MADS-DL - Deep Learning

Organization

Prof. Dr. Stephan Doerfel





Moodle (WiSe 24/25)

Agenda

Me

Values, Conduct, Help

Values
Getting Help
Code of Conduct

The Module MADS-DL

Outline

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The Module MADS-DL

Prof. Dr. Stephan Doerfel



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► Study of Mathematics (Diploma) at TU Dresden and TH Lund



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 - recommender systems
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 - impact evaluation
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- ▶ Prof at FH Kiel :-)



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Always feel free to ask questions - regarding the current topics during the sessions!



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- ► after/between sessions
- during exercises
- ► email: stephan.doerfel@fh-kiel.de
- ► larger consultations
 - ► Office C.12 1.31 or Zoom
 - no regular office hours
 - preferably, drop a mail first, including topics of discussion



Outline

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Values, Conduct, Help Values Getting Help Code of Conduct

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 - the doors of our buildings.

"For us, excellent teaching is interdisciplinary, application-oriented, based on research and science, and characterised by its internationality and the wide range of methods used."

"Our University thrives on diversity It creates educational processes that are gender-appropriate, intercultural, and non-discriminatory."

Statement 6 of FH-Kiel's Guidelines

Defending our Democracy Together!

- "We condemn in the strongest possible terms the inhuman plans for deportations of individual groups in our society that have come to light and we oppose them resolutely!" – Björn Christensen (president of FH Kiel) in his mail to colleagues and students, Jan. 24, 2024 (translated from German)
- ► In January, a rally was organized in Kiel and called for by various local organizations incl. democratic parties, unions, public service organizations, universities incl. FH Kiel, and many others



For Diversity



For Diversity - No space for discrimination!

Values, Conduct, Help Values 7 / 24

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Getting Help

Here are helpful institutions for support with issues of almost any kind (finance, psyche, family, health, legal, discrimination, sexual harassment, . . .):

- ► FH Kiel: <a>C Study Guidance
- ► FH Kiel (Diversity Representative): Counseling
- Studentenwerk SH: Student Advice Center
- Allgemeiner Studierendenausschuss der FH Kiel: (ASTA): C
 Beratung

Feel free to talk to me, colleagues, and fellow students!

Agenda

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The Module MADS-DL

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- Collaborate!
- Try to find objective, factual, scientific arguments or hypotheses.
- Bring you personal perspective and experience into the discussion.
- Accept different opinions.

Addressing Each Other

Inclusive They: I (try to) use the inclusive pronouns they/their both in plural and singular.

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▶ When speaking German, you can say Du to me.

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► E.g. "Who would like to present their results?"

Meet on an equal footing:

- ▶ When speaking German, you can say Du to me.
- Let's agree on first name basis.

► Fix rooms – off campus

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**Let's discuss time: session start/end/break!

Students from other Study Programs

Welcome!

- ▶ Students from other programs are welcome to the lecture!
- ► Please register with me, via email.
- ▶ It is YOUR responsibility to organize all official aspects proper registration, credits, compatibility with you program, . . .
- Check with the examination office, organizers of your program of studies

Outline

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The Module MADS-DL

Mode:

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- ▶ no sample solutions!

"But one learns from books and reels only that certain things can be done.

Actual learning requires that you do those things."

Prince Farad'n Corrino (in Frank Herbert's "Children of Dune")

Active Participation

Active participation is the best way to prepare for becoming a data scientist in real life (and for the exam).

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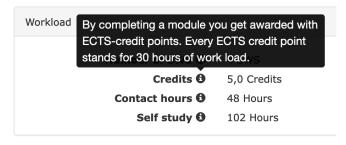
This Course 2/2

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Tollow and comment them, while we discuss them.

Effort and Time



Source: Module Database

Python



- ▶ We will use Python 3 for the practical parts of this course.
- ▶ Please make sure, your device is running python.
- ▶ Use a separate python environment for this lecture.

► Install latest packages, when needed.

Learning Goals of MADS-DL

- understand and apply the fundamental idea of how artificial neural networks are built, learned, and evaluated for classification and prediction
- apply PyTorch to create predictors and classifiers using neural networks
- understand and apply neural convolutional layers
- understand and apply selected advanced notions in deep learning

Attribution

Some parts of this lecture are based on scripts and notes of

Programmieren mit Neuronalen Netzen Prof. Dr. Frank Puppe, Dr. Markus Krug, Amar Hekalo, M.Sc Lecture at Würzburg University

Roadmap

- 1. Introduction: Motivation, Roots, Perceptron
- 2. Basics: Tensors, PyTorch
- 3. Neural Nets in PyTorch: Multilayer Architecture, Classification, Regression
- 4. A Multilayer Network for Regression: Mathematical model, activation functions, dummification
- **5. Training:** Network modes, automatic differentiation, learning hyperparameters, optimization/validation
- 6. Computer Vision: CNNs, image classification, explanations
- 7. Forecasting Sequential Data: Sequential data, recurrent architectures, full proof of concept experiment
- **8. Further Notions:** Depending on time: further neural network constructs.

We'll spend a lot of time on basics and training!

A deep understanding of the core elements is necessary to understand training results and process.

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To NOT wait until the deadline!