Introduction to Natural Language Processing

Organizational Information

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https://ai.uni-hannover.de

Introduction to NLP Organizational

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Bachelor course

- Lectures. Henning Wachsmuth
- Tutorials. Timon Ziegenbein
- Languages. English, Python

Information



- Web. https://www.ai.uni-hannover.de/de/teaching/courses/inlp
- Stud.IP. https://studip.uni-hannover.de/dispatch.php/course/ overview?cid=534acbf0dee63b9e058f11bd01c2b05e

Time and location

- Lectures. Thursday 13:00–14:30, 3702-031 (Schneiderberg 32)
- Tutorials. Tuesday 10:30–12:00, 1101-F138 (Welfengarten 1) First tutorial introduces Python and the assignment concept

Consultation?

• Set up appointment via e-mail: <u>h.wachsmuth@ai.uni-hannover.de</u>

Introduction to NLP Organizational

Teaching at NLP Group, https://ai.uni-hannover.de/en/studies/courses

Courses

- Introduction to Natural Language Processing (bachelor, summer). NLP fundamentals, from rule-based methods to statistical methods
- Statistical Natural Language Processing (master, winter). Core NLP, from statistical methods to neural methods
- Computational Argumentation (master, summer). State-of-the-art NLP, advanced methods in a specific research context

Seminars

- Natural Language Processing (bachelor, winter)
- Natural Language Generation (master, summer)

Labs and projects

- Argumentation Technology (master, summer)
- Ethical Artificial Intelligence (master, winter)

This Course

Overall goals

 Learn major skills needed to approach fundamental natural language processing (NLP) tasks

Contents

- Several rule-based and statistical NLP techniques
- Several NLP tasks and approaches
- Required basics of linguistics and empirical methods

Competences

- Understanding of theory and practice of NLP
- Design and implementation of NLP methods for given tasks
- Scientific experiments and evaluations on large amounts of text

Outline of the Course

Introduction

1. Overview

Modeling linguistic knowledge

- 2. Basics of linguistics
- 3. NLP using rules
- 4. NLP using lexicons

Modeling statistical patterns

- 4. Basics of empirical methods
- 5. NLP using regular expressions
- 6. NLP using context-free grammars
- 7. NLP using language models

Application

9. Practical issues

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Note: Due to holidays, there are fewer lectures this year than usual. Some slides will hence be skipped, marked "(skipped in 2025)". These slides will *not* be exam-relevant.

Course Elements

Teaching

- Lectures. Presentation of course content and organizational info
- Tutorials. Presentation of assignments and solutions, Q&A

Assignment sheets (details in first tutorial)

- Amount. 5 in total, bi-weekly (~50% written, ~50% programming)
 First sheet published on April 28; to be submitted by May 12, 23:59 (UTC+2)
- Group work. You need to submit with 3-4 people
- Bonus. (a) Min. 60% of all points: exam grade + 1/3, (b) Min. 85%: + 2/3
 Example for (b): grade of 2.7 is changed to 2.0; only grades < 5.0 can be improved

Exams

- Written. 90 minutes, questions on all lecture parts, English, August 6
- Registration. May 15-31, 2025

More details on the exam later

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Textbooks (Not Obligatory)

Foundations of Statistical Natural Language Processing

(Manning and Schütze, 1999)

- More oriented towards computer science
- Profound basics, outdated techniques

Speech and Language Processing, 2nd edition

(Jurafsky and Martin, 2009)

- More oriented towards computational linguistics
- Comprehensive, neural techniques not covered

Speech and Language Processing, draft of 3rd edition

(Jurafsky and Martin, 2025) \rightarrow draft freely available online

- More oriented towards computational linguistics
- Comprehensive, up-to-date, excellently written







References

- Jurafsky and Martin (2009). Daniel Jurafsky and James H. Martin. Speech and Language Processing: An Introduction to Natural Language Processing, Speech Recognition, and Computational Linguistics. 2nd edition, Prentice-Hall, 2009.
- Jurafsky and Martin (2025). Daniel Jurafsky and James H. Martin. Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition with Language Models, 3rd edition. Online manuscript released January 12, 2025. https://web.stanford.edu/jurafsky/slp3/
- Manning and Schütze (2009). Christopher D. Manning and Hinrich Schütze. Foundations of Statistical Natural Language Processing. MIT Press, 1999.