

Preprocessing the signal

Use only standard python tools and libraries such as numpy and scipy.signal and pandas

<https://numpy.org/doc/stable/>

<https://docs.scipy.org/doc/scipy/reference/signal.html>

https://pandas.pydata.org/docs/user_guide/index.html

1. Read data file(s) given in data.zip. There are several simultaneously measured and time synced signals (ecg and two ppg sensors both with three wavelengths). Plot these signals and visually inspect them.
2. Resample both signals so that they are the same length and samples are equidistant. Sample frequency should be easily adjusted as a variable. Use sampling frequency of 200 Hz. The original sampling frequency for ecg is 128 Hz and ppg = 100 Hz and length of the measurements are just over 2 mins.
3. Visualize the signals in frequency domain. Does it look as expected (compare to frequencies that you expected to see from time domain inspection)? Which frequency band carries most of the information? (hint: fft or welch)
4. Filter the signal using butterworth and moving average filters using reasonable frequency-band/smoothing so that you are not filtering out the information carrying signal i.e. filter out only out-of-band noise.