

Modul: 5173090

Natural Language Processing

Modulprofil

Prüfungsnummer

5173090

Dauer

1 Semester

Häufigkeit des Angebots

Jedes Wintersemester

SWS

4

ECTS-Credits (CP)

5.0

Workload

Angeleitete Studienzeit:

Präsenzzeit: 60 Std.

Selbststudienzeit: 90 Std.

Gesamt: 150 Std.

Lehrveranstaltungsart(en)

Seminaristischer Unterricht

Lehrsprache

Englisch

Organisation

Modulverantwortung

Prof. Dr. Ivan Yamshchikov

Dozierende

Prof. Dr. Ivan Yamshchikov

Verwendbarkeit

MAI

Studiensemester

2. Semester

Art des Moduls

Pflichtmodul

Verpflichtende Voraussetzungen gemäß SPO

None

Empfohlene Voraussetzungen

Mathematical Foundations of AI

Artificial Intelligence and Machine Learning

Artificial Neural Networks and Cognitive Models

Inhalte

The model is implementing a learning-by-doing approach. The students read a variety of scientific publications that are fundamental for the topic, present and discuss these contributions as the course unfolds. They participate in a Kaggle-like NLP competition as well as submit several tutorials and the final capstone project.

The course covers the following set of topics:

1. Natural Language and Semantics:
 - Introduction and Natural Language Processing Applications
 - Text and Speech Basics
 - Verbal Intelligence
 - Information theory foundations
 - Text representations
2. Research Methodology:
 - Reading scientific papers
 - Scientific reproducibility
 - Empirical Methods
3. Tokenization
 - BPE
 - Information-theoretic approach to tokenization
 - Unigram
 - Modern Tokenisation methods
4. Word Embeddings
 - Embeddings
 - Global and local Representations
 - Distributed Representations
5. Early Language Models
 - Markov Chains
 - Recurrent neural networks for text processing
 - Autoencoders
5. Foundations of Large Language Models

- Transformers
- Large Language Models
- Pretraining
- RLHF
- Other forms of fine-tuning

5. Advanced chapters of of Large Language Models

- LLM bias
- LLM safety
- Agentic frameworks

Prüfung

Verpflichtende Voraussetzung gemäß SPO für die Teilnahme an der Prüfung

Keine

Art der Prüfung

Sonstige Prüfung (soP) gemäß
§§ 26, 27 APO

Dauer/Form der Prüfung

Portfolio

Die konkrete Festlegung der
abzuleistenden Prüfung erfolgt
im Studienplan

Prüfungssprache

Englisch

Voraussetzung für die Vergabe von Leistungspunkten

Keine

Lernergebnisse

After successfully completing the module:

- students learn how to develop and apply the methods of Natural Language Processing.
- students are able to develop result-oriented applications that integrate suitable Natural Language Processing methods.
- students are able to analyse concrete industry tasks in the field of natural language processing from an RnD perspective, evaluate and select suitable methods and software components from the field of natural language processing to develop them further and fit for the suggested task.
- students organise themselves and their team independently in the application of learned methods of Natural Language Processing.

Literatur

- Kamath, Uday, John Liu, and James Whitaker. Deep learning for NLP and speech recognition. Vol. 84. Cham: Springer, 2019.
- Chris Manning and Hinrich Schütze, Foundations of Statistical Natural Language Processing, MIT Press. Cambridge, MA: May 1999.