Speech Signal Processing

EC5.408

Assignment 3

Sep 6, 2023

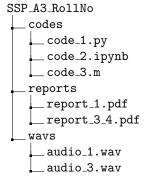
Guidelines

- Do not copy or plagiarise. If you're caught for plagiarism, the penalty will range from **zero** in the assignment to **F** grade in the course.
- Cite your sources (be it images, papers or existing libraries) when necessary.
- Mention clearly if any assumptions are being considered.
- Only MATLAB or Python can be used for the coding part.
- Theory answers (in report) should be typed unless mentioned otherwise.

Submission Format

Make a directory using the naming format SSP_A3_RollNo. The submission might include codes (.py/.m) to answer the coding problems, reports (.pdf) to answer and plot the theory questions or notebooks (.ipynb) to answer both coding and theory questions together. Place the files in their respective folders and zip the main directory using the naming format SSP_A3_RollNo.zip and upload this zip file to Moodle.

This is how the final directory structure might look like



Questions

1.	Explain briefly about the following	[5]
	(a) UBM	[1]
	(b) LP Residue	[1]
	(c) Spectral Subtraction	[1]
	(d) Mel Filter bank	[1]
	(e) Cepstrum	[1]
2.	Record your name, compute MFCC on the frame level. Then take the first 13 coefficients and plot it. Comment on the plots.	of each frame [4]
3.	Using the given audio file, do the following,	[8]
	First, choose a voiced region from the audio and create a voiced frame using a Hamming window of length 512	
	(a) Compute the auto-correlation of the frame and plot it.	[2]
	(b) Compute the magnitude spectrum of the frame and plot it.	[2]
	(c) Compute the LP spectrum of the frame and plot it.	[2]
	(d) Estimate pitch using the above three methods. Which method provides a better pitc [2]	ch estimation?

[Maximum marks: 17]

NOTE: The report can be one (or separate, your preference) **PDF** with all the theory answers and plots or you can also chose to do the entire assignment in one python notebook (.ipynb) by answering theory in markdown and code directly in it.