

Course introduction

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Organization

Machine Learning Applications

Course Contents

Organization

Who are we?

Instructors

- Elena Trunz, Postdoc with the Visual Computing Group
 - `trunz@cs.uni-bonn.de`
- Moritz Wolter, Postdoc with the HPCA Lab
 - `moritz.wolter@uni-bonn.de`

Teaching Assistants:

- Pauline Lion, Bachelor student Computer Science
- Konstantin Gasenzer, Master student Computer Science
- Zahra Ganji, Master student Computer Science
- Lokesh Veeramacheneni, Ph.D. student with the HPCA Lab.

- We will upload Github-Classroom links, Lecture recordings and slides onto Ecampus.
 - `https://ecampus.uni-bonn.de/`
 - To access eCampus, you need a UniID → helpdesk HRZ.
- You can opt out of GitHub use. We provided zip files via Ecampus.
- We envision a hands-on course experience.
- You should be able to gain an intuition for modern machine learning algorithms and possible applications.
- Many exercises come with unit tests, which allow you to check your work.

Machine Learning Applications

Machine learning is everywhere

- Image processing
- Protein structure prediction
- Language processing
- Virtual personal assistants
- Fraud detection
- Autonomous robots
- Recommendation systems
- Photo editing
- ...

Figure: A prostate with expert and network annotation.

We thank Barbara Wichtmann for bringing this problem to our attention.

Example Processing of historical newspapers

Figure: An old newspaper page and its network segmentation.

We thank Felix Selgert for bringing this problem to our attention.

Course Contents

- Mathematical foundations, based on [DFO20]
- Foundations of machine learning, based on [DFO20]
- Deep learning, based on [GBC16]

References

- [DFO20] Marc Peter Deisenroth, A. Aldo Faisal, and Cheng Soon Ong. *Mathematics for Machine Learning*. <https://mml-book.com>. Cambridge University Press, 2020. DOI: 10.1017/9781108679930.
- [GBC16] Ian Goodfellow, Yoshua Bengio, and Aaron Courville. *Deep Learning*. <http://www.deeplearningbook.org>. MIT Press, 2016.