Micro Syllabus of Natural Language Processing

|  |  |  |
| --- | --- | --- |
| **UNIT-I:**  **Introduction** (10 hr)  Welcome, motivations, what is Natural Language Processing?. The problem of ambiguity and uncertainty in language. The Turing test; NLP representations in syntax, semantics, and pragmatics.  The Applications of NLP; The role of Deep Learning in Natural Language Processing; Deep learning for NLP Computing. Backpropagations, recurrent neural networks, Transformers | | |
| **UNIT-I** | Module | Micro-content |
|  | Introduction | Introduction to NLP |
|  |  | History |
|  | Motivation | Necessity of NLP |
|  |  | Motivations for NLP |
|  | Ambiguity of NLP | Ambiguity of NLP |
|  |  | Complex of Language and it Ambiguities |
|  | Role Deep Learning | Deep learning |
|  |  | Role of DL in implementation of NLP |
|  | Applications | Applications of NLP |
|  |  | Trends in NLP |
| **UNIT-II:**  **Syntactic Parsing and Semantic Analysis :** (10 hr)  Grammar formalisms and tree banks, Efficient parsing for Context Free grammars (CFG).Statistical Context Free Grammars and Probabilistic Context Free Grammars (PCFG), Lexicalized PCFGs.  Semantic Analysis: Lexical semantics and word-sense disambiguation. Computational semantics, semantic Role, labelling and semantic Parsing. | | |
| Unit-II | Module | Micro-content |
|  | Grammar | What is Grammar |
|  |  | Grammar Rules ,  Tree banks, Corpus |
|  | CFG | Context Free grammar Rules Formalisms |
|  |  | CFG Rules Syntaxes |
|  |  | PCFG Rules and it its Syntaxes |
|  |  | Lexical PCFG Rules |
|  | Semantic Analysis | Semantic analysis techniques |
|  |  | Semantic roles and Parsing |
|  |  | Semantic implementations |
| **UN-III:**  **N-gram Language Models and POS:** (10 hr )  The role of language models; Simple N-gram models. Estimating parameters and smoothing evaluating language models. Parts of Speech Tagging and Sequence Labeling: Lexical syntax, Hidden Markov Models (Forward and Viterbi Algol’s and EM Trainings) | | |
| Unit-III | Module | Micro-content |
|  | Stemming | N-Gram model |
|  |  | Types of N-grams for stemming |
|  |  | N-grams for stemming implementation |
|  | Language Models | Smoothing model for languages |
|  | Parts of Speech | POS labeling and syntaxes |
|  |  | HMM Model |
|  | Language Lexical analysis Algorithms | Veiterbi model |
|  |  |  |
|  |  | Forward model |
|  |  | Models implementation |
| **UNIT-IV:**  **Deep learning for Named Entity Recognition (NER)** (10 hr)  Dependency Parsing, Gradient Checks, Overfitting, Regularization, Activation functions, Mullti-task and Semi-supervised Learning. | | |
| Unit-IV | Module | Micro-content |
|  | Named Entity Recognition | Parsing and Dependencies |
|  |  | Parsing for Identification |
|  |  | Identification of Entities |
|  | Models Evolution | Implementation |
|  |  | Gradient Check for the models |
|  |  | Overfittings issues and solutions |
|  | Optimization of models | Regulations and Activation Functions |
|  |  | Multi-tasks models and Supervised Learning |
|  |  | Semi-Supervised Learning models |
|  |  | Optimization techniques for the models |
| **UNIT-V: Information Extraction:**  (10 hr)  Named Entity recognition and relation extraction. IE using sequencing labeling.  Machine Translation: Basic issues in MT. Statistical translation, word alignment, phase-based translation, and synchronous grammars. | | |
| Unit-V | Module | Micro-content |
|  | Named Entity Recognition | What is NER |
|  |  | How the Entities Recognition |
|  |  | Entities Extraction from the Text |
|  |  | NER Pipeline |
|  |  | Information Extraction from the Documents or clouds |
|  |  | Labeling and Sequencing techniques for IE |
|  | Machine Translation | Machine Translation Techniques |
|  |  | Statistical Translation techniques |
|  |  | Word and Phrase alignments and translation |
|  |  | Grammar and Synchronous Grammar in translation |