

Natural Language Processing and Sentiment Analysis

Extracting insights through AI, statistical, and formal linguistic tools



PROGRAMME
Master 2

SEMESTER
Semester 1

CREDITS
2 ECTS

CONTACT HOURS
18h Lectures

Course Description

This course focuses on the methods and tools used to build Natural Language Processing (NLP) applications, with a dedicated emphasis on Sentiment Analysis.

The curriculum is systematically structured into three core approaches: Artificial Intelligence and Large Language Models (LLMs), probabilistic and statistical methods, and formal linguistic frameworks. Students will explore the technical mechanisms underlying these methods, utilize standard platforms, and apply them directly to opinion mining. The course also critically addresses the inherent limitations of each approach.

Learning Outcomes

- Understand the foundations of neural networks, tokenization, and transformers in modern AI.
- Apply probabilistic frameworks (e.g., Hidden Markov Models) and formal linguistic grammars to text analysis.
- Utilize standard NLP tools and platforms (ChatGPT, Llama, Sketch Engine, NooJ) to extract textual data.
- Conduct sentiment analysis to effectively gauge public opinion and emotions from text.
- Critically assess the limitations of LLMs, statistical approaches, and formal linguistic methods.

Indicative Content

- 1. AI and LLM Tools:** Neural networks, transformers (QKV), and next-token prediction (ChatGPT, Claude, Llama).
- 2. Probabilistic / Statistical Methods:** Probability distributions, Hidden Markov Models, and clusterization (Gate, Sketch Engine).
- 3. Formal / Linguistic Methods:** Formal dictionaries and grammars using linguistic platforms (XFST, LFG, HPSG, NooJ).
- 4. Applied Sentiment Analysis:** Opinion mining, question answering, and emotion detection using the three approaches.
- 5. Methodological Limitations:** Analyzing the technical and functional constraints of AI, statistical, and formal paradigms.

Teaching & Learning Approach

This course bridges the theoretical underpinnings of NLP with robust, hands-on application. Students will systematically test and compare AI platforms, statistical models, and formal linguistic tools to build real-world sentiment analysis applications.

Assessment

Individual Project