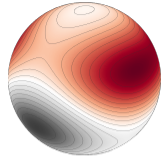




UNIVERSITÄT
HEIDELBERG
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SEIT 1386



Organizational Meeting

Seminar: Mathematical Machine Learning

Selected Famous Papers

Summer Semester 2026

Introduction



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- Language: English
- Intended for Master students

Concept of the Seminar

- Read and analyze **scientific papers**.
- Many-to-Many Role-Playing Format from <https://colinraffel.com/blog/role-playing-seminar.html>:
- One paper per meeting.
- Take a specific role.
- Discuss the paper together.

Roles: Author

Assume that you are the author of the paper. Present your work. **Motivate** your research and **present your results**. Keep in mind that you only have 5 minutes, so focus on the main points. Split up the paper with your partner so that you do not repeat each other.

Roles: Reviewer

Assume that the paper has not been published yet and is currently submitted to a top conference where you've been assigned as a peer reviewer. Complete a **full review** of the paper answering all prompts of the official review form of the top venue in this research area, e.g. <https://www.jmlr.org/reviewer-guide.html>. This includes recommending whether to **accept or reject** the paper.

Roles: Archaeologist

Some time in the future: This paper was found buried under ground in the desert. You're an archaeologist who must determine where this paper sits in the **context** of previous and subsequent work. Find and report on one **older** paper cited within the current paper that substantially influenced the current paper and one **newer** paper that cites this current paper.

Roles: Hacker

You're a hacker who needs a demo of this paper ASAP. **Implement** a small part or simplified version of the main algorithm in the paper on a small dataset or toy problem. Prepare to share the core code of the algorithm to the class and demo your implementation. Do **not** simply download and run an existing implementation – though you are welcome to use (and give credit to) an existing implementation for “backbone” code.

Roles: Private Investigator

You are a detective who needs to run a background check on the **paper's authors**. Where have they worked? What did they study? What previous projects might have led them to working on this one? What motivated them to work on this project? Feel free to contact the authors, but remember to be courteous, polite, and on-topic.

- Attending **all** meetings.
- Participation in class
 - In the beginning every person gives a 5 minute report from their role perspective.
 - Afterwards we have a scientific discussion of the paper.
- We grade your performance after each meeting. Your final grade is the weighted sum of those five grades.

Papers

1. Diederik P. Kingma and Jimmy Ba. *Adam: a method for stochastic optimization*. Dec. 2014. arXiv: 1412.6980
2. Kaiming He et al. “Deep residual learning for image recognition”. In: *2016 IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*. IEEE, June 2016. DOI: 10.1109/cvpr.2016.90. arXiv: 1512.03385
3. Aleksander Madry et al. *Towards deep learning models resistant to adversarial attacks*. 2017. arXiv: 1706.06083
4. Ashish Vaswani et al. “Attention is all you need”. In: *Advances in Neural Information Processing Systems*. Ed. by I. Guyon et al. Vol. 30. NIPS’17. Curran Associates, Inc., June 2017. arXiv: 1706.03762. URL: https://proceedings.neurips.cc/paper_files/paper/2017/hash/3f5ee243547dee91fbd053c1c4a845aa-Abstract.html
5. Long Ouyang et al. “Training language models to follow instructions with human feedback”. In: *Advances in Neural Information Processing Systems*. Ed. by S. Koyejo et al. Vol. 35. NeurIPS’22. Curran Associates, Inc., 2022, pp. 27730–27744. arXiv: 2203.02155. URL: https://proceedings.neurips.cc/paper_files/paper/2022/hash/b1efde53be364a73914f58805a001731-Abstract-Conference.html

- Today: Distribution of roles
 - Accepting a role is the **binding** registration for the seminar.
- Starting in April: 5 meetings à 90 minutes
- weekday and time:
Wednesday 16:15-17:45 (22.4., 6.5., 20.5., 3.6., 17.6.)
- online (link via email)

Assigning Roles

	Paper 1	Paper 2	Paper 3	Paper 4	Paper 5
Author	1	9	7	5	3
Author	2	4	6	8	10
Reviewer	3	1	9	7	5
Reviewer	4	6	8	10	2
Archaeologist	5	3	1	9	7
Archaeologist	6	8	10	2	4
Hacker	7	5	3	1	9
Hacker	8	10	2	4	6
Private Investigator	9	7	5	3	1
Private Investigator	10	2	4	6	8

- It is highly recommended to communicate within your team.

What's next?

- Resources are online:
<https://scoop.iwr.uni-heidelberg.de/teaching/2026ss/seminar-mathematical-machine-learning/>
- These slides will be shared on the website.

Questions?