



## CCS369 & TS &A Syllabus

Text and speech analysis (Anna University)



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**COURSE OBJECTIVES:**

- Understand natural language processing basics
- Apply classification algorithms to text documents
- Build question-answering and dialogue systems
- Develop a speech recognition system
- Develop a speech synthesizer

**UNIT I NATURAL LANGUAGE BASICS**

6

Foundations of natural language processing – Language Syntax and Structure- Text Preprocessing and Wrangling – Text tokenization – Stemming – Lemmatization – Removing stopwords – Feature Engineering for Text representation – Bag of Words model- Bag of N-Grams model – TF-IDF model

**Suggested Activities**

- Flipped classroom on NLP
- Implementation of Text Preprocessing using NLTK
- Implementation of TF-IDF models

**Suggested Evaluation Methods**

- Quiz on NLP Basics
- Demonstration of Programs

**UNIT II -TEXT CLASSIFICATION**

6

Vector Semantics and Embeddings -Word Embeddings - Word2Vec model – Glove model – FastText model – Overview of Deep Learning models – RNN – Transformers – Overview of Text summarization and Topic Models

**Suggested Activities**

- Flipped classroom on Feature extraction of documents
- Implementation of SVM models for text classification
- External learning: Text summarization and Topic models

**Suggested Evaluation Methods**

- Assignment on above topics
- Quiz on RNN, Transformers
- Implementing NLP with RNN and Transformers

**UNIT III-QUESTION ANSWERING AND DIALOGUE SYSTEMS**

9

Information retrieval – IR-based question answering – knowledge-based question answering – language models for QA – classic QA models – chatbots – Design of dialogue systems -- evaluating dialogue systems

**Suggested Activities:**

- Flipped classroom on language models for QA
- Developing a knowledge-based question-answering system
- Classic QA model development S

**Suggested Evaluation Methods**

- Assignment on the above topics
- Quiz on knowledge-based question answering system
- Development of simple chatbots

**UNIT IV -TEXT-TO-SPEECH SYNTHESIS****6**

Overview. Text normalization. Letter-to-sound. Prosody, Evaluation. Signal processing - Concatenative and parametric approaches, WaveNet and other deep learning-based TTS systems

**Suggested Activities:**

- Flipped classroom on Speech signal processing
- Exploring Text normalization
- Data collection
- Implementation of TTS systems

**Suggested Evaluation Methods**

- Assignment on the above topics
- Quiz on wavenet, deep learning-based TTS systems
- Finding accuracy with different TTS systems

**UNIT V -AUTOMATIC SPEECH RECOGNITION****6**

Speech recognition: Acoustic modelling – Feature Extraction - HMM, HMM-DNN systems

**Suggested Activities:**

- Flipped classroom on Speech recognition.
- Exploring Feature extraction

**Suggested Evaluation Methods**

- Assignment on the above topics
- Quiz on acoustic modelling

**30 PERIODS****PRACTICAL EXERCISES****30 PERIODS**

1. Create Regular expressions in Python for detecting word patterns and tokenizing text
2. Getting started with Python and NLTK - Searching Text, Counting Vocabulary, Frequency Distribution, Collocations, Bigrams
3. Accessing Text Corpora using NLTK in Python
4. Write a function that finds the 50 most frequently occurring words of a text that are not stop words.
5. Implement the Word2Vec model
6. Use a transformer for implementing classification
7. Design a chatbot with a simple dialog system
8. Convert text to speech and find accuracy
9. Design a speech recognition system and find the error rate

**TOTAL: 60 PERIODS****COURSE OUTCOMES:**

On completion of the course, the students will be able to

- CO1: Explain existing and emerging deep learning architectures for text and speech processing  
CO2: Apply deep learning techniques for NLP tasks, language modelling and machine translation  
CO3: Explain coreference and coherence for text processing  
CO4: Build question-answering systems, chatbots and dialogue systems  
CO5: Apply deep learning models for building speech recognition and text-to-speech systems