Computational problems

They offer one and a half additional unit instead of of participation at 2^{η} preparatory examination (at a distance). Deliverables:

1. Folder containing python or matlab code with comments and data
2. Folder containing the latex reference: text (*.tex), figures (png, matlab figs), pdf reference.

All cut-off frequencies ('digital frequencies') are measured in cycles per sampling period. All filters to be of finite shock response of 300 sample lengths. Slice the input signal as desired.

Delivery date: Same as the 2^{η} preparatory exam, i.e. posting on elearning **from Tuesday 10 January 2022 at 19:10 to Wednesday 11 January 2023 at 11:00.**

Theme 1^{o}

Implement the overlay and summation method to filter a music recording that you select from the internet (e.g. soundcloud, youtube, etc.) and convert it to a wav file with a low-pass filter with cutoff frequency f_c=0.15.

Theme 2^{o}

Implement the overlay and storage method to filter a music recording that you select from the internet (e.g. soundcloud, youtube, etc.) and convert it to a wav file with a low-pass filter with cutoff frequency f_c=0.15.

Theme 3^{o}

Implement the overlay and summation method to filter a music recording that you select from the internet (e.g. soundcloud, youtube, etc.) and convert it to a wav file with an anodyne filter with cutoff frequency f_c=0.35.

Theme 4^{o}

Implement the overlay and storage method to filter a music recording that you select from the internet (e.g. soundcloud, youtube, etc.) and convert it to a wav file with an anodic filter with cutoff frequency f_c=0.35.

Theme 5^{o}

Implement the overlay and summation method to filter a recording of music you select from the internet (e.g. soundcloud, youtube

etc.) and convert it to a wav file with a bandpass filter with cutoff frequencies f_p=0.20 and f_s=0.40.

Theme 6ο

Implement the overlay and storage method to filter a music recording that you select from the internet (e.g. soundcloud, youtube etc.) and convert it to a wav file with a bandpass filter with cutoff frequencies f_p=0.20 and f_s=0.40.

Theme 7ο

Implement the method of calculating discrete Fourier transforms of two real-valued signals using existing fast Fourier transform functions[1] for a pair of seismic signals extracted from the Stanford Earthquake Dataset (STEAD)

https://github.com/smousavi05/STEAD

[1] https://elearning.auth.gr/mod/resource/view.php?id=645909