**Report on Weather**

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

**Code:**

data["Wind Speed\_km/h"].unique()

**Output:**

array([ 9, 24, 26, 15, 4, 0, 19, 17, 11, 22, 35, 13, 20, 6, 7, 30, 32,

41, 39, 28, 44, 33, 37, 52, 46, 2, 50, 48, 57, 63, 43, 83, 70, 54],

dtype=int64)

**Report:**

In this data frame, we found the unique values in the column of "Wind Speed\_km/h" by using the unique().

1. **Find the number of times when the 'Weather is exactly Clear'.**

**Code:**

data.loc[data["Weather"]=="clear","Weather"].count()

**Output:**

0

**Report:**

In this data frame, we found the count, where the "Weather" column is having “Clear”. loc is used to get the rows for the given condition.

1. **Find the number of times when the 'Wind Speed was exactly 4 km/h'.**

**Code:**

data.loc[data["Wind Speed\_km/h"]==4].count()

**Output:**

Date/Time 474

Temp\_C 474

Dew Point Temp\_C 474

Rel Hum\_% 474

Wind Speed\_km/h 474

Visibility\_km 474

Press\_kPa 474

Weather 474

dtype: int64

**Report:**

In this data frame, we found that the column "Wind Speed\_km/h" is equal to 4, and loc is used to get all the rows of given condition.

1. **Find out all the Null Values in the data.**

**Code:**

data.isna().count()

**Output:**

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

**Report:**

In this data frame, we found that, is the data frame is having any null values by using is na() and to count the number of records we used count().In this data we don’t have any null values.

1. **Rename the column name 'Weather' of the dataframe to 'Weather Condition'.**

**Code:**

data.rename(columns={"Weather":"Weather condition"},inplace=True)

**Output:**

| **Date/Time** | **Temp\_C** | **Dew Point Temp\_C** | **Rel Hum\_%** | **Wind Speed\_km/h** | **Visibility\_km** | **Press\_kPa** | **Weather condition** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **0** | 01-01-2012 00:00 | -1.3 | -3.5 | 18 | 9 | 25.0 | 98.67 | Clear |
| **1** | 01-01-2012 01:00 | 7.4 | 2.8 | 20 | 24 | 24.1 | 99.37 | Rain |
| **2** | 01-01-2012 02:00 | 15.7 | 13.4 | 21 | 26 | 25.0 | 99.84 | Cloudy |
| **3** | 01-01-2012 03:00 | 4.9 | -2.6 | 27 | 15 | 24.1 | 100.94 | Mainly Clear |
| **4** | 01-01-2012 04:00 | -13.4 | -19.7 | 30 | 4 | 25.0 | 102.32 | Mostly Cloudy |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... |
| **8779** | 9/30/2012 5:00 | 1.4 | -3.7 | 97 | 22 | 48.3 | 100.16 | Cloudy |
| **8780** | 9/30/2012 6:00 | -4.6 | -9.5 | 98 | 11 | 48.3 | 101.46 | Mostly Cloudy |
| **8781** | 9/30/2012 7:00 | 1.5 | -6.3 | 99 | 30 | 24.1 | 101.48 | Clear |
| **8782** | 9/30/2012 8:00 | -6.3 | -13.5 | 99 | 15 | 24.1 | 101.90 | Cloudy |
| **8783** | 9/30/2012 9:00 | 24.5 | 14.7 | 100 | 11 | 25.0 | 102.98 | Mostly Cloudy |

8784 rows × 8 columns

**Report:**

In this data frame, we renamed the column "Weather" as "Weather condition" by using dictionary with the key word replace, It should be changed permanently we should use “inplace=True”.

1. **What is the mean 'Visibility' ?**

**Code:**

data["Visibility\_km"].mean()

**Output:**

27.66

**Report:**

In this data frame, we want to know the mean or average of the column "Visibility\_km", with the function mean()

1. **What is the Standard Deviation of 'Pressure' in this data?**

**Code:**

data["Press\_kPa"].std()

**Output:**

0.844

**Report:**

In this data frame, we want to know the standard deviation for the column "Press\_kPa" by using the function std().

1. **What is the Variance of 'Relative Humidity' in this data ?**

**Code:**

data["Rel Hum\_%"].var()

**Output:**

286.24

**Report:**

In this data frame, we want to know the variance for the column "Rel Hum\_%" by using the function var().

1. **Find all instances when 'Snow' was recorded.**

**Code:**

data.loc[data["Weather condition"]=="Snow"]

**Output:**

| **Date/Time** | **Temp\_C** | **Dew Point Temp\_C** | **Rel Hum\_%** | **Wind Speed\_km/h** | **Visibility\_km** | **Press\_kPa** | **Weather condition** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **11** | 01-01-2012 11:00 | -6.2 | -9.6 | 37 | 35 | 4.8 | 101.56 | Snow |
| **70** | 03-01-2012 22:00 | -4.0 | -6.6 | 62 | 22 | 16.1 | 100.48 | Snow |
| **73** | 04-01-2012 01:00 | 2.3 | -3.4 | 64 | 35 | 25.0 | 103.43 | Snow |
| **105** | 05-01-2012 09:00 | -1.8 | -4.2 | 73 | 15 | 6.4 | 101.28 | Snow |
| **112** | 05-01-2012 16:00 | 1.7 | -0.3 | 75 | 6 | 9.7 | 101.47 | Snow |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... |
| **8573** | 9/22/2012 13:00 | -6.0 | -10.2 | 82 | 19 | 16.1 | 101.71 | Snow |
| **8650** | 9/25/2012 18:00 | -4.6 | -6.6 | 52 | 4 | 12.9 | 100.48 | Snow |
| **8671** | 9/26/2012 15:00 | -5.9 | -10.5 | 60 | 13 | 16.1 | 101.01 | Snow |
| **8713** | 9/28/2012 1:00 | -5.2 | -7.8 | 72 | 33 | 4.0 | 101.33 | Snow |
| **8734** | 9/28/2012 8:00 | 0.7 | -1.2 | 79 | 30 | 8.0 | 101.22 | Snow |

390 rows × 8 columns

**Report:**

In this data frame, we found that the column "Weather condition" is having “Snow” ,we should get all the records for the above condition.

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

**Code:**

data.loc[(data["Wind Speed\_km/h"]==24)&(data["Visibility\_km"]==25)].value\_counts()

**Output:**

Date/Time Temp\_C Dew Point Temp\_C Rel Hum\_% Wind Speed\_km/h Visibility\_km Press\_kPa Weather condition

01-05-2012 15:00 15.4 13.3 59 24 25.0 100.85 Cloudy 1

6/16/2012 10:00 13.1 11.0 75 24 25.0 100.48 Rain Showers 1

5/29/2012 19:00 -11.9 -19.3 88 24 25.0 100.27 Mostly Cloudy 1

5/28/2012 18:00 -3.5 -7.9 83 24 25.0 100.19 Clear 1

5/21/2012 13:00 0.5 -7.2 78 24 25.0 100.24 Cloudy 1

..

1/20/2012 20:00 -13.8 -16.5 75 24 25.0 101.01 Clear 1

1/20/2012 1:00 -17.3 -25.4 71 24 25.0 101.27 Mainly Clear 1

09-11-2012 05:00 -1.9 -8.7 64 24 25.0 101.32 Mostly Cloudy 1

09-10-2012 02:00 -11.2 -18.1 83 24 25.0 99.32 Cloudy 1

9/28/2012 0:00 -9.0 -15.5 71 24 25.0 99.42 Mainly Clear 1

Length: 107, dtype: int64

**Report:**

In this data frame, we should have the "Wind Speed\_km/h" is 24 and "Visibility\_km" is 25. if the both the conditions are satisfied then we get all records of the data frame.

1. **What is the Mean value of each column against each 'Weather Condition ?**

**Code:**

g=data.groupby("Weather condition")

g[["Press\_kPa","Temp\_C","Rel Hum\_%","Wind Speed\_km/h","Visibility\_km","Temp\_C",]].mean()

**Output:**

|  | **Press\_kPa** | **Temp\_C** | **Rel Hum\_%** | **Wind Speed\_km/h** | **Visibility\_km** | **Temp\_C** |
| --- | --- | --- | --- | --- | --- | --- |
| **Weather condition** |  |  |  |  |  |  |
| **Clear** | 101.084495 | 6.825716 | 67.127451 | 10.557315 | 30.153243 | 6.825716 |
| **Cloudy** | 101.056852 | 7.970544 | 67.349537 | 16.127315 | 26.625752 | 7.970544 |
| **Drizzle** | 101.099268 | 7.353659 | 69.048780 | 16.097561 | 17.931707 | 7.353659 |
| **Drizzle,Fog** | 100.820750 | 8.067500 | 70.062500 | 11.862500 | 5.257500 | 8.067500 |
| **Drizzle,Ice Pellets,Fog** | 99.440000 | 0.400000 | 52.000000 | 20.000000 | 4.000000 | 0.400000 |
| **Drizzle,Snow** | 100.490000 | 1.050000 | 44.000000 | 14.000000 | 10.500000 | 1.050000 |
| **Drizzle,Snow,Fog** | 100.971333 | 0.693333 | 69.800000 | 15.533333 | 5.513333 | 0.693333 |
| **Fog** | 101.149400 | 4.303333 | 66.466667 | 7.946667 | 6.248000 | 4.303333 |
| **Freezing Drizzle** | 101.070000 | -5.657143 | 68.857143 | 16.571429 | 9.200000 | -5.657143 |
| **Freezing Drizzle,Fog** | 100.851667 | -2.533333 | 64.000000 | 17.000000 | 5.266667 | -2.533333 |
| **Freezing Drizzle,Haze** | 101.136667 | -5.433333 | 63.333333 | 10.333333 | 2.666667 | -5.433333 |
| **Freezing Drizzle,Snow** | 100.380909 | -5.109091 | 62.454545 | 16.272727 | 5.872727 | -5.109091 |
| **Freezing Fog** | 101.222500 | -7.575000 | 68.000000 | 4.750000 | 0.650000 | -7.575000 |
| **Freezing Rain** | 101.500714 | -3.885714 | 60.785714 | 19.214286 | 8.242857 | -3.885714 |
| **Freezing Rain,Fog** | 100.267500 | -2.225000 | 52.750000 | 15.500000 | 7.550000 | -2.225000 |
| **Freezing Rain,Haze** | 100.265000 | -4.900000 | 63.000000 | 7.500000 | 2.400000 | -4.900000 |
| **Freezing Rain,Ice Pellets,Fog** | 98.330000 | -2.600000 | 65.000000 | 28.000000 | 8.000000 | -2.600000 |
| **Freezing Rain,Snow Grains** | 102.520000 | -5.000000 | 92.000000 | 32.000000 | 4.800000 | -5.000000 |
| **Haze** | 100.805625 | -0.200000 | 69.625000 | 10.437500 | 7.831250 | -0.200000 |
| **Mainly Clear** | 101.040940 | 12.558927 | 68.020893 | 14.144824 | 34.264862 | 12.558927 |
| **Moderate Rain,Fog** | 100.450000 | 1.700000 | 89.000000 | 17.000000 | 6.400000 | 1.700000 |
| **Moderate Snow** | 100.760000 | -5.525000 | 67.500000 | 33.750000 | 0.750000 | -5.525000 |
| **Moderate Snow,Blowing Snow** | 102.215000 | -5.450000 | 81.500000 | 40.000000 | 0.600000 | -5.450000 |
| **Mostly Cloudy** | 101.051054 | 10.574287 | 67.214113 | 15.813920 | 31.253842 | 10.574287 |
| **Rain** | 101.051797 | 9.786275 | 67.614379 | 19.254902 | 18.856536 | 9.786275 |
| **Rain Showers** | 101.020106 | 13.722340 | 68.335106 | 17.132979 | 22.816489 | 13.722340 |
| **Rain Showers,Fog** | 99.800000 | 12.800000 | 31.000000 | 13.000000 | 6.400000 | 12.800000 |
| **Rain Showers,Snow Showers** | 101.080000 | 2.150000 | 68.500000 | 22.500000 | 21.700000 | 2.150000 |
| **Rain,Fog** | 100.991983 | 8.273276 | 66.818966 | 14.793103 | 6.873276 | 8.273276 |
| **Rain,Haze** | 100.716667 | 4.633333 | 57.666667 | 11.666667 | 6.700000 | 4.633333 |
| **Rain,Ice Pellets** | 101.880000 | 0.600000 | 54.000000 | 24.000000 | 9.700000 | 0.600000 |
| **Rain,Snow** | 100.895000 | 1.055556 | 66.944444 | 28.388889 | 11.672222 | 1.055556 |
| **Rain,Snow Grains** | 100.870000 | 1.900000 | 87.000000 | 26.000000 | 25.000000 | 1.900000 |
| **Rain,Snow,Fog** | 102.480000 | 0.800000 | 61.000000 | 9.000000 | 6.400000 | 0.800000 |
| **Rain,Snow,Ice Pellets** | 101.170000 | 1.100000 | 72.500000 | 23.250000 | 6.000000 | 1.100000 |
| **Snow** | 101.077205 | -4.524103 | 66.402564 | 20.038462 | 11.171795 | -4.524103 |
| **Snow Pellets** | 99.560000 | 0.700000 | 66.000000 | 35.000000 | 2.400000 | 0.700000 |
| **Snow Showers** | 100.999333 | -3.506667 | 65.600000 | 19.233333 | 20.158333 | -3.506667 |
| **Snow Showers,Fog** | 100.770000 | -10.675000 | 63.750000 | 13.750000 | 7.025000 | -10.675000 |
| **Snow,Blowing Snow** | 101.032105 | -5.410526 | 72.631579 | 34.842105 | 4.105263 | -5.410526 |
| **Snow,Fog** | 101.194865 | -5.075676 | 70.459459 | 17.324324 | 4.537838 | -5.075676 |
| **Snow,Haze** | 100.360000 | -4.020000 | 66.000000 | 5.000000 | 4.640000 | -4.020000 |
| **Snow,Ice Pellets** | 100.746667 | -1.883333 | 74.000000 | 23.833333 | 7.416667 | -1.883333 |
| **Thunderstorms** | 101.375000 | 24.150000 | 56.500000 | 7.500000 | 24.550000 | 24.150000 |
| **Thunderstorms,Heavy Rain Showers** | 101.400000 | 10.900000 | 82.000000 | 9.000000 | 2.400000 | 10.900000 |
| **Thunderstorms,Moderate Rain Showers,Fog** | 99.940000 | 19.600000 | 58.000000 | 15.000000 | 3.200000 | 19.600000 |
| **Thunderstorms,Rain** | 101.536667 | 20.433333 | 71.666667 | 15.666667 | 19.833333 | 20.433333 |
| **Thunderstorms,Rain Showers** | 100.976875 | 20.037500 | 68.437500 | 18.312500 | 15.893750 | 20.037500 |
| **Thunderstorms,Rain Showers,Fog** | 100.806667 | 21.600000 | 58.666667 | 19.666667 | 9.700000 | 21.600000 |
| **Thunderstorms,Rain,Fog** | 100.450000 | 20.600000 | 42.000000 | 19.000000 | 4.800000 | 20.600000 |

**Report:**

In this data frame, we found the mean of each column of the data frame by using groupby on the column of "Weather condition" each unique value acts as a group and perform the mean(). All the columns are given in list of list.

1. **What is the Minimum & Maximum value of each column against each 'Weather Condition ?**

**Code:**

g[["Press\_kPa","Temp\_C","Rel Hum\_%","Wind Speed\_km/h","Visibility\_km","Temp\_C",]].min()

g[["Press\_kPa","Temp\_C","Rel Hum\_%","Wind Speed\_km/h","Visibility\_km","Temp\_C",]].max()

**Output:**

Min()

|  | **Press\_kPa** | **Temp\_C** | **Rel Hum\_%** | **Wind Speed\_km/h** | **Visibility\_km** | **Temp\_C** |
| --- | --- | --- | --- | --- | --- | --- |
| **Weather condition** |  |  |  |  |  |  |
| **Clear** | 97.75 | -23.3 | 18 | 0 | 11.3 | -23.3 |
| **Cloudy** | 97.52 | -21.4 | 20 | 0 | 11.3 | -21.4 |
| **Drizzle** | 98.29 | 1.1 | 37 | 0 | 6.4 | 1.1 |
| **Drizzle,Fog** | 98.32 | 0.0 | 38 | 0 | 1.0 | 0.0 |
| **Drizzle,Ice Pellets,Fog** | 99.44 | 0.4 | 52 | 20 | 4.0 | 0.4 |
| **Drizzle,Snow** | 100.27 | 0.9 | 39 | 9 | 9.7 | 0.9 |
| **Drizzle,Snow,Fog** | 99.26 | 0.3 | 46 | 7 | 2.4 | 0.3 |
| **Fog** | 97.97 | -16.0 | 21 | 0 | 0.2 | -16.0 |
| **Freezing Drizzle** | 99.75 | -9.0 | 43 | 6 | 4.8 | -9.0 |
| **Freezing Drizzle,Fog** | 98.81 | -6.4 | 31 | 6 | 3.6 | -6.4 |
| **Freezing Drizzle,Haze** | 100.55 | -5.8 | 32 | 9 | 2.0 | -5.8 |
| **Freezing Drizzle,Snow** | 99.74 | -8.3 | 37 | 6 | 2.4 | -8.3 |
| **Freezing Fog** | 100.66 | -19.0 | 34 | 0 | 0.2 | -19.0 |
| **Freezing Rain** | 100.92 | -6.5 | 40 | 7 | 2.8 | -6.5 |
| **Freezing Rain,Fog** | 99.45 | -6.1 | 35 | 7 | 2.8 | -6.1 |
| **Freezing Rain,Haze** | 100.23 | -4.9 | 57 | 6 | 2.0 | -4.9 |
| **Freezing Rain,Ice Pellets,Fog** | 98.33 | -2.6 | 65 | 28 | 8.0 | -2.6 |
| **Freezing Rain,Snow Grains** | 102.52 | -5.0 | 92 | 32 | 4.8 | -5.0 |
| **Haze** | 99.27 | -11.5 | 37 | 0 | 4.8 | -11.5 |
| **Mainly Clear** | 97.84 | -22.8 | 20 | 0 | 12.9 | -22.8 |
| **Moderate Rain,Fog** | 100.45 | 1.7 | 89 | 17 | 6.4 | 1.7 |
| **Moderate Snow** | 99.93 | -6.3 | 29 | 26 | 0.6 | -6.3 |
| **Moderate Snow,Blowing Snow** | 101.97 | -5.5 | 67 | 39 | 0.6 | -5.5 |
| **Mostly Cloudy** | 97.56 | -23.2 | 18 | 0 | 11.3 | -23.2 |
| **Rain** | 98.06 | 0.3 | 20 | 0 | 4.0 | 0.3 |
| **Rain Showers** | 97.93 | 1.6 | 24 | 0 | 6.4 | 1.6 |
| **Rain Showers,Fog** | 99.80 | 12.8 | 31 | 13 | 6.4 | 12.8 |
| **Rain Showers,Snow Showers** | 100.54 | 2.1 | 67 | 17 | 19.3 | 2.1 |
| **Rain,Fog** | 98.70 | 0.0 | 23 | 0 | 2.0 | 0.0 |
| **Rain,Haze** | 99.89 | 4.0 | 40 | 7 | 4.0 | 4.0 |
| **Rain,Ice Pellets** | 101.88 | 0.6 | 54 | 24 | 9.7 | 0.6 |
| **Rain,Snow** | 100.03 | 0.6 | 31 | 13 | 2.4 | 0.6 |
| **Rain,Snow Grains** | 100.87 | 1.9 | 87 | 26 | 25.0 | 1.9 |
| **Rain,Snow,Fog** | 102.48 | 0.8 | 61 | 9 | 6.4 | 0.8 |
| **Rain,Snow,Ice Pellets** | 100.30 | 0.9 | 53 | 17 | 4.8 | 0.9 |
| **Snow** | 97.99 | -16.7 | 20 | 0 | 1.0 | -16.7 |
| **Snow Pellets** | 99.56 | 0.7 | 66 | 35 | 2.4 | 0.7 |
| **Snow Showers** | 99.09 | -13.3 | 31 | 0 | 2.4 | -13.3 |
| **Snow Showers,Fog** | 100.33 | -11.3 | 56 | 7 | 4.0 | -11.3 |
| **Snow,Blowing Snow** | 99.23 | -12.0 | 44 | 24 | 0.6 | -12.0 |
| **Snow,Fog** | 99.60 | -10.1 | 38 | 4 | 1.2 | -10.1 |
| **Snow,Haze** | 98.58 | -4.3 | 48 | 0 | 4.0 | -4.3 |
| **Snow,Ice Pellets** | 100.13 | -4.3 | 50 | 19 | 2.8 | -4.3 |
| **Thunderstorms** | 100.86 | 21.6 | 56 | 0 | 24.1 | 21.6 |
| **Thunderstorms,Heavy Rain Showers** | 101.40 | 10.9 | 82 | 9 | 2.4 | 10.9 |
| **Thunderstorms,Moderate Rain Showers,Fog** | 99.94 | 19.6 | 58 | 15 | 3.2 | 19.6 |
| **Thunderstorms,Rain** | 100.56 | 19.4 | 64 | 4 | 16.1 | 19.4 |
| **Thunderstorms,Rain Showers** | 99.40 | 11.0 | 44 | 7 | 6.4 | 11.0 |
| **Thunderstorms,Rain Showers,Fog** | 99.33 | 19.5 | 34 | 7 | 9.7 | 19.5 |
| **Thunderstorms,Rain,Fog** | 100.45 | 20.6 | 42 | 19 | 4.8 | 20.6 |

Max()

| **Press\_kPa** | **Temp\_C** | **Rel Hum\_%** | **Wind Speed\_km/h** | **Visibility\_km** | **Temp\_C** |
| --- | --- | --- | --- | --- | --- |
| **Weather condition** |  |  |  |  |  |  |
| **Clear** | 103.63 | 32.8 | 100 | 33 | 48.3 | 32.8 |
| **Cloudy** | 103.52 | 30.5 | 100 | 54 | 48.3 | 30.5 |
| **Drizzle** | 103.58 | 18.8 | 97 | 30 | 25.0 | 18.8 |
| **Drizzle,Fog** | 103.56 | 19.9 | 98 | 28 | 9.7 | 19.9 |
| **Drizzle,Ice Pellets,Fog** | 99.44 | 0.4 | 52 | 20 | 4.0 | 0.4 |
| **Drizzle,Snow** | 100.71 | 1.2 | 49 | 19 | 11.3 | 1.2 |
| **Drizzle,Snow,Fog** | 102.47 | 1.1 | 94 | 32 | 9.7 | 1.1 |
| **Fog** | 103.22 | 20.8 | 99 | 22 | 9.7 | 20.8 |
| **Freezing Drizzle** | 101.78 | -2.3 | 89 | 26 | 12.9 | -2.3 |
| **Freezing Drizzle,Fog** | 103.01 | -0.3 | 80 | 33 | 8.0 | -0.3 |
| **Freezing Drizzle,Haze** | 101.83 | -5.0 | 81 | 11 | 4.0 | -5.0 |
| **Freezing Drizzle,Snow** | 101.15 | -3.3 | 90 | 24 | 12.9 | -3.3 |
| **Freezing Fog** | 101.64 | -0.1 | 86 | 9 | 0.8 | -0.1 |
| **Freezing Rain** | 102.45 | 0.3 | 100 | 28 | 16.1 | 0.3 |
| **Freezing Rain,Fog** | 101.21 | 0.1 | 77 | 26 | 9.7 | 0.1 |
| **Freezing Rain,Haze** | 100.30 | -4.9 | 69 | 9 | 2.8 | -4.9 |
| **Freezing Rain,Ice Pellets,Fog** | 98.33 | -2.6 | 65 | 28 | 8.0 | -2.6 |
| **Freezing Rain,Snow Grains** | 102.52 | -5.0 | 92 | 32 | 4.8 | -5.0 |
| **Haze** | 103.29 | 14.1 | 98 | 17 | 9.7 | 14.1 |
| **Mainly Clear** | 103.65 | 33.0 | 100 | 63 | 48.3 | 33.0 |
| **Moderate Rain,Fog** | 100.45 | 1.7 | 89 | 17 | 6.4 | 1.7 |
| **Moderate Snow** | 101.96 | -4.9 | 85 | 39 | 0.8 | -4.9 |
| **Moderate Snow,Blowing Snow** | 102.46 | -5.4 | 96 | 41 | 0.6 | -5.4 |
| **Mostly Cloudy** | 103.63 | 32.4 | 100 | 83 | 48.3 | 32.4 |
| **Rain** | 103.59 | 22.8 | 97 | 52 | 48.3 | 22.8 |
| **Rain Showers** | 103.65 | 26.4 | 99 | 41 | 48.3 | 26.4 |
| **Rain Showers,Fog** | 99.80 | 12.8 | 31 | 13 | 6.4 | 12.8 |
| **Rain Showers,Snow Showers** | 101.62 | 2.2 | 70 | 28 | 24.1 | 2.2 |
| **Rain,Fog** | 102.71 | 21.7 | 93 | 46 | 9.7 | 21.7 |
| **Rain,Haze** | 101.52 | 5.5 | 75 | 17 | 9.7 | 5.5 |
| **Rain,Ice Pellets** | 101.88 | 0.6 | 54 | 24 | 9.7 | 0.6 |
| **Rain,Snow** | 102.21 | 1.7 | 93 | 52 | 25.0 | 1.7 |
| **Rain,Snow Grains** | 100.87 | 1.9 | 87 | 26 | 25.0 | 1.9 |
| **Rain,Snow,Fog** | 102.48 | 0.8 | 61 | 9 | 6.4 | 0.8 |
| **Rain,Snow,Ice Pellets** | 101.90 | 1.3 | 86 | 28 | 6.4 | 1.3 |
| **Snow** | 103.65 | 3.7 | 100 | 57 | 25.0 | 3.7 |
| **Snow Pellets** | 99.56 | 0.7 | 66 | 35 | 2.4 | 0.7 |
| **Snow Showers** | 102.45 | 2.9 | 95 | 37 | 48.3 | 2.9 |
| **Snow Showers,Fog** | 101.48 | -10.0 | 76 | 22 | 9.7 | -10.0 |
| **Snow,Blowing Snow** | 103.59 | -1.4 | 97 | 48 | 9.7 | -1.4 |
| **Snow,Fog** | 103.51 | 1.1 | 99 | 35 | 9.7 | 1.1 |
| **Snow,Haze** | 101.90 | -3.6 | 83 | 15 | 6.4 | -3.6 |
| **Snow,Ice Pellets** | 101.73 | 0.8 | 92 | 33 | 11.3 | 0.8 |
| **Thunderstorms** | 101.89 | 26.7 | 57 | 15 | 25.0 | 26.7 |
| **Thunderstorms,Heavy Rain Showers** | 101.40 | 10.9 | 82 | 9 | 2.4 | 10.9 |
| **Thunderstorms,Moderate Rain Showers,Fog** | 99.94 | 19.6 | 58 | 15 | 3.2 | 19.6 |
| **Thunderstorms,Rain** | 102.82 | 21.3 | 80 | 30 | 24.1 | 21.3 |
| **Thunderstorms,Rain Showers** | 102.55 | 25.5 | 95 | 32 | 25.0 | 25.5 |
| **Thunderstorms,Rain Showers,Fog** | 101.77 | 22.9 | 82 | 35 | 9.7 | 22.9 |
| **Thunderstorms,Rain,Fog** | 100.45 | 20.6 | 42 | 19 | 4.8 | 20.6 |

**Report:**

In this data frame, we found all minimum and maximum values of each column on each “Weather condition” by using groupby function.

1. **Show all the Records where Weather Condition is Fog.**

**Code:**

data.loc[data["Weather condition"]=="Fog"]

**Output:**

| **Date/Time** | **Temp\_C** | **Dew Point Temp\_C** | **Rel Hum\_%** | **Wind Speed\_km/h** | **Visibility\_km** | **Press\_kPa** | **Weather condition** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **13** | 01-01-2012 13:00 | 9.5 | 7.8 | 40 | 13 | 6.4 | 100.90 | Fog |
| **53** | 03-01-2012 05:00 | -3.6 | -4.3 | 57 | 7 | 9.7 | 101.32 | Fog |
| **136** | 06-01-2012 16:00 | 14.8 | 13.5 | 80 | 19 | 9.7 | 100.86 | Fog |
| **197** | 09-01-2012 05:00 | 2.1 | 0.7 | 43 | 11 | 8.0 | 101.44 | Fog |
| **278** | 12-01-2012 14:00 | 1.2 | 0.6 | 70 | 13 | 6.4 | 103.22 | Fog |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... |
| **8475** | 9/18/2012 11:00 | 6.2 | 5.4 | 56 | 7 | 4.8 | 102.03 | Fog |
| **8511** | 9/19/2012 22:00 | 15.7 | 15.4 | 66 | 7 | 8.0 | 101.93 | Fog |
| **8518** | 9/19/2012 8:00 | -2.9 | -4.5 | 68 | 6 | 6.4 | 100.41 | Fog |
| **8537** | 9/20/2012 3:00 | -0.5 | -2.1 | 74 | 7 | 4.0 | 100.81 | Fog |
| **8771** | 9/30/2012 19:00 | 12.8 | 12.2 | 91 | 19 | 4.8 | 100.60 | Fog |

150 rows × 8 columns

**Report:**

In this data frame, we show that the "Weather condition" is "Fog" , it shows all records of the data frame.

1. **Find all instances when 'Weather is Clear' or 'Visibility is above 40'.**

**Code:**

data.loc[(data["Weather condition"]=="clear")|(data["Visibility\_km"]>40)]

**Output:**

| **Date/Time** | **Temp\_C** | **Dew Point Temp\_C** | **Rel Hum\_%** | **Wind Speed\_km/h** | **Visibility\_km** | **Press\_kPa** | **Weather condition** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **9** | 01-01-2012 09:00 | 20.0 | 3.8 | 35 | 17 | 48.3 | 100.11 | Clear |
| **17** | 01-01-2012 17:00 | -6.8 | -9.8 | 42 | 20 | 48.3 | 100.76 | Mainly Clear |
| **18** | 01-01-2012 18:00 | 2.3 | -2.4 | 42 | 6 | 48.3 | 101.05 | Cloudy |
| **19** | 01-01-2012 19:00 | -12.7 | -17.2 | 43 | 17 | 48.3 | 101.16 | Clear |
| **23** | 01-01-2012 23:00 | 29.5 | 16.8 | 45 | 4 | 48.3 | 101.07 | Mainly Clear |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... |
| **8759** | 9/29/2012 9:00 | -2.1 | -10.9 | 86 | 24 | 48.3 | 101.41 | Mostly Cloudy |
| **8774** | 9/30/2012 21:00 | 23.0 | 14.7 | 92 | 13 | 48.3 | 101.93 | Mostly Cloudy |
| **8777** | 9/30/2012 3:00 | 9.3 | 5.8 | 95 | 9 | 48.3 | 101.25 | Mainly Clear |
| **8779** | 9/30/2012 5:00 | 1.4 | -3.7 | 97 | 22 | 48.3 | 100.16 | Cloudy |
| **8780** | 9/30/2012 6:00 | -4.6 | -9.5 | 98 | 11 | 48.3 | 101.46 | Mostly Cloudy |

2014 rows × 8 columns

**Report:**

In this data frame, we found that the "Weather condition" is "clear" or "Visibility\_km” is greater than 40 . In this any one condition is satisfied then we will get all the instance of the data frame.

**15) Find all instances when :**

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

**or**

**B. 'Visibility is above 40'**

**Code:**

data.loc[(data["Weather condition"]=="clear")&(data["Rel Hum\_%"]>50)|(data["Visibility\_km"]>40)]

**Output:**

|  | **Date/Time** | **Temp\_C** | **Dew Point Temp\_C** | **Rel Hum\_%** | **Wind Speed\_km/h** | **Visibility\_km** | **Press\_kPa** | **Weather condition** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **9** | 01-01-2012 09:00 | 20.0 | 3.8 | 35 | 17 | 48.3 | 100.11 | Clear |
| **17** | 01-01-2012 17:00 | -6.8 | -9.8 | 42 | 20 | 48.3 | 100.76 | Mainly Clear |
| **18** | 01-01-2012 18:00 | 2.3 | -2.4 | 42 | 6 | 48.3 | 101.05 | Cloudy |
| **19** | 01-01-2012 19:00 | -12.7 | -17.2 | 43 | 17 | 48.3 | 101.16 | Clear |
| **23** | 01-01-2012 23:00 | 29.5 | 16.8 | 45 | 4 | 48.3 | 101.07 | Mainly Clear |
| **...** | ... | ... | ... | ... | ... | ... | ... | ... |
| **8759** | 9/29/2012 9:00 | -2.1 | -10.9 | 86 | 24 | 48.3 | 101.41 | Mostly Cloudy |
| **8774** | 9/30/2012 21:00 | 23.0 | 14.7 | 92 | 13 | 48.3 | 101.93 | Mostly Cloudy |
| **8777** | 9/30/2012 3:00 | 9.3 | 5.8 | 95 | 9 | 48.3 | 101.25 | Mainly Clear |
| **8779** | 9/30/2012 5:00 | 1.4 | -3.7 | 97 | 22 | 48.3 | 100.16 | Cloudy |
| **8780** | 9/30/2012 6:00 | -4.6 | -9.5 | 98 | 11 | 48.3 | 101.46 | Mostly Cloudy |

2014 rows × 8 columns

**Report:**

In this data frame, we found that the "Weather condition" is "clear" and "Rel Hum\_%" is greater than 50 or "Visibility\_km" greater than 40. In the above code first it performs and operator and later or operator is performed.