Exercises

Get together in groups of three (max four) and prepare this small project as a conversation starter for the oral exam on Wednesday 16th in the time frame from 16:00 - 20:00. Note, this will only be a conversation starter and does not exhaustively cover all possible questions during the exam.

0 Nahuelbuta weather station

The data file contains data from a weather station in Nahuelbuta.

- Read in the CSV file `"data0_no_time.csv"`. (use `np.loadtxt()` and `delimiter=","`)
- Write a function that filters out the invalid values (-9999.0) from the data.
- Plot the first (air temperature in deg C) and second column (solar radiation $\frac{Watt}{m^2}$) in two separate plots.
- The time information is missing, try to figure out from what time period the data is.

1 Smoothing data

Load data from text, apply smoothing to the data (sliding window)

2 Min, Max, Mean

- Read in data from the user as input from the command line. If the user types ”x” stop reading.
- Write a function that calculates the min, max and mean values from that input. The function should return a tuple (a, b, c) containing the three values
- Print the values at the end

3 Daily average

The data given is from one year (2017) of the weather station in Santa Gracia. There are 24 values per day (1 hour average).

- Read in the CSV file `"data3.csv"`. (use `np.loadtxt()`, `delimiter=","` and `usecols=(1,2)`)
- Write a function that filters out the invalid values (-9999.0) from the data.
- Write a function that calculates the average for each day (average over 24 values).
- Plot the data: first column contains air temperature, second column contains air relative humidity.

4 Derivative

The data given is from one year (2018) of the weather station in Santa Gracia. There are 24 values per day (1 hour average).

- Read in the CSV file `"data4.csv"`. (use `np.loadtxt()`, `delimiter=","` and `usecols=(1,2)`)
- Write a function that filters out the invalid values (-9999.0) from the data.
- Write a function that calculates the first and second derivative.
- Plot the data: first column contains the average wind speed, second column contains the maximum wind speed.

5 Polynomial

The data given is from one month (2022.04) of the weather station in Nahuelbuta. There are 24 values per day (1 hour average).

- Read in the CSV file `"data5.csv"`. (use `np.loadtxt()`, `delimiter=","` and `usecols=(1,2)`)
- Write a function that filters out the invalid values (-9999.0) from the data.
- Take one of the precipitation peaks (for example on 2022-04-24) and try to fit a second order polynomial using the function `polyfit`.
- Plot the data: first column contains the solar radiation, second column contains the precipitation.

6 TODO

TODO

7 TODO

TODO

8 TODO

TODO

9 TODO

TODO

10 TODO

TODO