Weather ditection

(A part of big Data Analysis)

The Weather dataset

Here. The Weather dataset is a time-seies data set with per hour information about the weather condiditon at a particular location Temperature. Dew point temperature Relative Humaiddty .Wind Speed Visiblity Pressure and Conditions. This data is avalable as csv file we are going to analyze this dataset using the Pandas DataFream.

In [2]:
```
import pandas as pd
```

In [10]:
```
data=pd.read_csv("1WeatherData.csv")
```

How to analyze DataFream ?

.head()

It shows the first N row in the data (by defult N=5)

In [11]:
```
data.head()
```

Out[11]:

	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

.Shape

It shows the tatal no. of rows and no. of columns of the datafream

In [14]:
```
data.shape
```

Out[14]:
```
(8784, 8)
```

.index

This attribute provides the index of the dataframe

In [17]:
```
data.index
```

Out[17]:
```
RangeIndex(start=0, stop=8784, step=1)
```

.columns

It shows the name of each columns

In [20]:
```
data.columns
```

Out[20]:
```
Index(['Date/Time', 'Temp_C', 'Dew Point Temp_C', 'Rel Hum_%',
       'Wind Speed_km/h', 'Visibility_km', 'Press_kPa', 'Weather'],
      dtype='object')
```

.datatypes

it shows the data type of each columns

In [24]:
```
data.dtypes
```

Out[24]:
```
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 value it can be applied on a single column only not on the datafreme

In [32]:
```
data["Weather"].unique()
```

Out[32]:
```
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)
```

.nuniquec()

it shows the tatal no. of uniquec value in each column it can be applied on a single column as well as on whole datafream

In [38]:
```
data["Weather"].nunique()
```

Out[38]:
```
50
```

In [37]:
```
data.nunique()
```

Out[37]:
```
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. non-null in each columns it can be applied on a single column as on whole datagream

In [42]:
```
data.count()
```

Out[42]:
```
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 value with ther count it can be applied on single column only

In [46]:
```
data["Weather"].value_counts()
```

Out[46]:
```
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
Haze                                          16
Thunderstorms,Rain Showers                    16
Drizzle,Snow,Fog                              15
Freezing Rain                                 14
Freezing Drizzle,Snow                         11
Freezing Drizzle                               7
Freezing Drizzle,Fog                           6
Snow,Ice Pellets                               6
Snow,Haze                                      5
Rain,Snow,Ice Pellets                          4
Freezing Rain,Fog                              4
Moderate Snow                                  4
Freezing Fog                                   4
Snow Showers,Fog                               4
Thunderstorms,Rain                             3
Freezing Drizzle,Haze                          3
Thunderstorms,Rain Showers,Fog                 3
Rain,Haze                                      3
Rain Showers,Snow Showers                      2
Freezing Rain,Haze                             2
Thunderstorms                                  2
Drizzle,Snow                                   2
Moderate Snow,Blowing Snow                     2
Thunderstorms,Heavy Rain Showers               1
Rain,Snow,Fog                                  1
Rain,Snow Grains                               1
Drizzle,Ice Pellets,Fog                        1
Snow Pellets                                   1
Freezing Rain,Ice Pellets,Fog                  1
Rain,Ice Pellets                               1
Rain Showers,Fog                               1
Moderate Rain,Fog                              1
Thunderstorms,Moderate Rain Showers,Fog        1
Thunderstorms,Rain,Fog                         1
Freezing Rain,Snow Grains                      1
Name: Weather, dtype: int64
```

.info()

provide the basic information about the datafream

In [50]:
```
#data.info
data.info()
```

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

Q) 1 Find the all unique value " Wind Speed "value in the data

In [63]:
```
data['Wind Speed_km/h'].nunique()
```

Out[63]:
```
34
```

In [64]:
```
data.nunique()
```

Out[64]:
```
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['Wind Speed_km/h'].unique()
```

Out[62]:
```
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 time when the Weather iss exactly clear.

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 [68]:
```
#value counts()
data.Weather.value_counts()
```

Out[68]:
```
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
Haze                                       16
Thunderstorms,Rain Showers                 16
Drizzle,Snow,Fog                           15
Freezing Rain                              14
Freezing Drizzle,Snow                      11
Freezing Drizzle                            7
Freezing Drizzle,Fog                        6
Snow,Ice Pellets                            6
Snow,Haze                                   5
Rain,Snow,Ice Pellets                       4
Freezing Rain,Fog                           4
Moderate Snow                               4
Freezing Fog                                4
Snow Showers,Fog                            4
Thunderstorms,Rain                          3
Freezing Drizzle,Haze                       3
Thunderstorms,Rain Showers,Fog              3
Rain,Haze                                   3
Rain Showers,Snow Showers                   2
Freezing Rain,Haze                          2
Thunderstorms                               2
Drizzle,Snow                                2
Moderate Snow,Blowing Snow                  2
Thunderstorms,Heavy Rain Showers            1
Rain,Snow,Fog                               1
Rain,Snow Grains                            1
Drizzle,Ice Pellets,Fog                     1
Snow Pellets                                1
Freezing Rain,Ice Pellets,Fog               1
Rain,Ice Pellets                            1
Rain Showers,Fog                            1
Moderate Rain,Fog                           1
Thunderstorms,Moderate Rain Showers,Fog     1
Thunderstorms,Rain,Fog                      1
Freezing Rain,Snow Grains                   1
Name: Weather, dtype: int64
```

In [74]:
```
#filtering
#data.head(1)
data[data.Weather=='Clear']
```

Out[74]:

	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 [75]:
```
#groupby()
data.groupby("Weather").get_group('Clear')
```

Out[75]:

	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/h"

In [77]:
```
data[data['Wind Speed_km/h']==4]
```

Out[77]:

	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 the all Null value in the data.

In [81]:
```
data.isnull().sum()
```

Out[81]:
```
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 [82]:
```
data.notnull().sum()
```

Out[82]:
```
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 datafream to "Weather"

In [85]:
```
data.head(2)
data.rename(columns={'Weather':'weather_conditon'},inplace=True)
```

In [86]:
```
data.head(2)
```

Out[86]:

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

Q) 6 What is the mean "Visibility"?

In [87]:
```
data.Visibility_km.mean()
```

Out[87]:
```
27.66444672131151
```

In [ ]:
```

```

Q) 7 What is the Standerd Deviation of "Pressure "in this data ?

In [88]:
```
data.Press_kPa.std()
```

Out[88]:
```
0.8440047459486474
```

In [89]:
```
data.head(3)
```

Out[89]:

	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h	Visibility_km	Press_kPa	weather_conditc
0	1/1/2012 0:00	-1.8	-3.9	86	4	8.0	101.24	Fc
1	1/1/2012 1:00	-1.8	-3.7	87	4	8.0	101.24	Fc
2	1/1/2012 2:00	-1.8	-3.4	89	7	4.0	101.26	Freezir Drizzle,Fc

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

In [90]:
```
data['Rel Hum_%'].var()
```

Out[90]: 286.2485501984998

Q) 9 Find all instances when snow was recorded.

In [95]:
```
#value counts
data['weather_conditon'].value_counts()
```

Out[95]:
```
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
Haze                                       16
Thunderstorms,Rain Showers                 16
Drizzle,Snow,Fog                           15
Freezing Rain                              14
Freezing Drizzle,Snow                      11
Freezing Drizzle                            7
Freezing Drizzle,Fog                        6
Snow,Ice Pellets                            6
Snow,Haze                                   5
Rain,Snow,Ice Pellets                       4
Freezing Rain,Fog                           4
Moderate Snow                               4
Freezing Fog                                4
Snow Showers,Fog                            4
Thunderstorms,Rain                          3
Freezing Drizzle,Haze                       3
Thunderstorms,Rain Showers,Fog              3
Rain,Haze                                   3
Rain Showers,Snow Showers                   2
Freezing Rain,Haze                          2
Thunderstorms                               2
Drizzle,Snow                                2
Moderate Snow,Blowing Snow                  2
Thunderstorms,Heavy Rain Showers            1
Rain,Snow,Fog                               1
Rain,Snow Grains                            1
Drizzle,Ice Pellets,Fog                     1
Snow Pellets                                1
Freezing Rain,Ice Pellets,Fog               1
Rain,Ice Pellets                            1
Rain Showers,Fog                            1
Moderate Rain,Fog                           1
Thunderstorms,Moderate Rain Showers,Fog     1
Thunderstorms,Rain,Fog                      1
Freezing Rain,Snow Grains                   1
Name: weather_conditon, dtype: int64
```

In [97]:
```
#filtring
data[data['weather_conditon']== 'Snow']
```

Out[97]:

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

390 rows × 8 columns

In [100]:
```
#str.contances
data[data['weather_conditon'].str.contains('Snow')]
```

Out[100]:

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

583 rows × 8 columns

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

In [115]:
```
data[(data['Wind Speed_km/h']>24) & (data['Visibility_km']==25)]
```

Out[115]:

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

308 rows × 8 columns

In [ ]:
```

```

Q) 11 What is the mean value of each column again each Weather condition?

In [120]:
```
data.groupby('weather_conditon').mean()
```

Out[120]:

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

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

In [ ]:

Q) 12 What is the minimum & maximum value of each column against each "Weather Condition"

In [121]:
```
data.groupby('weather_conditon').min()
```

Out[121]:

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

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

weather_conditon	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h	Visibility_km	Press_
Thunderstorms,Heavy Rain Showers	5/29/2012 6:00	10.9	9.0	88	9	2.4	10
Thunderstorms,Moderate Rain Showers,Fog	7/17/2012 6:00	19.6	18.5	93	15	3.2	10
Thunderstorms,Rain	5/25/2012 20:00	19.4	18.2	83	4	16.1	10
Thunderstorms,Rain Showers	5/29/2012 16:00	11.0	7.0	68	7	6.4	9
Thunderstorms,Rain Showers,Fog	6/29/2012 3:00	19.5	16.1	80	7	9.7	9
Thunderstorms,Rain,Fog	7/17/2012 5:00	20.6	18.6	88	19	4.8	10

In [122]:
```
data.groupby('weather_conditon').max()
```

Out[122]:

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

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

weather_conditon	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h	Visibility_km	Press_
Thunderstorms,Heavy Rain Showers	5/29/2012 6:00	10.9	9.0	88	9	2.4	10
Thunderstorms,Moderate Rain Showers,Fog	7/17/2012 6:00	19.6	18.5	93	15	3.2	10
Thunderstorms,Rain	7/23/2012 18:00	21.3	19.1	93	30	24.1	10
Thunderstorms,Rain Showers	9/8/2012 4:00	25.5	23.1	98	32	25.0	10
Thunderstorms,Rain Showers,Fog	7/31/2012 20:00	22.9	21.3	91	35	9.7	10
Thunderstorms,Rain,Fog	7/17/2012 5:00	20.6	18.6	88	19	4.8	10

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

In [125]:
```
data[data['weather_conditon']=='Fog']
```

Out[125]:

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

150 rows × 8 columns

In [ ]:

In [ ]:

Q) 14 Find the instances when 'weather is clear ' or visible is above 40

In [130]:
```
data[(data['weather_conditon']=='Clear')  | (data['Visibility_km']>40)]
```

Out[130]:

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

3027 rows × 8 columns

In [ ]:
```
```

Q) 15 Find all instances when ;

A. Weather is clear and relative humadity is greater than 50 or B. Visibility is above 40'

In [136]:
```
data[(data['weather_conditon']=='Clear') &  (data['Rel Hum_%']>50)]
```

Out[136]:

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

1070 rows × 8 columns

In [137]:
```
data[(data['weather_conditon']=='Clear') &  (data['Visibility_km']>40)]
```

Out[137]:

	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h	Visibility_km	Press_kPa	weather_cor
351	1/15/2012 15:00	-15.4	-22.8	53	24	48.3	102.71	
352	1/15/2012 16:00	-15.1	-22.8	52	24	48.3	102.79	
425	1/18/2012 17:00	-11.3	-18.8	54	26	48.3	101.54	
440	1/19/2012 8:00	-13.7	-18.4	68	19	48.3	101.84	
441	1/19/2012 9:00	-12.7	-17.2	69	17	48.3	101.73	
...	...	...	...	...	...	...	...	...
8384	12/15/2012 8:00	-10.7	-15.6	67	13	48.3	102.69	
8385	12/15/2012 9:00	-10.4	-15.9	64	19	48.3	102.74	
8389	12/15/2012 13:00	-8.4	-14.7	60	19	48.3	102.64	
8631	12/25/2012 15:00	-7.1	-13.7	59	17	48.3	101.98	
8632	12/25/2012 16:00	-7.5	-13.9	60	11	48.3	102.03	

313 rows × 8 columns

In [138]:
```
data[(data['weather_conditon']=='Clear') &  (data['Rel Hum_%']>50) | (data['Visibility_km']>40)]
```

Out[138]:

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

2921 rows × 8 columns

In [ ]:
```

```