

Speech Understanding

Richa Singh

Course Outline

- Objectives

1. To provide insights into fundamental concepts and algorithms related to speech processing and understanding
2. Impart working expertise by introducing practical problems.

- Learning Outcomes

- Students will have the ability to: 1. Build a speech recognition system 2. Design and implement basic speech based application

Course Outline

Introduction to Speech processing: Digitization and Recording of speech signal, Review of Digital Signal Processing Concepts, Human Speech production, Acoustic Phonetics and Articulatory Phonetics, Different categories speech sounds and Location of sounds in the acoustic waveform and spectrograms. (14 Lectures)

Speech recognition: Analysis and Synthesis of Pole-Zero Speech Models, Short-Time Fourier Transform, Analysis: FT view and Filtering view, Synthesis: Filter bank summation (FBS) Method and OLA Method, Features Extraction, Extraction of Fundamental frequency, Speech Enhancement, Clustering and Gaussian Mixture models, Speaker Recognition.(14 Lectures)

Speech based applications: HMM and Neural models for speech recognition, Speech generation, Question answering, Dialogue systems, Other Speech based Applications.(14 Lectures)





Advanced Topics

- Audio generation
- Audio processing
- Automatic speech recognition
- Automatic speaker recognition
- Synthetic speech generation
- Audio deepfake detection and generation

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Machine Learning
Deep Learning

Course Evaluation

- Exam: 40%
- Assignments: 25%
- Minor project: 10%
- Major project: 15%
- Presentations, reviews and critiques: 10%