

Deep Speech Processing (DSP) Assignment: 5

Cepstral analysis of speech

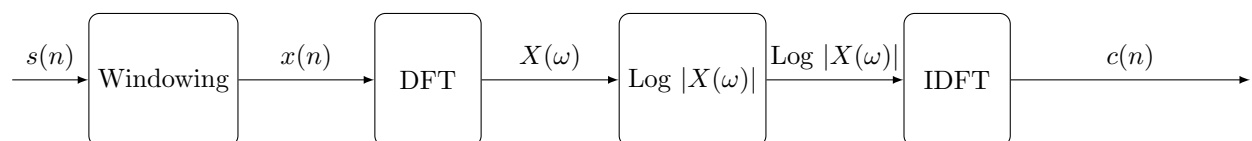
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Instructions

- When uploading to Google Classroom, compress your files into a ZIP archive. Name the ZIP file as `SRN_Name.zip`
- All students are required to submit their assignments before coming for evaluation
- From now on, there is no need to upload a separate report. Instead, include your observations directly within the IPython notebook. For each experiment, create a text cell to write your observations. In addition, embed audio files directly into the notebook.
- During the the evaluation, you will present the concepts using the IPython notebook exclusively.
- Any deviation from the guidelines cannot be considered during the evaluation.
- For all the questions in the Basics section, ensure that both the time-domain representation and the magnitude spectrum plots are included in your Ipython notebook.
- If any doubts, please mail to `kishorks@iitdh.ac.in`

Cepstrum [Q1]

Concepts to read: Cepstral analysis



- Select a 30ms segment of both voiced and unvoiced speech, denoted as $s(n)$

- Apply the transformation steps as depicted in the block diagram above.
- Plot all intermediate signals (total of 5 plots).
- Document your observations.

Low time liftering [Q2]

- $w[n] = \begin{cases} 1 & \text{for } 0 \leq n < 12 \text{ samples,} \\ 0 & \text{for } 12 \leq n \text{ samples.} \end{cases}$
- $y[n] = c[n]w[n]$
- Use $c[n]$ from Q1, plot $y[n]$ [Both voiced and unvoiced segment]
- Apply DTFT/FFT on $y[n]$ to get $Y(w)$. and plot its log magnitude spectrum.

High time liftering [Q3]

- $w[n] = \begin{cases} 0 & \text{for } 0 \leq n < 12 \text{ samples,} \\ 1 & \text{for } 12 \leq n \text{ samples.} \end{cases}$
- $y[n] = c[n]w[n]$
- Use $c[n]$ from Q1, plot $y[n]$ [Both voiced and unvoiced segment]
- Apply DTFT/FFT on $y[n]$ to get $Y(w)$. and plot its log magnitude spectrum.

Utils

- lab1: https://colab.research.google.com/drive/1nX20djsBuHpdy29TNpbDCXc_6TCzyMlo?usp=sharing
- lab3: <https://colab.research.google.com/drive/1yDGsctDdYIyCzTv2hJPCsRkzFJB9a00-?usp=sharing>
- For recording audio, use wavsurfer or Audacity