A primer in Programming – Assignment 2

Exercise 2.1 — Linear Fitting.

This exercise extends Exercise 1.2 from the Mathematics primer. It is helpful to complete the Math exercise first.

In the file 'meteo82d.dat' we can find the average wind speed for the given time periods in column 15.

Read this data and create a normalized wind speed distribution (bins 0-1, 1-2 ,…m/s). This distribution is commonly modelled with the Weibull-distribution:

$$f(u) = \frac{k}{A}\left(\frac{u}{A}\right)^{k-1} e^{-\left(\frac{u}{A}\right)^{k}}$$

The result of Exercise 1.2 from the Mathematics primer is a linear function with which it should be possible to find the two Weibull parameters A and k via a linear fit.

Perform the necessary calculations and using a linear fit determine the Weibull parameters.

Finally plot your modelled Weibull distribution with the measurement data to get an idea about the fit quality

HINT: It becomes necessary to assign a numerical value to a bin. It is reasonable use its center value, e.g: bin 1-2 → 1.5

Exercise 2.2 — Non-Linear Fitting.

Determine the same Weibull parameters using a Non-linear curve fit to the Weibull function on the same set of measurements.

Also plot this Weibull function with the determined parameters in the same graph as the normalized wind speed distribution to get an idea of the quality of the determined fit parameters.

Which of both methods gives more reliable results? Please argue