

# The weather dataset

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

The data is available as a CSV file . We are going to analyze the dataset using the pandas Library

```
In [67]: import pandas as pd
```

```
In [68]: data=pd.read_csv(r"P:\analysis\1. Weather Data.csv")
```

```
In [69]: data.head()
```

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
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

## Analysing the dataSet

```
In [70]: data.shape
```

Out[70]: (8784, 8)

```
In [71]: data.index
```

```
Out[71]: RangeIndex(start=0, stop=8784, step=1)
```

```
In [72]: data.columns
```

```
Out[72]: Index(['Date/Time', 'Temp_C', 'Dew Point Temp_C', 'Rel Hum_%',  
              'Wind Speed_km/h', 'Visibility_km', 'Press_kPa', 'Weather'],  
              dtype='object')
```

```
In [73]: data.dtypes
```

```
Out[73]: 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 [74]: data['Weather'].unique()
```

```
Out[74]: 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 [75]: data.nunique() #Total number of unique values in each column
```

```
Out[75]: 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 [76]: data['Weather'].value_counts() #In a column it shows the unique values with the total count
```

```
Out[76]: 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 [77]: 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 [78]: data['Wind Speed\_km/h'].nunique()

Out[78]: 34

**Q2) Find the number of times when the 'Weather is exactly clear'.**

```
In [79]: # using value_counts  
data['Weather'].value_counts()
```

```
Out[79]: 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 [80]: # using filtering
data[data['Weather']=='Clear']

```

Out[80]:

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

1326 rows × 8 columns

```
In [81]: # using groupby
```

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

```
Out[81]:
```

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

Out[82]:

	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

### Q4) Rename the column name 'Weather' of the dataset to 'Weather Condition'

```
In [83]: data.rename(columns = {'Weather' : 'Weather Condition'},inplace = True)
```

```
In [84]: data
```

```
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
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

## Q5) What is the mean,sd,variance of 'visibility'

```
In [85]: data['Visibility_km'].mean()
```

```
Out[85]: 27.66444672131151
```

```
In [86]: data['Visibility_km'].std()
```

```
Out[86]: 12.62268824517152
```

```
In [87]: data['Visibility_km'].var()
```

```
Out[87]: 159.33225853479126
```

## Q6) Find all instances when 'Snow' was recorded

```
In [88]: data[data['Weather Condition']=='Snow']
```

```
Out[88]:
```

	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_kmh	Visibility_km	Press_kPa	Weather Condition
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

## Q7) Find all instances when 'Wind speed is above 24' and 'visibility is 25'.

```
In [89]: data[(data['Wind Speed_km/h'] > 24) & (data['Visibility_km'] == 25)]
```

Out[89]:

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

308 rows × 8 columns

**Q8) What is the minimum & Maximum value of each column against each 'Weather Condition' ?**

```
In [90]: data.groupby('Weather Condition').mean()
```

Out[90]:

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



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

	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h	Visibility_km	Press_kPa
Weather Condition						
Thunderstorms,Rain,Fog	20.600000	18.600000	88.000000	19.000000	4.800000	100.080000

**Q9) What is the min and max value of each column against each weather condition**

```
In [91]: data.groupby('Weather Condition').max()
```

Out[91]:

	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h	Visibility_km	Press_kPa
Weather Condition							
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

	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h	Visibility_km	Press_kPa
<b>Weather Condition</b>							
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
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

	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h	Visibility_km	Press_kPa
Weather Condition							
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

```
In [92]: data.groupby('Weather Condition').min()
```

Out[92]:

	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h	Visibility_km	Press_kPa
Weather Condition							
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



Weather Condition	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h	Visibility_km	Press_kPa
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

	Date/Time	Temp_C	Dew Point Temp_C	Rel Hum_%	Wind Speed_km/h	Visibility_km	Press_kPa	Weather Condition
	7/17/2012 6:00	19.6	18.5	93	15	3.2	100.01	Thunderstorms,Moderate Rain Showers,Fog
	5/25/2012 20:00	19.4	18.2	83	4	16.1	100.19	Thunderstorms,Rain
	5/29/2012 16:00	11.0	7.0	68	7	6.4	99.65	Thunderstorms,Rain Showers
	6/29/2012 3:00	19.5	16.1	80	7	9.7	99.71	Thunderstorms,Rain Showers,Fog
	7/17/2012 5:00	20.6	18.6	88	19	4.8	100.08	Thunderstorms,Rain,Fog

## Q10) Show all the records where Weather Condition is fog

```
In [93]: data[data['Weather Condition']=='Fog']
```

Out[93]:

	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
...	...	...	...	...	...	...	...	...
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

## Q11) Find all instances when 'Weather is clear' or 'Visibility is above 40'

```
In [94]: data[(data['Weather Condition'] == 'Clear') & (data['Visibility_km'] > 40 )]
```

Out[94]:

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

313 rows × 8 columns

## Q12) Find all instances when (weather is clear and relative humidity is greater than 50) or (visibility is above 40)

```
In [95]: data[(data['Weather Condition'] == 'Clear') & (data['Rel Hum_%'] > 50) | (data['Visibility_km'] > 40)]
```

Out[95]:

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

2921 rows × 8 columns