

```
In [1]: import numpy as np
import pandas as pd
import matplotlib.pyplot as plt

In [6]: data = pd.read_csv(r'C:\Users\prana\1. Weather Data.csv')
data

Out[6]:
   Date/Time  Temp_C  Dew Point Temp_C  Rel Hum_%  Wind Speed_kmh  Visibility_km  Press_kPa  Weather
0  1/1/2012 0:00    -1.8             -3.9        86             4             8.0      101.24    Fog
1  1/1/2012 1:00    -1.8             -3.7        87             4             8.0      101.24    Fog
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 x 8 columns

In [7]: #find all the unique wind speed values in dataset
data.nunique()

Out[7]:
Date/Time      8784
Temp_C         533
Dew Point Temp_C  489
Rel Hum_%      83
Wind Speed_kmh  34
Visibility_km    24
Press_kPa       518
Weather        58
dtype: int64

In [13]: #find the number of times when the weather is exactly clear
data.groupby('Weather').get_group('Clear')

Out[13]:
   Date/Time  Temp_C  Dew Point Temp_C  Rel Hum_%  Wind Speed_kmh  Visibility_km  Press_kPa  Weather
67  1/9/2012 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 x 8 columns

In [14]: # find the number of times when the speed is exactly 4 km/h
data.groupby('Wind Speed_kmh').get_group(4)

Out[14]:
   Date/Time  Temp_C  Dew Point Temp_C  Rel Hum_%  Wind Speed_kmh  Visibility_km  Press_kPa  Weather
0  1/1/2012 0:00    -1.8             -3.9        86             4             8.0      101.24    Fog
1  1/1/2012 1:00    -1.8             -3.7        87             4             8.0      101.24    Fog
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 x 8 columns

In [18]: # find all the null values in the data
data.isnull().sum()
data.notnull().sum()

Out[18]:
Date/Time      8784
Temp_C         8784
Dew Point Temp_C 8784
Rel Hum_%      8784
Wind Speed_kmh 8784
Visibility_km    8784
Press_kPa       8784
Weather        8784
dtype: int64

In [21]: # rename the coulmn name 'weather' of the dataframe to 'Weather Condition'.
data.rename(columns = {'weather': 'Weather condition'}, inplace = True)
data

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

8784 rows x 8 columns

In [23]: # mean of visibility
data.Visibility_km.mean()

Out[23]:
27.66444672131151

In [27]: # standard deviation of pressure in this data
data.Press_kPa.std()

Out[27]:
0.84498474559486474

In [29]: ## variance of relative Humidity in this data
data['Rel_Hum_%'].var()

Out[29]:
286.2485501984998

In [35]: # all instances when snow was recorded
data[data['Weather condition'].str.contains('Snow')]

Out[35]:
   Date/Time  Temp_C  Dew Point Temp_C  Rel Hum_%  Wind Speed_kmh  Visibility_km  Press_kPa  Weather condition
41  1/2/2012 17:00   -2.1             -9.5        57             22           25.0      99.66    Snow Showers
44  1/2/2012 20:00   -5.6            -13.4        54             24           25.0      100.07    Snow Showers
45  1/2/2012 21:00   -5.8            -12.8        58             26           25.0      100.15    Snow Showers
47  1/2/2012 23:00   -7.4            -14.1        59             17           19.3      100.27    Snow Showers
48  1/3/2012 0:00   -9.0            -16.0        57             28           25.0      100.35    Snow Showers
...
...
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

583 rows x 8 columns

In [39]: # all the instances when speed is above 24 and visibility is 25
data[(data['Wind Speed_kmh']>24) & (data['Visibility_km']==25)]

Out[39]:
   Date/Time  Temp_C  Dew Point Temp_C  Rel Hum_%  Wind Speed_kmh  Visibility_km  Press_kPa  Weather condition
23  1/1/2012 23:00    5.3             2.0        79             30           25.0      99.31    Cloudy
24  1/2/2012 0:00    5.2             1.5        77             35           25.0      99.26    Rain Showers
25  1/2/2012 1:00    4.6             0.0        72             39           25.0      99.26    Cloudy
26  1/2/2012 2:00    3.9             -0.9        71             32           25.0      99.26    Mostly Cloudy
27  1/2/2012 3:00    3.7             -1.5        69             33           25.0      99.30    Mostly Cloudy
...
...
8795 12/28/2012 17:00   -8.6            -12.0        76             26           25.0      101.34    Mainly Clear
8753 12/30/2012 19:00  -12.1            -15.8        74             28           25.0      101.26    Mainly Clear
8755 12/30/2012 19:00  -13.4            -16.5        77             26           25.0      101.47    Mainly Clear
8759 12/30/2012 23:00  -12.1            -15.1        78             28           25.0      101.52    Mostly Cloudy
8760 12/31/2012 0:00  -11.1            -14.4        77             26           25.0      101.51    Cloudy

308 rows x 8 columns

In [49]: # mean value of each column against 'Weather Condition'
data.head(2)

Out[49]:
   Date/Time  Temp_C  Dew Point Temp_C  Rel Hum_%  Wind Speed_kmh  Visibility_km  Press_kPa  Weather condition
0  1/1/2012 0:00    -1.8             -3.9        86             4             8.0      101.24    Fog
1  1/1/2012 1:00    -1.8             -3.7        87             4             8.0      101.24    Fog

In [44]: data.groupby('Weather condition').mean()

Out[44]:
   Date/Time  Temp_C  Dew Point Temp_C  Rel Hum_%  Wind Speed_kmh  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    3/1/2012 6:00   -0.1             -0.3        99             9              0.8      102.85
Freezing Rain   2/1/2012 7:00    0.3             -1.7        92             28           16.1      101.00
Freezing Rain,Fog  12/17/2012 1:00    0.1             -0.9        93             26             9.7      101.01
Freezing Rain,Haze  2/1/2012 15:00   -4.9             -7.4        83             9              2.8      100.41
Freezing Rain,Ice Pellets,Fog  12/17/2012 3:00   -2.6             -3.7        92             28             8.0      100.95
Freezing Rain,Snow Grains  1/13/2012 9:00   -5.0             -7.3        84             32             4.8      98.56
Haze          3/13/2012 23:00    14.1             11.1        86             17             9.7      102.97
Mainly Clear    9/9/2012 9:00    33.0             21.2        99             63            48.3      103.59
Moderate Rain,Fog  12/10/2012 8:00    1.7              0.8        94             17             6.4      99.98
Moderate Snow   12/27/2012 9:00   -4.9             -6.7        93             39             0.8      100.67
Moderate Snow,Blowing Snow  12/27/2012 12:00   -5.4             -6.4        93             41             0.6      100.64
Mostly Cloudy   9/9/2012 2:00    32.4             24.4       100             83            48.3      103.65
Rain           9/5/2012 2:00    22.8             20.4        99             52            48.3      102.26
Rain Showers    9/8/2012 16:00    26.4             23.0        97             41            48.3      102.31
Rain Showers,Fog  10/20/2012 3:00    12.8             12.1        96             13             6.4      99.83
Rain Showers,Snow Showers  12/5/2012 10:00    2.2             -1.2        78             28           24.1      101.11
Rain,Fog        9/30/2012 23:00    21.7             19.5       100             46             9.7      101.77
Rain,Haze       3/13/2012 9:00    5.5              2.9        86             17             9.7      100.61
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             -0.4        99             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  10/29/2012 15:00  -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  3/9/2012 4:00    0.8             -1.7        92             33            11.3      100.96
Thunderstorms  7/4/2012 16:00    26.7             20.1        87             15           25.0      100.62
Thunderstorms,Heavy Rain Showers  5/29/2012 6:00    10.9              9.0        88             9              2.4      100.26
Thunderstorms,Moderate Rain Showers,Fog  7/17/2012 6:00    19.6             18.5        93             15             3.2      100.01
Thunderstorms,Rain  7/23/2012 18:00    21.3             19.1        93             30           24.1      100.63
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 6:00    20.6             18.6        88             19             4.8      100.08

In [45]: data.groupby('Weather condition').min()

Out[45]:
   Date/Time  Temp_C  Dew Point Temp_C  Rel Hum_%  Wind Speed_kmh  Visibility_km  Press_kPa
Weather condition
Clear        1/1/2012 1:00   -23.3             -28.5        20              0             0      99.52
Cloudy       1/1/2012 17:00   -21.4             -26.8        18              0             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        78              0             0.2      98.31
Freezing Drizzle  1/13/2012 10:00   -9.0             -12.2        80              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  1/31/2012 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        92             36             0.6      100.80
Moderate Snow,Blowing Snow  12/27/2012 10:00   -5.5             -6.6        83             29             0.6      99.58
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             6.4      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           13.1      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           24.0      98.18
Rain,Snow Grains  12/21/2012 0:00    1.9             -2.1        75             26           25.0      100.60
Rain,Snow,Ice Pellets  12/21/2012 1:00    0.9             -0.7        88             17             4.8      99.85
Rain,Snow,Pellets  1/10/2012 1:00  -16.7            -24.6        41              0             1.0      97.75
Snow Pellets  11/24/2012 15:00    0.7             -0.4        99             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     2/13/2012 3:00   -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      99.60
Thunderstorms  7/16/2012 1:00    21.6             19.4        67              0           24.1      99.84
Thunderstorms,Heavy Rain Showers  5/29/2012 6:00    10.9              9.0        88              9             2.4      100.26
Thunderstorms,Moderate Rain Showers,Fog  7/17/2012 6:00    19.6             18.5        93             15             3.2      100.01
Thunderstorms,Rain  5/25/2012 20:00    19.4             18.2        83             14           16.1      100.19
Thunderstorms,Rain Showers  5/29/2012 16:00    11.0              7.0        68              7             6.4      99.65
Thunderstorms,Rain Showers,Fog  6/29/2012 3:00    20.5             16.1        80              7             9.7      100.71
Thunderstorms,Rain,Fog  7/17/2012 6:00    19.6             18.6        88              19             4.8      100.08

In [ ]:
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