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| **Unit-I: Introduction to NLP** | | |
| Unit | Module | Micro Content |
| **Unit – I** | Introduction | 1. Welcome |
| 1. Motivations and Road Map |
| 1. What is Natural Language Processing |
| Language Ambiguity | 1. The Problem of Ambiguity and Uncertainty in Languages |
| 1. The Turing test |
| 1. NLP Representations in Syntax |
| Semantics and Deep Learning Role | 1. Semantics and pragmatics |
| 1. The Applications of NLP |
| 1. The Role of Deep Learning in NLP |
| DL Models and Applications of NLP | 1. Deep Learning for NL Computing |
| **Unit-II : Syntactic Parsing** | | |
| Unit | Module | Micro Content |
| **Unit-II** | Grammar | 1. Grammar formalisms |
| Tree Banks | 1. Tree banks |
| 1. Tree banks Construction |
| Context Free Grammar | 1. Context Free Grammars (CFGs) |
| 1. Efficient parsing for Context Free Grammars (CFGs) |
| Probabilistic CFG | 1. Probabilistic CFGs(PCFGs) |
| 1. Statistical Parsing and Probabilistic CFGs(PCFGs) |
| Lexical Parsing | 1. Lexicalized PCFGs |
| Semantic Analysis | 1. Semantic Analysis : Lexical Semantics |
| Semantic Parsing | 1. Word-sense ambiguities |
|  | 1. Compositional Semantics |
|  | 1. Compositional Semantics |
| Sematic Labeling and Parsing | 1. Semantic Role Labeling |
|  | 1. Semantic Parsing |
|  | 1. Semantic Parsing |

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| **Unit-III : N-Gram Language Models** | | |
| Unit | Module | Micro Content |
| **Unit-III** | N-Gram Model | 1. Language Models |
| 1. Simple N-Gram models |
| Parameter Tanning and Optimization | 1. Estimating Parameters |
| 1. Parameter smoothing |
| 1. Evaluating language models |
| POS Tagging and Labeling | 1. POS Tagging |
| 1. POS Tagging Structures and Representations |
| 1. Sequence Labeling |
| 1. Lexical Syntax. |
| POS Tagging Models | 1. Hidden Markov Models |
| 1. Forward Model |
| 1. Viterbi Algorithm |
| 1. EM Training |
| **Unit-IV: Deep Learning for Named Entity Recognition** | | |
| Unit | Module | Micro Content |
| **Unit –IV** | Deep Learning Parameterization for NER | 1. Dependency Parsing |
| 1. Gradient Checks |
| DL Optimization Methods | 1. Overfitting |
| 1. Regularization |
| 1. Activation Function |
| 1. Multitask Optimization |
| 1. Semi Supervised Learning. |
| Text Process with Embedding and Converting to Vectorization | 1. Text Embedding: Word Vector representation |
| Vectorization models | 1. Word2vec model |
| 1. GloVe model |
| 1. Advanced Word Vector Representations |
| 1. Sequence-to-Sequence Model |
| **Unit-V: Information Extraction(IE)** | | |
| Unit | Module | Micro Content |
| **Unit-V** | Named Entity Recognition | 1. Named Entity Recognition |
| 1. Relation Extraction |
| Sequence Labeling | 1. using Sequence labeling |
| Machine Translation | 1. Machine Translation(MT): |
| 1. Basic issues in MT |
| Translation Process and Word by word and Phrase by Phrase | 1. Statistical translation |
| 1. Word Alignment |
| 1. Phrase based Translation |