Prof. Dr. Jens Vogelgesang · CSH Study Program Director · j.vogelgesang@uni-hohenheim.de

Registration now open for the

CSH Autumn School 2024
Understanding and Training Language Models
Applications in Sentiment Analysis

with Erik-Jan Senn
September 30 – October 2, 2024
Hohenheim

Overview

Unlock the magic of language models—join us at the CSH Autumn School 2024 and elevate your expertise!

Most likely you have heard of language models such as GPT-4: They are said to revolutionize many aspects of work and life - for example, language models can assist you when setting up a website, finding creative titles for your papers, giving advice on what to gift to your parents on Christmas... But why and how do they actually work? Their capabilities might seem magical - but actually, you can understand and build them yourself! This course aims to provide you the basic tools to understand, work with, and build your own language models.

The course is organized following the standard language modeling pipeline used for a specific (supervised) language modeling task:

1. Transform the text into a machine-readable numerical representation using tokenization (and positional embeddings).
2. Learn a useful general-purpose representation of language: a foundation model (e.g. BERT), focusing on non-generative models. The following building blocks are required:
    - Feed-forward artificial neural networks: Architecture, training ((stochastic) gradient descent, backpropagation), hyperparameters and overfitting are discussed and compared to standard linear regression models.
    - The self-attention mechanism and transformer models to efficiently model time-dependency in language.
    - Training without labels using masked-language modeling.
3. Use the language representation for specific (supervised) tasks.
    - Know how to apply the foundation model as feature extractor, or fine-tune the foundation model for the specific task.
    - The main application is sentiment classification.

Prof. Dr. Jens Vogelgesang · CSH Study Program Director · j.vogelgesang@uni-hohenheim.de

All aspects will be supplemented by practical exercises in Python, focusing on various applications of sentiment analysis. Participants can apply their acquired skills in a small project on the last day of class (sentiment of product/movie reviews, or project based on interest of the individual participant).

The learning goals are as follows: Students are able to

- explain all components of the language modeling pipeline,
- use and train foundation models,
- apply and adapt pretrained models for specific supervised tasks (e.g. sentiment analysis).

Prof. Dr. Jens Vogelgesang · CSH Study Program Director · j.vogelgesang@uni-hohenheim.de

The schedule

University of Hohenheim, 70599 Stuttgart.

Setup (via Zoom): September 27, 2024, 15h00 - 17h00:

15h00 - 17h00	Check your technical setup.

Day 1 (in presence): September 30, 2024, 9h00 - 17h30:

9h00 - 10h30	Lecture: Introduction, language modeling pipeline
10h30 - 11h00	Coffee Break
11h00 - 12h30	Lecture: Tokenization of text
12h30 - 13h30	Lunch Break
13h30 - 15h30	Exercise: Preparing text and tokenization
15h30 - 16h00	Coffee Break
16h00 - 17h30	Lecture: Feed forward neural network

Day 2 (in presence): Oktober 1, 2024, 9h00 - 17h30:

9h00 - 10h30	Lecture and Exercise: Training a feed forward neural network
10h30 - 11h00	Coffee Break
11h00 - 12h30	Lecture and Exercise: Self-attention and transformers
12h30 - 13h30	Lunch Break
13h30 - 15h30	Lecture: Foundation models
15h30 - 16h00	Coffee Break
16h00 - 17h30	Exercise: Training foundation models

Day 3 (in presence): Oktober 2, 2024, 9h00 - 17h30:

9h00 - 10h30	Lecture: Task-specific learning and fine-tuning
10h30 - 11h00	Coffee Break
11h00 - 12h30	Exercise: Task-specific learning and fine-tuning
12h30 - 13h30	Lunch Break
13h30 - 15h30	Exercise: Sentiment analysis project
15h30 - 16h00	Coffee Break
16h00 - 17h30	Lecture and Exercise: Generative language models, conclusion

Registration for the CSH Autumn School 2024 at weiterbildung.uni-hohenheim.de

Prof. Dr. Jens Vogelgesang · CSH Study Program Director · j.vogelgesang@uni-hohenheim.de

Target Audience

The course mainly aims at Master and PhD-students interested in understanding and training (large) language models. Basic knowledge in statistics (e.g. linear models for regression and classification), calculus (chain rule) and Python (or at least a similar programming language) is required. Experience with machine learning and data handling is useful. No ECTS points can be earned. By attending, participants can earn a certificate of participation.

Fees, Devices and Credits

Interested participants can register via weiterbildung.uni-hohenheim.de for the workshop until September 15, 2024. The specific room and Zoom link will be shared before the event.

The following tuition fee structure applies:

Group	**Through July 15, 2024** (prices in EUR)	**After July 15, 2024** (prices in EUR)
Students	50.00	100.00
PhD students / Staff Members	120.00	150.00
PostDocs	200.00	260.00
Professors	240.00	300.00

Outstanding fees have to be wired as indicated in the payment instructions. An email with detailed payment instructions will be send to participants after registration and before the workshop. Registration is binding. Fees transferred are non-refundable.

Participants should bring their own laptop (incl. charger) with a working Linux, Mac or Windows/WLS installation. Python and Conda should also be installed.

At the end of the Autumn School, participants will be given a certificate indicating the number of hours they attended.

Contact

For any further information please contact

University of Hohenheim
Prof. Dr. Jens Vogelgesang
Study Program Director
Computational Science Hub (CSH)
E-Mail: j.vogelgesang@uni-hohenheim.de