	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 [66]:

```
data.nunique()
```

Out[66]:

```
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 [67]:

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

Out[67]:

```
34
```

In [68]:

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

Out[68]:

```
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)
```

Q2) Find the number of times when the "Weather is exactly Clear".

In [69]:

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

Out[69]:

	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 [70]:

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

Out[70]:

```
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: Weather, dtype: int64
```

In [71]:

```
#Filtering
data[data['Weather'] == 'Clear']   #Answer
```

Out[71]:

	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 [72]:

```
#groupby
data.groupby('Weather').get_group('Clear')
```

Out[72]:

	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

Q3) Find the number of times when the "Wind Speed was exactly 4 km/h".

In [73]:

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

Out[73]:

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

474 rows × 8 columns

Q4) Find out all the null values in the data.

In [74]:

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

Out[74]:

```
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 [75]:

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

Out[75]:

```
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
```

Q5) Rename the column name 'Weather' of the dataframe to 'Weather Condition'.

In [76]:

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

In [77]:

```
data.head()
```

Out[77]:

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

Q6) What is the mean 'Visibility'?

In [78]:

```
data['Visibility_km'].mean()
```

Out[78]:

```
27.66444672131151
```

Q7) What is the Standard Deviation of 'Pressure' in this data?

In [79]:

```
data['Press_kPa'].std()
```

Out[79]:

```
0.8440047459486474
```

Q8) What is the Variance of 'Relative Humidity' in this data?

In [80]:

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

Out[80]:

```
286.2485501984998
```

Q9) Find all the instances when 'Snow' was recorded.

In [81]:

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

Out[81]:

```
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: Weather Condition, dtype: int64
```

In [82]:

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

Out[82]:

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

390 rows × 8 columns

In [83]:

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

Out[83]:

	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h	Visibility_km	Press_kPa	Weathe Conditic
41	1/2/2012 17:00	-2.1	-9.5	57	22	25.0	99.66	Sno Showe
44	1/2/2012 20:00	-5.6	-13.4	54	24	25.0	100.07	Sno Showe
45	1/2/2012 21:00	-5.8	-12.8	58	26	25.0	100.15	Sno Showe
47	1/2/2012 23:00	-7.4	-14.1	59	17	19.3	100.27	Sno Showe
48	1/3/2012 0:00	-9.0	-16.0	57	28	25.0	100.35	Sno Showe
...	...	...	...	...	...	...	...	
8779	12/31/2012 19:00	0.1	-2.7	81	30	9.7	100.13	Sno
8780	12/31/2012 20:00	0.2	-2.4	83	24	9.7	100.03	Sno
8781	12/31/2012 21:00	-0.5	-1.5	93	28	4.8	99.95	Sno
8782	12/31/2012 22:00	-0.2	-1.8	89	28	9.7	99.91	Sno
8783	12/31/2012 23:00	0.0	-2.1	86	30	11.3	99.89	Sno

583 rows × 8 columns

Q10) Find all the instances when 'Wind Speed is above 24' and 'Visibility is 25'.

In [84]:

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

Out[84]:

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

In [85]:

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

Out[85]:

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

308 rows × 8 columns

Q11) What is the mean value of each column against each 'Weather Condition'?

In [86]:

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

Out[86]:

Weather Condition	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h	Visibility_km	Press
Clear	6.825716	0.089367	64.497738	10.557315	30.153243	101.5
Cloudy	7.970544	2.375810	69.592593	16.127315	26.625752	100.9
Drizzle	7.353659	5.504878	88.243902	16.097561	17.931707	100.4
Drizzle,Fog	8.067500	7.033750	93.275000	11.862500	5.257500	100.7
Drizzle,Ice Pellets,Fog	0.400000	-0.700000	92.000000	20.000000	4.000000	100.7
Drizzle,Snow	1.050000	0.150000	93.500000	14.000000	10.500000	100.8
Drizzle,Snow,Fog	0.693333	0.120000	95.866667	15.533333	5.513333	99.2
Fog	4.303333	3.159333	92.286667	7.946667	6.248000	101.1
Freezing Drizzle	-5.657143	-8.000000	83.571429	16.571429	9.200000	100.2
Freezing Drizzle,Fog	-2.533333	-4.183333	88.500000	17.000000	5.266667	100.4
Freezing Drizzle,Haze	-5.433333	-8.000000	82.000000	10.333333	2.666667	100.3
Freezing Drizzle,Snow	-5.109091	-7.072727	86.090909	16.272727	5.872727	100.5
Freezing Fog	-7.575000	-9.250000	87.750000	4.750000	0.650000	102.3
Freezing Rain	-3.885714	-6.078571	84.642857	19.214286	8.242857	99.6
Freezing Rain,Fog	-2.225000	-3.750000	89.500000	15.500000	7.550000	99.9
Freezing Rain,Haze	-4.900000	-7.450000	82.500000	7.500000	2.400000	100.3
Freezing Rain,Ice Pellets,Fog	-2.600000	-3.700000	92.000000	28.000000	8.000000	100.9
Freezing Rain,Snow Grains	-5.000000	-7.300000	84.000000	32.000000	4.800000	98.5
Haze	-0.200000	-2.975000	81.625000	10.437500	7.831250	101.4
Mainly Clear	12.558927	4.581671	60.667142	14.144824	34.264862	101.2
Moderate Rain,Fog	1.700000	0.800000	94.000000	17.000000	6.400000	99.9
Moderate Snow	-5.525000	-7.250000	87.750000	33.750000	0.750000	100.2
Moderate Snow,Blowing Snow	-5.450000	-6.500000	92.500000	40.000000	0.600000	100.5
Mostly Cloudy	10.574287	3.131174	62.102465	15.813920	31.253842	101.0
Rain	9.786275	7.042810	83.624183	19.254902	18.856536	100.2
Rain Showers	13.722340	9.187766	75.159574	17.132979	22.816489	100.4
Rain Showers,Fog	12.800000	12.100000	96.000000	13.000000	6.400000	99.8
Rain Showers,Snow Showers	2.150000	-1.500000	76.500000	22.500000	21.700000	101.1
Rain,Fog	8.273276	7.219828	93.189655	14.793103	6.873276	100.5
Rain,Haze	4.633333	2.066667	83.333333	11.666667	6.700000	100.5
Rain,Ice Pellets	0.600000	-0.600000	92.000000	24.000000	9.700000	100.1
Rain,Snow	1.055556	-0.566667	89.000000	28.388889	11.672222	99.9
Rain,Snow Grains	1.900000	-2.100000	75.000000	26.000000	25.000000	100.6

Weather Condition	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h	Visibility_km	Press
Rain,Snow,Fog	0.800000	0.300000	96.000000	9.000000	6.400000	100.73
Rain,Snow,Ice Pellets	1.100000	-0.175000	91.500000	23.250000	6.000000	100.10
Snow	-4.524103	-7.623333	79.307692	20.038462	11.171795	100.53
Snow Pellets	0.700000	-6.400000	59.000000	35.000000	2.400000	99.70
Snow Showers	-3.506667	-7.866667	72.350000	19.233333	20.158333	100.96
Snow Showers,Fog	-10.675000	-11.900000	90.750000	13.750000	7.025000	101.29
Snow,Blowing Snow	-5.410526	-7.621053	84.473684	34.842105	4.105263	99.70
Snow,Fog	-5.075676	-6.364865	90.675676	17.324324	4.537838	100.68
Snow,Haze	-4.020000	-6.860000	80.600000	5.000000	4.640000	100.78
Snow,Ice Pellets	-1.883333	-3.666667	87.666667	23.833333	7.416667	100.54
Thunderstorms	24.150000	19.750000	77.000000	7.500000	24.550000	100.23
Thunderstorms,Heavy Rain Showers	10.900000	9.000000	88.000000	9.000000	2.400000	100.26
Thunderstorms,Moderate Rain Showers,Fog	19.600000	18.500000	93.000000	15.000000	3.200000	100.01
Thunderstorms,Rain	20.433333	18.533333	89.000000	15.666667	19.833333	100.42
Thunderstorms,Rain Showers	20.037500	17.618750	86.375000	18.312500	15.893750	100.23
Thunderstorms,Rain Showers,Fog	21.600000	18.700000	84.000000	19.666667	9.700000	100.06
Thunderstorms,Rain,Fog	20.500000	18.400000	88.000000	19.000000	4.800000	100.18

Q12) What is the minimum and maximum value of each column against each 'Weather Condition'?

In [87]:

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

Out[87]:

Weather Condition	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h	Visibility_km
Clear	1/11/2012 1:00	-23.3	-28.5	20	0	11.3
Cloudy	1/1/2012 17:00	-21.4	-26.8	18	0	11.3
Drizzle	1/23/2012 21:00	1.1	-0.2	74	0	6.4
Drizzle,Fog	1/23/2012 20:00	0.0	-1.6	85	0	1.0
Drizzle,Ice Pellets,Fog	12/17/2012 9:00	0.4	-0.7	92	20	4.0
Drizzle,Snow	12/17/2012 15:00	0.9	0.1	92	9	9.7
Drizzle,Snow,Fog	12/18/2012 21:00	0.3	-0.1	92	7	2.4
Fog	1/1/2012 0:00	-16.0	-17.2	80	0	0.2
Freezing Drizzle	1/13/2012 10:00	-9.0	-12.2	78	6	4.8
Freezing Drizzle,Fog	1/1/2012 2:00	-6.4	-9.0	82	6	3.6
Freezing Drizzle,Haze	2/1/2012 11:00	-5.8	-8.3	81	9	2.0
Freezing Drizzle,Snow	1/13/2012 3:00	-8.3	-10.4	79	6	2.4
Freezing Fog	1/22/2012 6:00	-19.0	-22.9	71	0	0.2
Freezing Rain	1/13/2012 11:00	-6.5	-9.0	81	7	2.8
Freezing Rain,Fog	1/17/2012 23:00	-6.1	-8.7	82	7	2.8
Freezing Rain,Haze	2/1/2012 14:00	-4.9	-7.5	82	6	2.0
Freezing Rain,Ice Pellets,Fog	12/17/2012 3:00	-2.6	-3.7	92	28	8.0
Freezing Rain,Snow Grains	1/13/2012 9:00	-5.0	-7.3	84	32	4.8
Haze	1/22/2012 12:00	-11.5	-16.0	68	0	4.8
Mainly Clear	1/10/2012 11:00	-22.8	-28.0	20	0	12.9
Moderate Rain,Fog	12/10/2012 8:00	1.7	0.8	94	17	6.4
Moderate Snow	1/12/2012 15:00	-6.3	-7.6	83	26	0.6

Weather Condition	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h	Visibility_km
Moderate Snow,Blowing Snow	12/27/2012 10:00	-5.5	-6.6	92	39	0.6
Mostly Cloudy	1/1/2012 16:00	-23.2	-28.5	18	0	11.3
Rain	1/1/2012 18:00	0.3	-5.7	40	0	4.0
Rain Showers	1/1/2012 22:00	1.6	-7.2	37	0	6.4
Rain Showers,Fog	10/20/2012 3:00	12.8	12.1	96	13	6.4
Rain Showers,Snow Showers	11/4/2012 8:00	2.1	-1.8	75	17	19.3
Rain,Fog	1/23/2012 18:00	0.0	-1.2	83	0	2.0
Rain,Haze	3/13/2012 7:00	4.0	1.0	81	7	4.0
Rain,Ice Pellets	12/18/2012 5:00	0.6	-0.6	92	24	9.7
Rain,Snow	1/10/2012 5:00	0.6	-1.7	81	13	2.4
Rain,Snow Grains	12/21/2012 0:00	1.9	-2.1	75	26	25.0
Rain,Snow,Fog	12/8/2012 21:00	0.8	0.3	96	9	6.4
Rain,Snow,Ice Pellets	12/21/2012 1:00	0.9	-0.7	88	17	4.8
Snow	1/10/2012 1:00	-16.7	-24.6	41	0	1.0
Snow Pellets	11/24/2012 15:00	0.7	-6.4	59	35	2.4
Snow Showers	1/12/2012 7:00	-13.3	-19.3	52	0	2.4
Snow Showers,Fog	12/26/2012 9:00	-11.3	-12.7	89	7	4.0
Snow,Blowing Snow	1/13/2012 21:00	-12.0	-16.2	70	24	0.6
Snow,Fog	12/16/2012 15:00	-10.1	-12.0	77	4	1.2
Snow,Haze	2/1/2012 17:00	-4.3	-7.2	80	0	4.0
Snow,Ice Pellets	12/10/2012 3:00	-4.3	-5.9	76	19	2.8
Thunderstorms	7/16/2012 1:00	21.6	19.4	67	0	24.1
Thunderstorms,Heavy Rain Showers	5/29/2012 6:00	10.9	9.0	88	9	2.4
Thunderstorms,Moderate Rain Showers,Fog	7/17/2012 6:00	19.6	18.5	93	15	3.2

Weather Condition	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h	Visibility_km
Thunderstorms,Rain	5/25/2012 20:00	19.4	18.2	83	4	16.1
Thunderstorms,Rain Showers	5/29/2012 16:00	11.0	7.0	68	7	6.4
Thunderstorms,Rain Showers,Fog	6/29/2012 3:00	19.5	16.1	80	7	9.7
Thunderstorms,Rain,Fog	7/17/2012 5:00	20.6	18.6	88	19	4.8

In [88]:

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

Out[88]:

Weather Condition	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h	Visibility_km
Clear	9/9/2012 5:00	32.8	20.4	99	33	48.3
Cloudy	9/9/2012 23:00	30.5	22.6	99	54	48.3
Drizzle	9/30/2012 3:00	18.8	17.7	96	30	25.0
Drizzle,Fog	9/30/2012 2:00	19.9	19.1	100	28	9.7
Drizzle,Ice Pellets,Fog	12/17/2012 9:00	0.4	-0.7	92	20	4.0
Drizzle,Snow	12/19/2012 18:00	1.2	0.2	95	19	11.3
Drizzle,Snow,Fog	12/22/2012 3:00	1.1	0.6	98	32	9.7
Fog	9/22/2012 0:00	20.8	19.6	100	22	9.7
Freezing Drizzle	2/1/2012 5:00	-2.3	-3.3	93	26	12.9
Freezing Drizzle,Fog	12/10/2012 5:00	-0.3	-2.3	94	33	8.0
Freezing Drizzle,Haze	2/1/2012 13:00	-5.0	-7.7	83	11	4.0
Freezing Drizzle,Snow	3/2/2012 12:00	-3.3	-4.6	94	24	12.9
Freezing Fog	3/17/2012 6:00	-0.1	-0.3	99	9	0.8
Freezing Rain	2/1/2012 7:00	0.3	-1.7	92	28	16.1
Freezing Rain,Fog	12/17/2012 1:00	0.1	-0.9	93	26	9.7
Freezing Rain,Haze	2/1/2012 15:00	-4.9	-7.4	83	9	2.8
Freezing Rain,Ice Pellets,Fog	12/17/2012 3:00	-2.6	-3.7	92	28	8.0
Freezing Rain,Snow Grains	1/13/2012 9:00	-5.0	-7.3	84	32	4.8
Haze	3/13/2012 23:00	14.1	11.1	86	17	9.7
Mainly Clear	9/9/2012 9:00	33.0	21.2	99	63	48.3
Moderate Rain,Fog	12/10/2012 8:00	1.7	0.8	94	17	6.4
Moderate Snow	12/27/2012 9:00	-4.9	-6.7	93	39	0.8

Weather Condition	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h	Visibility_km
Moderate Snow,Blowing Snow	12/27/2012 12:00	-5.4	-6.4	93	41	0.6
Mostly Cloudy	9/9/2012 2:00	32.4	24.4	100	83	48.3
Rain	9/5/2012 2:00	22.8	20.4	99	52	48.3
Rain Showers	9/8/2012 16:00	26.4	23.0	97	41	48.3
Rain Showers,Fog	10/20/2012 3:00	12.8	12.1	96	13	6.4
Rain Showers,Snow Showers	12/5/2012 10:00	2.2	-1.2	78	28	24.1
Rain,Fog	9/30/2012 23:00	21.7	19.5	100	46	9.7
Rain,Haze	3/13/2012 9:00	5.5	2.9	86	17	9.7
Rain,Ice Pellets	12/18/2012 5:00	0.6	-0.6	92	24	9.7
Rain,Snow	4/23/2012 3:00	1.7	0.5	94	52	25.0
Rain,Snow Grains	12/21/2012 0:00	1.9	-2.1	75	26	25.0
Rain,Snow,Fog	12/8/2012 21:00	0.8	0.3	96	9	6.4
Rain,Snow,Ice Pellets	12/21/2012 5:00	1.3	0.1	94	28	6.4
Snow	4/27/2012 9:00	3.7	0.3	96	57	25.0
Snow Pellets	11/24/2012 15:00	0.7	-6.4	59	35	2.4
Snow Showers	3/4/2012 21:00	2.9	-0.7	94	37	48.3
Snow Showers,Fog	12/29/2012 13:00	-10.0	-11.1	92	22	9.7
Snow,Blowing Snow	2/25/2012 9:00	-1.4	-2.9	91	48	9.7
Snow,Fog	3/14/2012 19:00	1.1	0.8	99	35	9.7
Snow,Haze	2/1/2012 21:00	-3.6	-6.4	81	15	6.4
Snow,Ice Pellets	3/3/2012 4:00	0.8	-1.7	92	33	11.3
Thunderstorms	7/4/2012 16:00	26.7	20.1	87	15	25.0
Thunderstorms,Heavy Rain Showers	5/29/2012 6:00	10.9	9.0	88	9	2.4
Thunderstorms,Moderate Rain Showers,Fog	7/17/2012 6:00	19.6	18.5	93	15	3.2

Weather Condition	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h	Visibility_km
Thunderstorms,Rain	7/23/2012 4:00	21.3	19.1	93	30	24.1
Thunderstorms,Rain Showers	9/8/2012 4:00	25.5	23.1	98	32	25.0
Thunderstorms,Rain Showers,Fog	7/31/2012 20:00	22.9	21.3	91	35	9.7
Thunderstorms,Rain,Fog	7/17/2012 5:00	20.6	18.6	88	19	4.8

Q13) Show all the records where Weather Condition is Fog.

In [89]:

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

Out[89]:

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

Q14) Find all instances when 'Weather is Clear' or 'Visibility is above 40'.

In [90]:

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

Out[90]:

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

In [91]:

```
data[(data['Weather Condition'] == "Clear") | (data['Visibility_km'] > 40)]
```

Out[91]:

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

3027 rows × 8 columns

Q15) Find all the instances when :

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

or

B. 'Visibility is above 40'

In [92]:

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

Out[92]:

	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h	Visibility_km	Press_kPa	Weathe Conditic
106	1/5/2012 10:00	-6.0	-10.0	73	17	48.3	100.45	Main Clea
107	1/5/2012 11:00	-5.6	-10.2	70	22	48.3	100.41	Main Clea
108	1/5/2012 12:00	-4.7	-9.6	69	20	48.3	100.38	Main Clea
109	1/5/2012 13:00	-4.4	-9.7	66	26	48.3	100.40	Main Clea
110	1/5/2012 14:00	-5.1	-10.7	65	22	48.3	100.46	Main Clea
...	...	...	...	...	...	...	...	
8749	12/30/2012 13:00	-12.4	-16.2	73	37	48.3	100.92	Most Cloud
8750	12/30/2012 14:00	-11.8	-16.1	70	37	48.3	100.96	Main Clea
8751	12/30/2012 15:00	-11.3	-15.6	70	32	48.3	101.05	Main Clea
8752	12/30/2012 16:00	-11.4	-15.5	72	26	48.3	101.15	Main Clea
8756	12/30/2012 20:00	-13.8	-16.5	80	24	25.0	101.52	Clea

2921 rows × 8 columns