Course program and reading list

Semester 2 Year 2024

School: Efi Arazi School of Computer Science M.Sc.

Natural Language Processing

Lecturer:

Dr. Kfir Bar kfir.bar@runi.ac.il

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Teaching Assistant:

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Mr. David German david.german@post.runi.ac.il

Course No.:	Course Type :	Weekly Hours :	Credit:
3523	Elective	3	3

Course Requirements :	Group Code :	Language:
Final Paper	242352301	Hebrew

Prerequisites

Prerequisite:

52 - Calculus I
53 - Calculus II
54 - Linear Algebra I
55 - Linear Algebra II
56 - Discrete Mathematics
59 - Data Structures
69 - Logic And Set Theory
77 - Algorithms

417 - Introduction To Computer Science
3141 - Machine Learning from Data

Course Description

Natural language processing (NLP) is a subtopic of Artificial Intelligence (AI), related to the research and development of computational techniques for understanding human languages. Research in language technologies goes back to the 50s, with the development of automatic translation systems from Russian into English. Some recent developments in the field include ChatGPT, and large language models. Until the 90s, most of the research and development in this field was based on theoretical and rule-based models. Recent approaches have increasingly focused on machine and deep learning, where machines are set to learn languages from annotated an unannotated data. These approaches are typically referred to as data-driven techniques. In this course, we cover the relevant theory and techniques for processing natural languages automatically. We explore some of the recent algorithms and the way they are applied in real-world applications, such as machine translations, text classification, sentiment analysis and more. We learn the fundamental terminology and approaches to morphology, syntactical parsing, semantic analysis and discourse modeling. Naturally, we focus more on data-driven approaches to NLP, including some general probabilistic computations and mathematics.

Course Goals

This course aims to introduce undergraduate and postgraduate CS students to research and development in computational linguistics and natural language processing. The course covers some basic concepts in linguistic, algorithmic and statistical essentials, and demonstrates these through solutions to real-world challenges.

Grading

- **Assignment 1: 7%**
- **Assignment 2: 7%**
- **Assignment 3: 7%**
- **Assignment 4: 7%**
- **Midterm exam: 15%**
- **Final Project: 57%**

Lecturer Office Hours

Please coordinate in advance by email/phone.

Kfir Bar:

You may use both of the following addresses:

kfir.bar@post.idc.ac.il, barkfir@yahoo.com (expected response time is 24 hours, and no more than 48 hours).

Amir Cohen:

amirdnc@gmail.com (expected response time is 24 hours, and no more than 48 hours).

Tutor Office Hours

Kai Golan kai.golanhashiloni@post.runi.ac.il

David German david.german@post.runi.ac.il

Teaching Assistant

Sahar Millis	sahar.millis@post.runi.ac.il
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Reading List

Textbooks:

- Speech and Language Processing, 2nd Edition, by Daniel Jurafsky and James H. Martin [J&M]
- Foundations of Statistical Natural Language Processing, by Christopher Manning and Hinrich Schuetze [M&S]