Natural Language Processing
Course Revision

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Final Exam

- **Date: Dec 31, 2025**
- **Time: 09:30-11:30**
- **Venue: T2-101**
- **Part I (50%)**
  - **Short Questions**
  - **Q1 – Q5**
  - **Total 50 marks (Each question 10 marks)**
- **Part II (50%)**
  - **Long Question (with calculation. Please bring scientific calculator)**
  - **Q6 (5 parts)**
  - **Total 50 marks**
- You can bring ONE A4 size note.

Course Topics

- NLP#01 An Introduction to Natural Language Processing
- NLP#02 N-gram Language Model
- NLP#03 Part-of-Speech Tagging
- NLP#04 Syntax and Parsing
- NLP#05 Meaning Representation
- NLP#06 Semantic Analysis
- NLP#07 Pragmatic Analysis
- NLP#08 Transfer Learning and Transformer
- NLP#09 NLP Applications
- NLP#10 Large Language Model (LLM) and Generative Artificial Intelligence (GenAI)

Chap#1 An Introduction to Natural Language Processing

1.1 Introduction

1.2 Human Language and Intelligence

1.3 Linguistic Levels of Human Language

1.4 Human Language Ambiguity

1.5 A Brief History of NLP

1.6 NLP and AI

1.7 Main Components of NLP

1.8 Natural Language Understanding (NLU)

1.9 Potential Applications of NLP

Chap#2 N-gram Language Model

2.1 Introduction

2.2 N-gram Language Model

2.3 Markov Chain in N-gram Model

2.4 Live Example – The Adventures of Sherlock Holmes

2.5 Shannon's Model in N-gram Model

2.6 Language Model Evaluation and Smoothing Techniques

Chap#3 Part-of-Speech Tagging

3.1 What is Part-of-Speech (POS)?

3.2 POS Tagging

3.3 Major Components in NLU

3.4 9 Key POS in English

3.5 Different Types of POS Tagset

3.6 Approaches for POS Tagging

3.7 Taggers Evaluations

Chap#4 Syntax and Parsing

4.1 Introduction and Motivation

4.2 Syntax Analysis

4.3 Types of Constituents in Sentences

4.4 Context-Free Grammar (CFG)

4.5 CFG Parsing

4.6 Lexical and Probabilistic Parsing

Chap#5 Meaning Representation

5.1 Introduction

5.2 What is Meaning?

5.3 Meaning Representations

5.4 Semantic Processing

5.5 Common Meaning Representation

5.6 Requirements for Meaning Representation

5.7 Inference

5.8 Fillmore's Theory of Universal Cases

5.9 First-Order Predicate Calculus

Chap#6 Semantic Analysis

6.2 Lexical vs Compositional Semantic Analysis

6.3 Word Senses and Relations

6.4 Word Sense Disambiguation

6.5 WordNet and Online Thesauri

6.6 Other Online Thesauri: MeSH

6.7 Word Similarity & Thesaurus Methods

6.8 Distributed Similarity

Chap#7 Pragmatic Analysis and Discourse

7.1 Introduction

7.2 Discourse Phenomena

7.3 Discourse Segmentation

7.4 Discourse Coherence

7.5 Algorithms for Coreference Resolution

7.6 Evaluation

Chap#8 Transfer Learning and Transformer Technology

8.1 What is Transfer Learning?

8.2 Motivation of Transfer Learning

8.3 Solutions of Transfer Learning

8.4 Recurrent Neural Networks (RNN)

8.5 Transformer Technology

8.6 BERT

8.7 Other Related Transformer Technology

Chap#9 Major Natural Language Processing Applications

9.2 Information Retrieval Systems

9.3 Text Summarization Systems

9.4 Question-and-Answering Systems

Chap#10 Large Language Model (LLM) and Generative Artificial Intelligence (GenAI)

10.1 Introduction to LLM and GenAI

10.2 Foundations of LLMs

10.3 Key Players in LLM Landscape

10.4 Applications of LLMs in GenAI

10.5 Ethical Considerations and Challenges

10.6 Future Outlook and Research Directions

Good Luck
Hope you enjoy this course