Exercise 4: Speech Enhancement and Evaluations

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Instructions

- ▶ Implement and return files as **Exercise_4_firstname.ipynb**.

- ▶ Return your answers to MyCourses by **23:59 on Monday, October 2**, 2023.

Introduction and Objective

- ▶ The objective of this exercise is to implement basic speech enhancement techniques and evaluate and visualize the quality of the enhancement.

- ▶ We implement four different filtering methods: Spectral subtraction, Wiener-filter, linear filter and a VAD based filter.

- ▶ In all these filters, (1) a constant average magnitude noise model and (2) ideal noise estimate, which is the true noise you generate to create the noisy signal, are used.

- ▶ The enhanced signals are evaluated by computing the signal-to-noise ratios- global SNR and segmental SNR. To visualize the results, the segmental SNRs of all enhanced signals are plotted.

- ▶ Application: Almost all the speech technologies !!

- ▶ Some functions are already provided in the note book to reduce the work load.

Steps in implementation

- ▶ Generate a noisy signal (additive white Gaussian noise of power -35dB)

- ▶ Estimate the noise for the noisy signal, based on 1) ideal estimate 2) avg noise model.

- ▶ Enhance the noisy signal by:
  1) Spectral subtraction: "spectralSub",
  2) Wiener filter: "wiener",
  3) Linear filter: "linear",
  4) VAD based filter: "vadEnhance"

- ▶ Compute the global SNR and the frame-wise segmental SNR of the enhanced signals
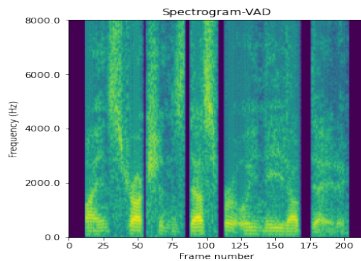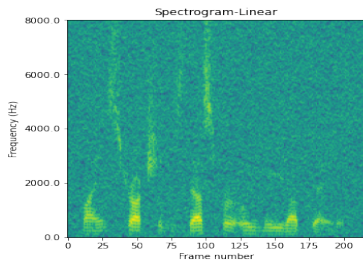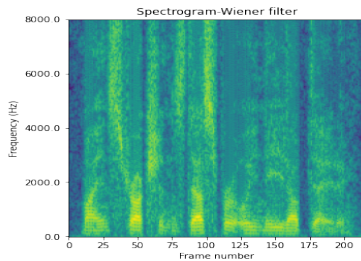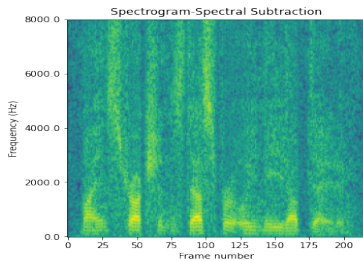
- ▶ Plot and visualize the results.

Expected plots (1)
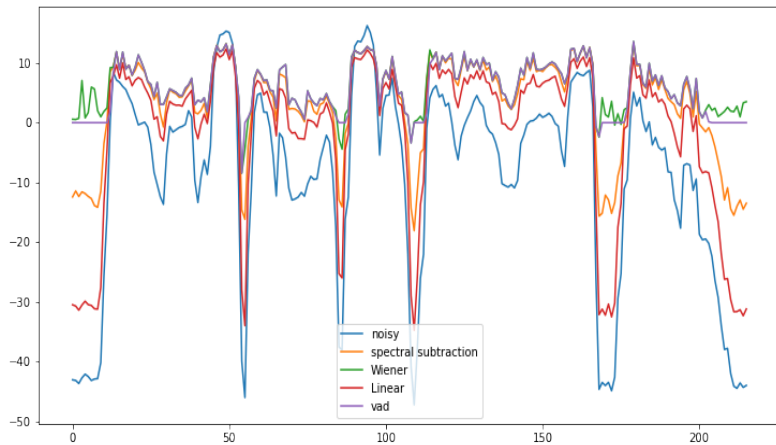
Expected plots (2)
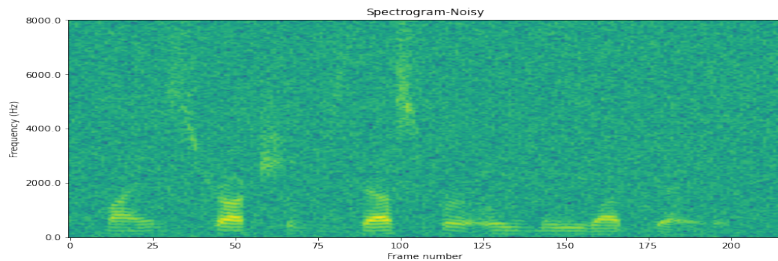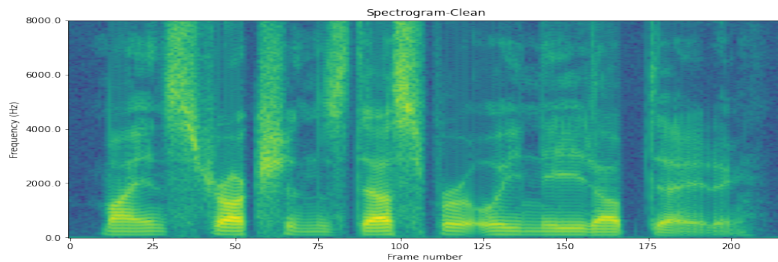
Expected plots (3)

- ▶ Record your own speech file and then run this notebook for your speech file. Write your observations. For doing VAD based noise-reduction, you need to create a ground truth VAD (i.e., output_targets).

Experimental findings, Analysis, Reasoning and
and any other?

Contact

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