Data visualisation lab 2

Made by: Paulius Lapienis

- Data set link: https://www.kaggle.com/datasets/sumanthvrao/daily-climate-time-series-data
- All of the tasks were performed using the Python programming language.

Task 1: Describing data types.

- The features used for the visualisations:
  - Time: Quantitative, Interval
  - Temperature: Qantitative, Interval
  - Humidity: Quantitative, Ratio
  - Wind: Quantitative, Ratio
  - Pressure: Quantitative, Ratio

In [ ]:
```
from labs.definitions import DATA_DIR
import pandas as pd

DATA_PATH = DATA_DIR / "DailyDelhiClimateTrain.csv"
df = pd.read_csv(DATA_PATH, parse_dates=["date"], index_col="date")
df
```

Out[ ]:

date	meantemp	humidity	wind_speed	meanpressure
2013-01-01	10.000000	84.500000	0.000000	1015.666667
2013-01-02	7.400000	92.000000	2.980000	1017.800000
2013-01-03	7.166667	87.000000	4.633333	1018.666667
2013-01-04	8.666667	71.333333	1.233333	1017.166667
2013-01-05	6.000000	86.833333	3.700000	1016.500000
...	...	...	...	...
2016-12-28	17.217391	68.043478	3.547826	1015.565217
2016-12-29	15.238095	87.857143	6.000000	1016.904762
2016-12-30	14.095238	89.666667	6.266667	1017.904762
2016-12-31	15.052632	87.000000	7.325000	1016.100000
2017-01-01	10.000000	100.000000	0.000000	1016.000000

1462 rows × 4 columns

Task 2: Statistcs (mean, min, max, etc. depending on the data types). Use box plots and other similar plots to illustrate it

The table below shows the statistics of the data set for each feature.

In [ ]:
```
df.describe()
```

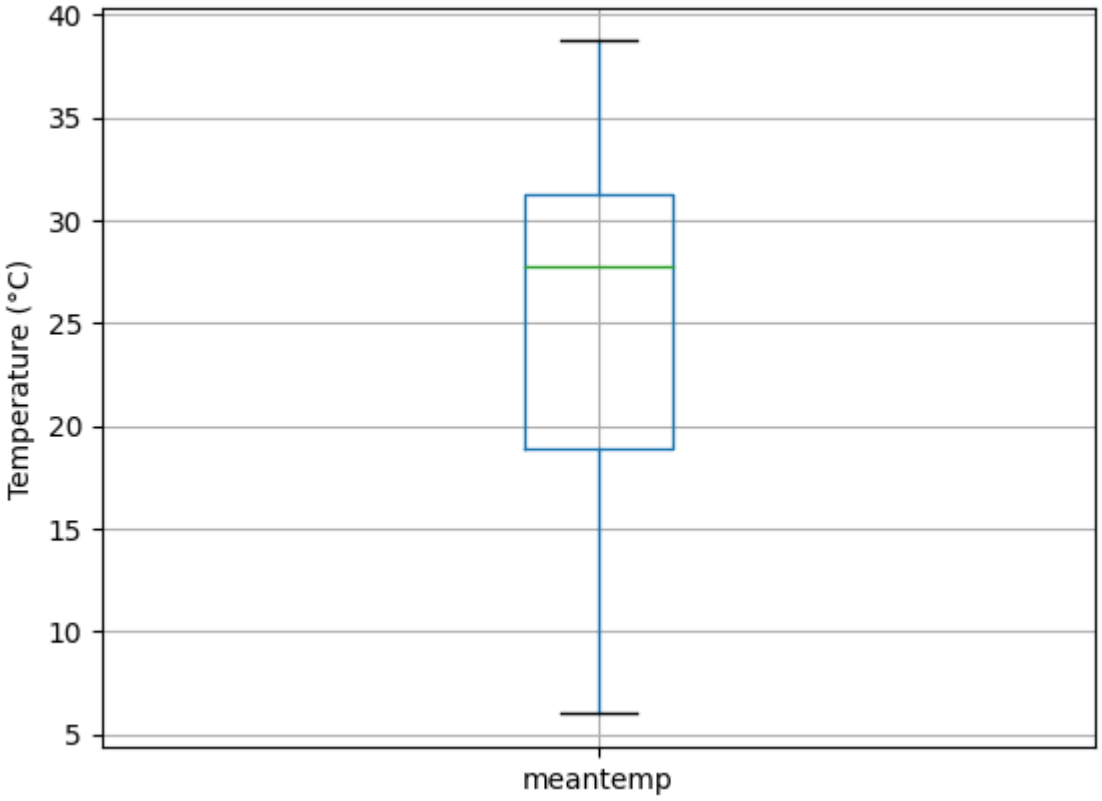
Out[ ]:

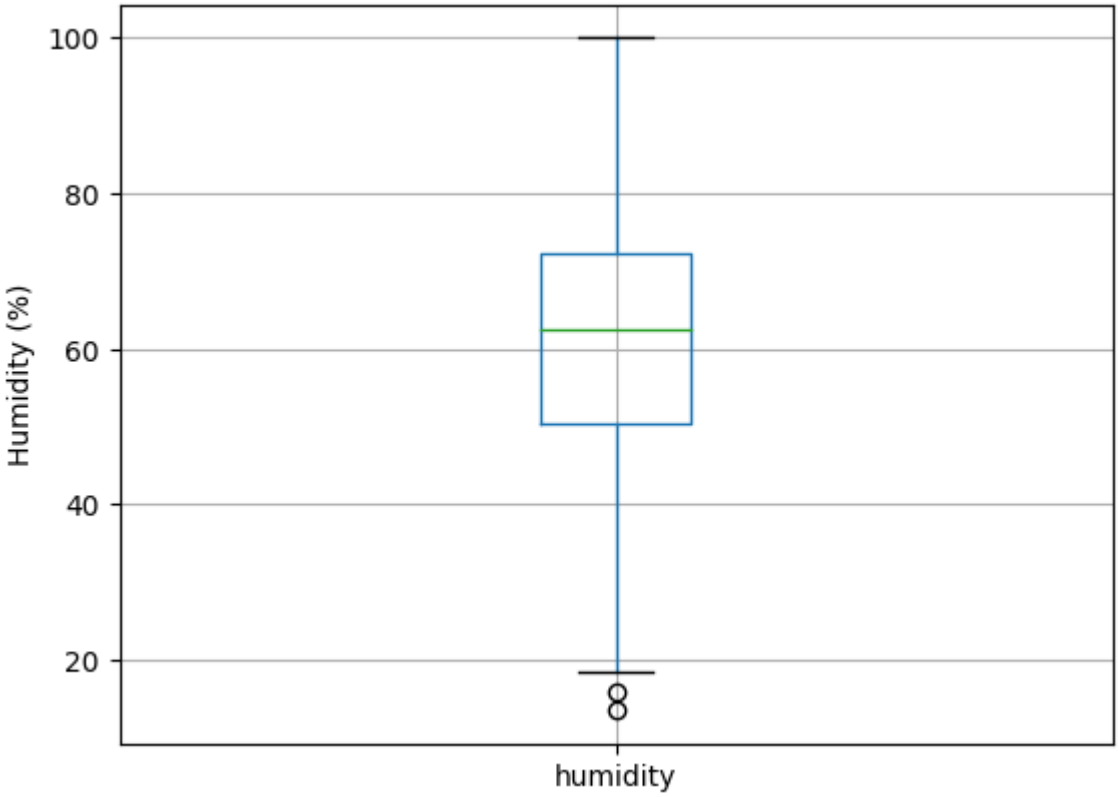
	meantemp	humidity	wind_speed	meanpressure
count	1462.000000	1462.000000	1462.000000	1462.000000
mean	25.495521	60.771702	6.802209	1011.104548
std	7.348103	16.769652	4.561602	180.231668
min	6.000000	13.428571	0.000000	-3.041667
25%	18.857143	50.375000	3.475000	1001.580357
50%	27.714286	62.625000	6.221667	1008.563492
75%	31.305804	72.218750	9.238235	1014.944901
max	38.714286	100.000000	42.220000	7679.333333

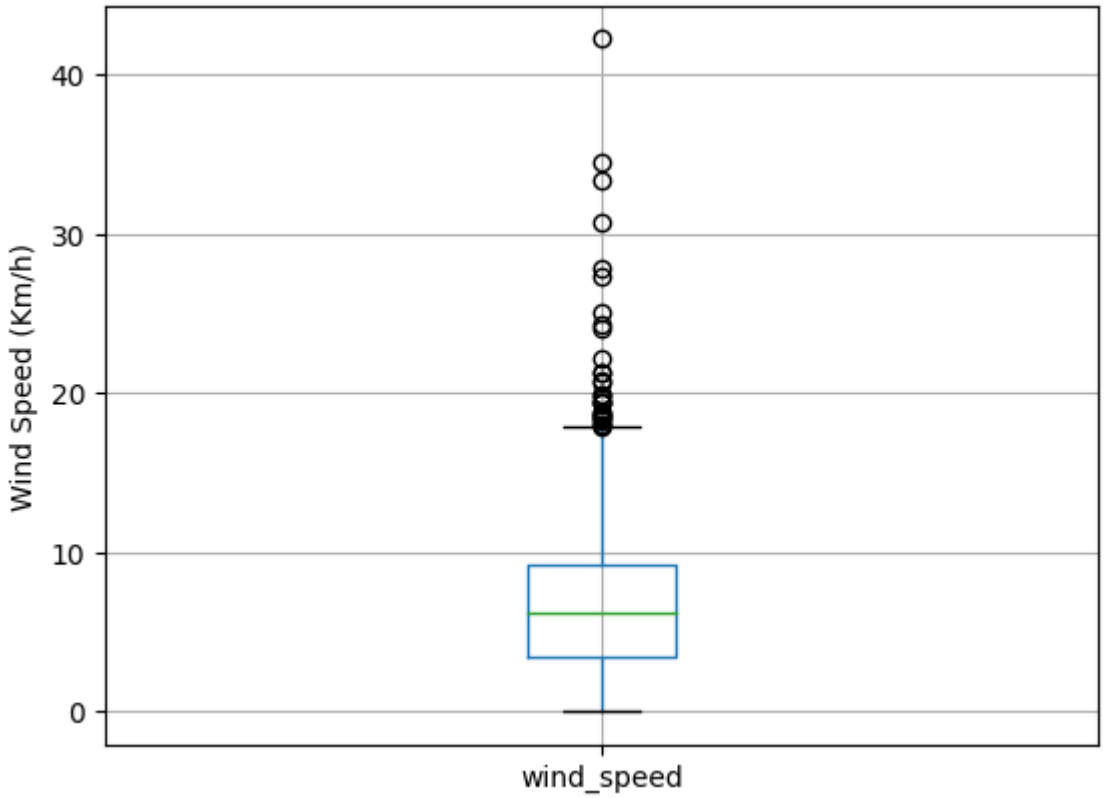
Bellow are the box plots for each of the features. The box plots show the distribution of the data, the median, the interquartile range, the minimum and maximum values, and the outliers. Wind speed and pressure have the most outliers, with pressure having the highest outlier.

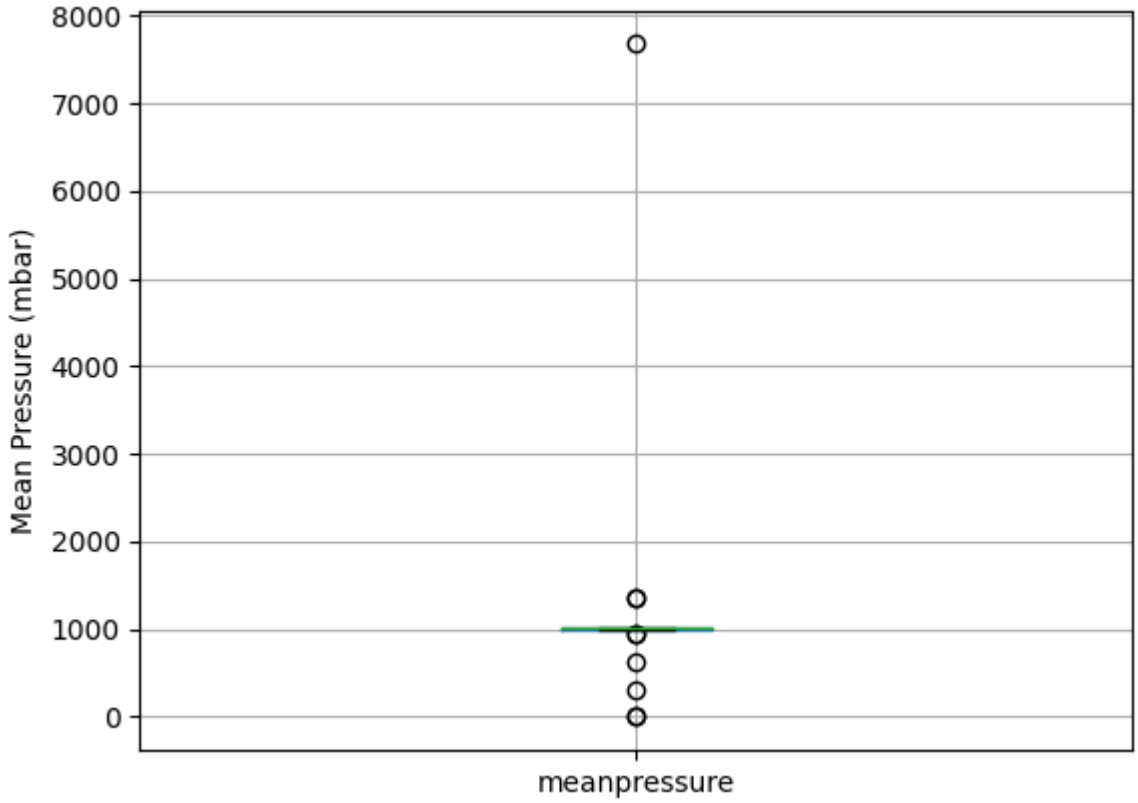
In [ ]:
```
import matplotlib.pyplot as plt

for column in df:
    match column:
        case "meantemp":
            plt.figure()
            ax = df.boxplot([column])
            ax.set_ylabel("Temperature (°C)")
        case "humidity":
            plt.figure()
            ax = df.boxplot([column])
            ax.set_ylabel("Humidity (%)")
        case "wind_speed":
            plt.figure()
            ax = df.boxplot([column])
            ax.set_ylabel("Wind Speed (Km/h)")
        case "meanpressure":
            plt.figure()
            ax = df.boxplot([column])
            ax.set_ylabel("Mean Pressure (mbar)")
```


Temperature (°C)
40
35
30
25
20
15
10
5
meantemp


Humidity (%)
100
80
60
40
20
humidity

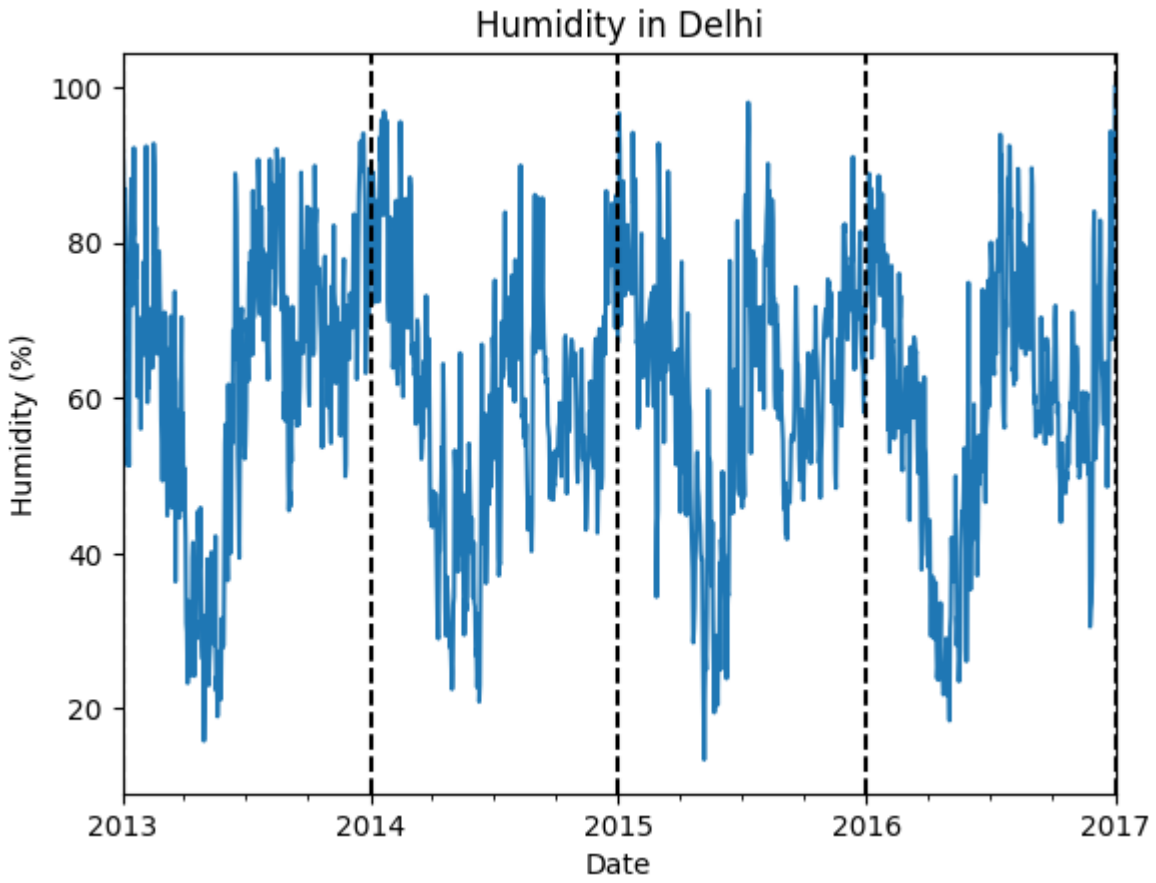




Task 3: Create basic visualizations of your data.

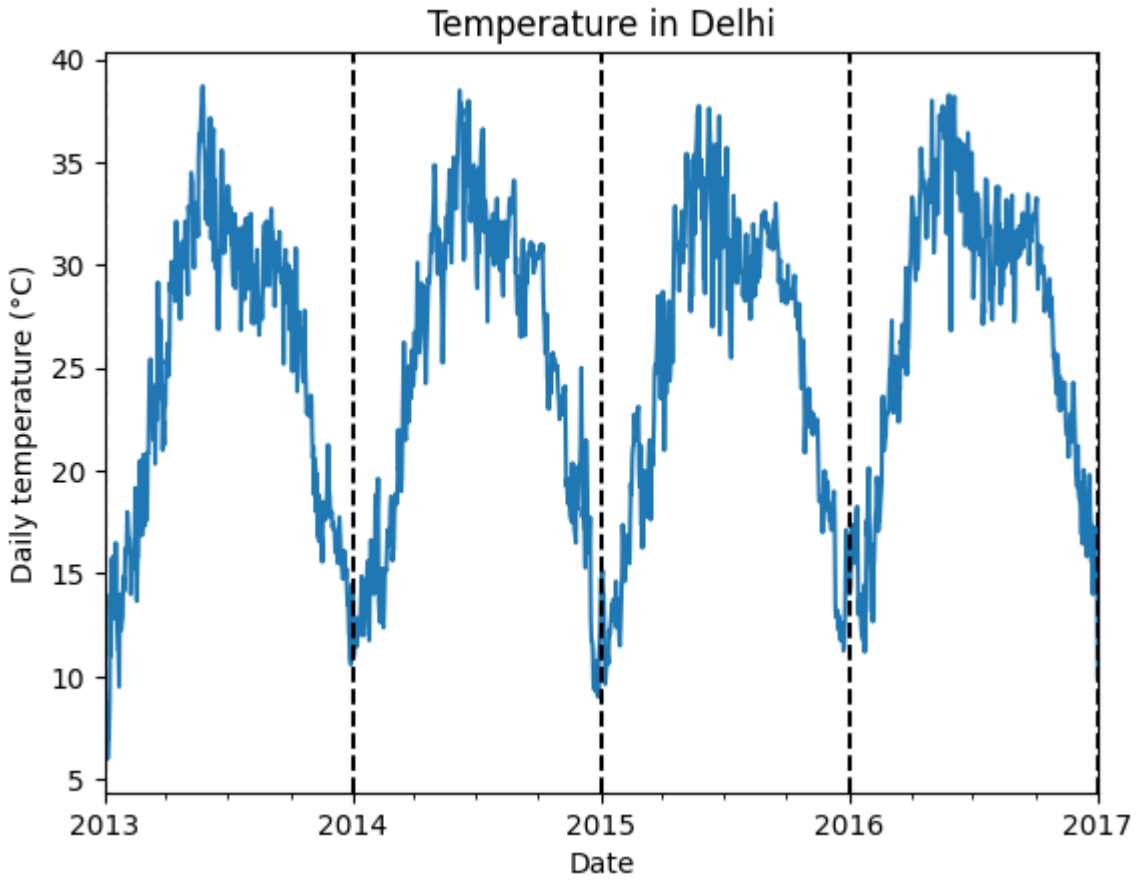
Bellow is the timeseries graph for humidity. Each vertical line represents the first day of the year.

In [ ]:
```
ax = df['humidity'].plot()
ax.set_ylabel("Humidity (%)")
ax.set_xlabel("Date")
ax.set_title("Humidity in Delhi")
xcoords = ['2013-01-01', '2014-01-01','2015-01-01', '2016-01-01', '2017-01-0
for xc in xcoords:
    plt.axvline(x=xc, color='black', linestyle='--')
```



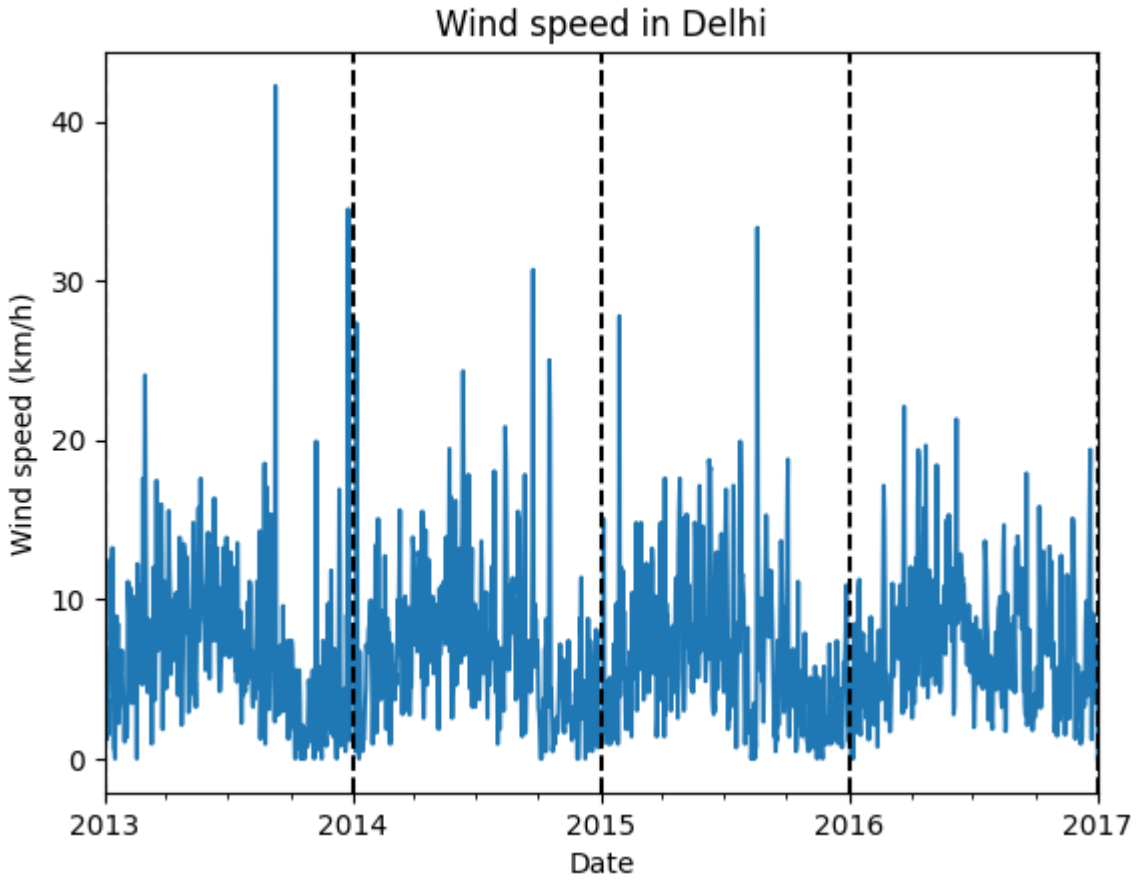
Bellow is the timeseries graph for Temperature. Each vertical line represents the first day of the year.

In [ ]:
```
ax = df['meantemp'].plot()
ax.set_ylabel("Daily temperature (°C)")
ax.set_xlabel("Date")
ax.set_title("Temperature in Delhi")
xcoords = ['2013-01-01', '2014-01-01','2015-01-01', '2016-01-01', '2017-01-0
for xc in xcoords:
    plt.axvline(x=xc, color='black', linestyle='--')
```



Bellow is the timeseries graph for Wind speed. Each vertical line represents the first day of the year.

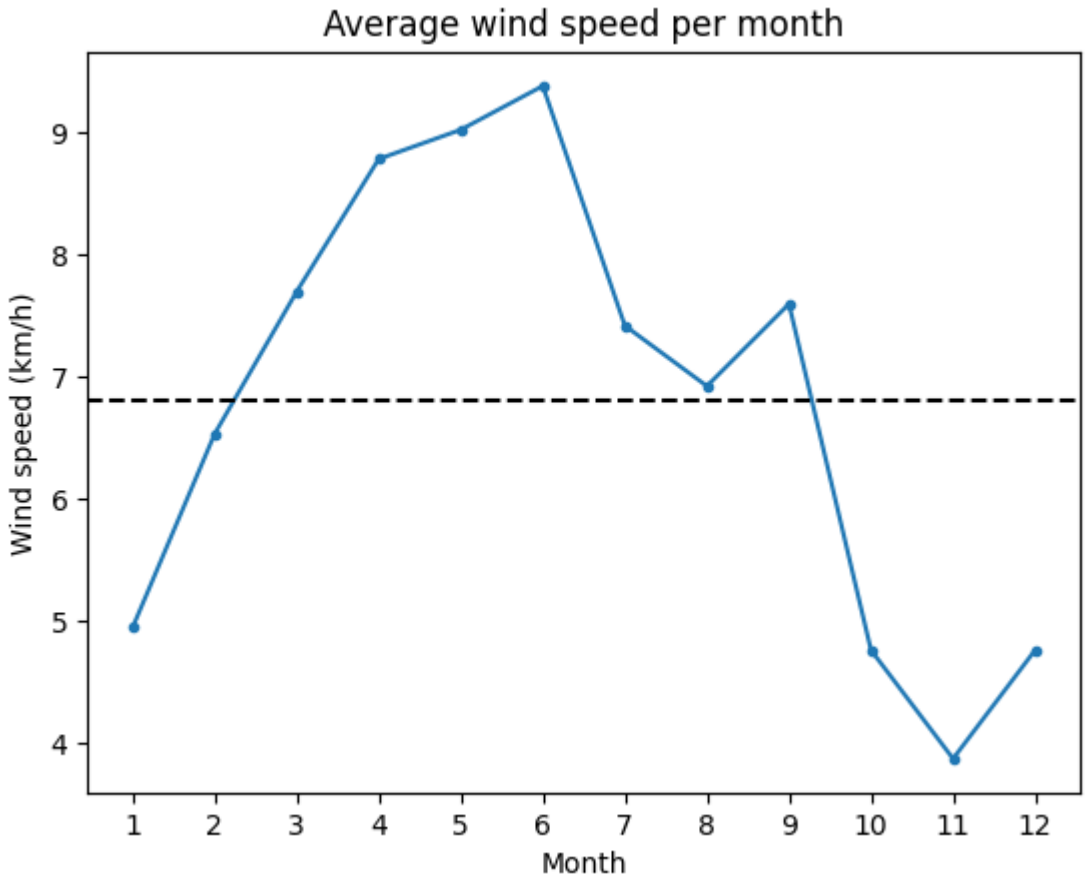
In [ ]:
```
ax = df['wind_speed'].plot()
ax.set_ylabel("Wind speed (km/h)")
ax.set_xlabel("Date")
ax.set_title("Wind speed in Delhi")
xcoords = ['2013-01-01', '2014-01-01','2015-01-01', '2016-01-01', '2017-01-0
for xc in xcoords:
    plt.axvline(x=xc, color='black', linestyle='--')
```



Bellow is the average wind speed per month graph. Horizontal line represents the mean wind speed.

In [ ]:
```
mean = df['wind_speed'].mean()
ax = df['wind_speed'].groupby(df.index.month).mean().plot(style=".-")
ax.set_xlabel("Month")
ax.set_ylabel("Wind speed (km/h)")
ax.set_title("Average wind speed per month")
ax.set_xticks(range(1, 13))
plt.axhline(y=mean, color='black', linestyle='--')
```

Out[ ]:
```
<matplotlib.lines.Line2D at 0x7f174cac66e0>
```



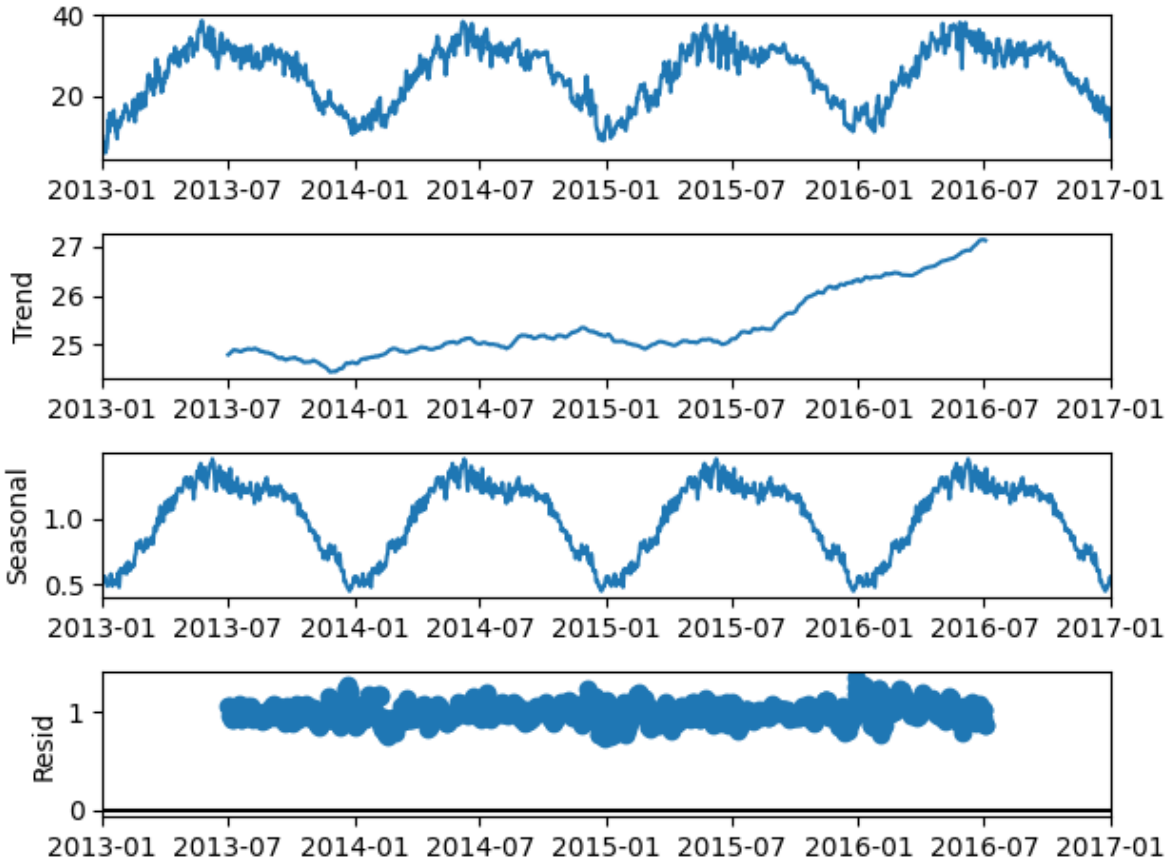
Task 4: Check for periodicity in your data, show it (if there is no seasonality, show that there is no seasonality).

In [ ]:
```
from statsmodels.tsa.seasonal import seasonal_decompose

analysis = df[['meantemp']].copy()


decompose_result_mult = seasonal_decompose(analysis, model="multiplicative",
decompose_result_mult.plot().suptitle("")
```

Out[ ]:
```
Text(0.5, 0.98, '')
```



The period chosen for the seasonality is one year (365 days). The graphs below show the seasonality of the data. The graphs show that the data is periodic and has seasonality. It also shows a clear upwards trend