Master Seminar: Machine Learning in Neuroimaging

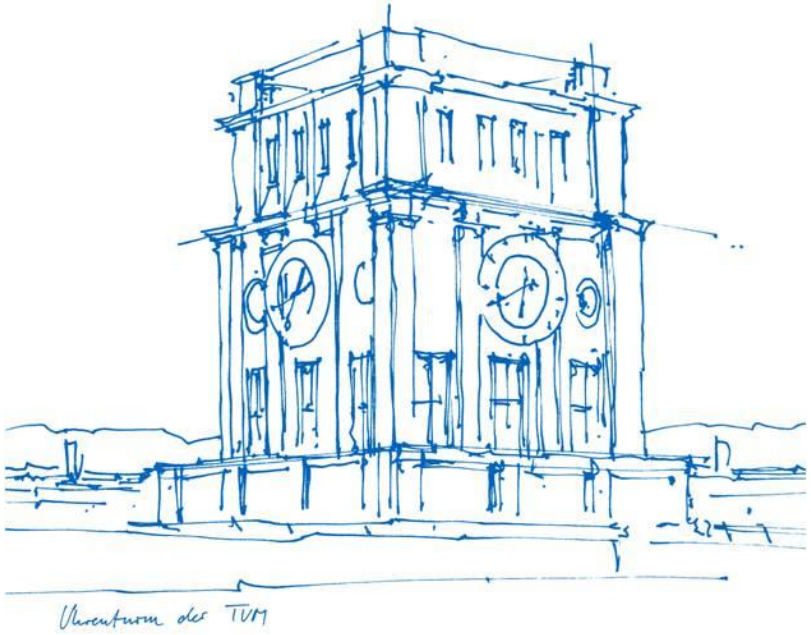
Anne-Marie Rickmann, Nuno Wolf,

Fabian Bongratz, Prof. Dr. Christian Wachinger

Lab for Artificial Intelligence in Medical Imaging

Department of Radiology / Faculty of Informatics

Technical University of Munich



18.07.2022, 1pm

Lab for Artificial Intelligence in Medical Imaging

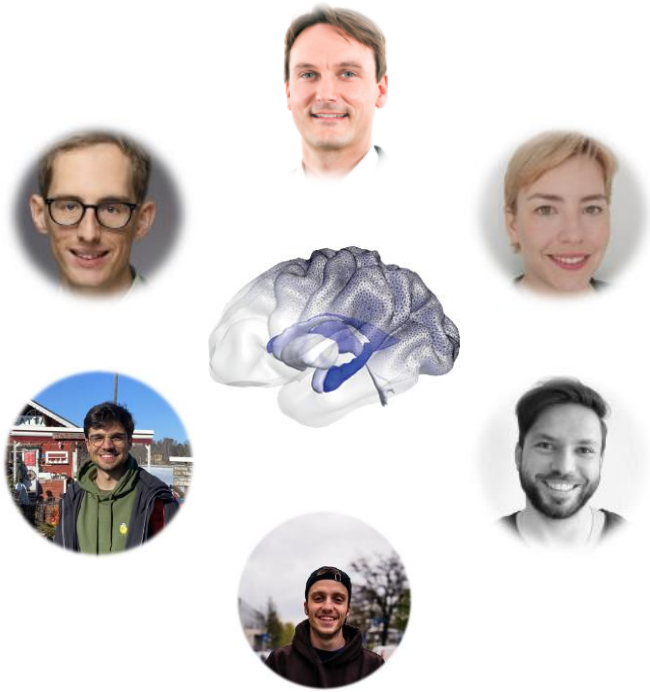
@TUM Informatics

@Klinikum rechts der Isar, Department of Radiology

@LMU Department of Child and Adolescent Psychiatry

ai-med.de

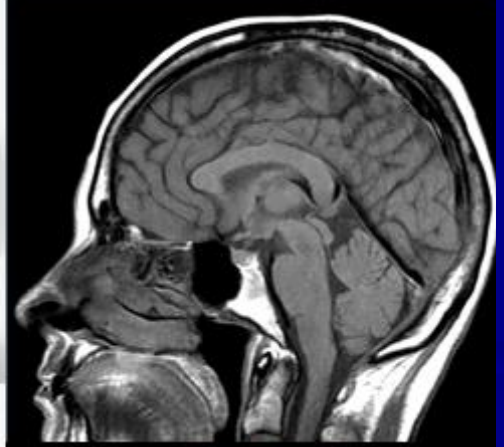
github.com/ai-med

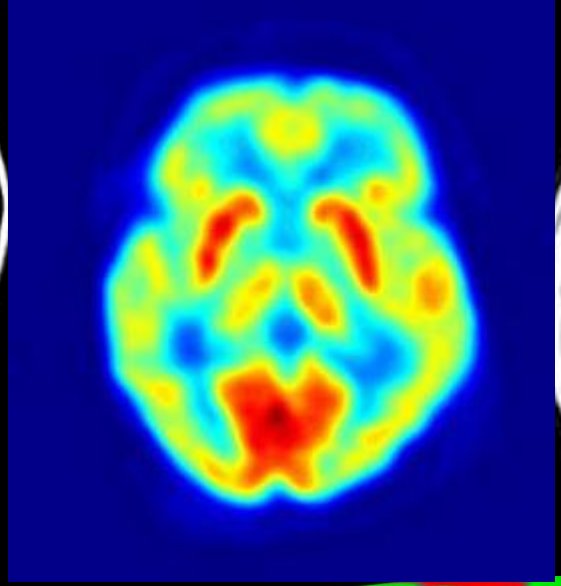


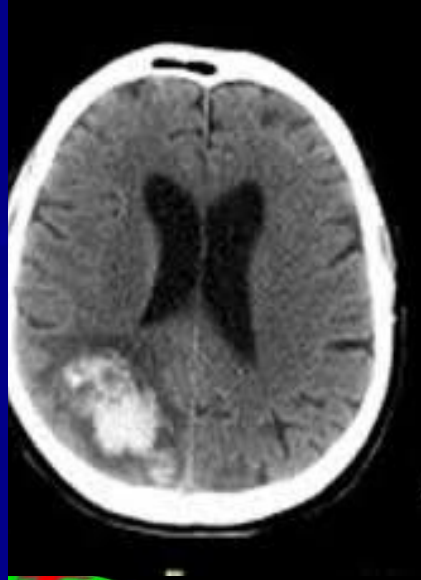
MRI

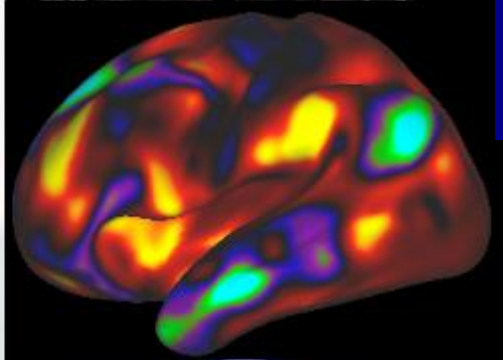
CT

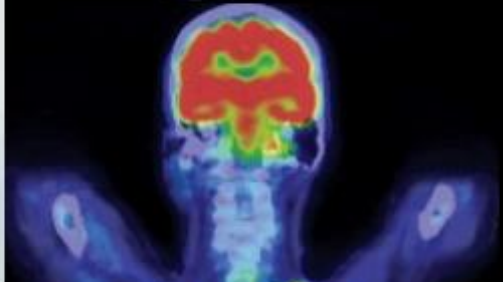
PET

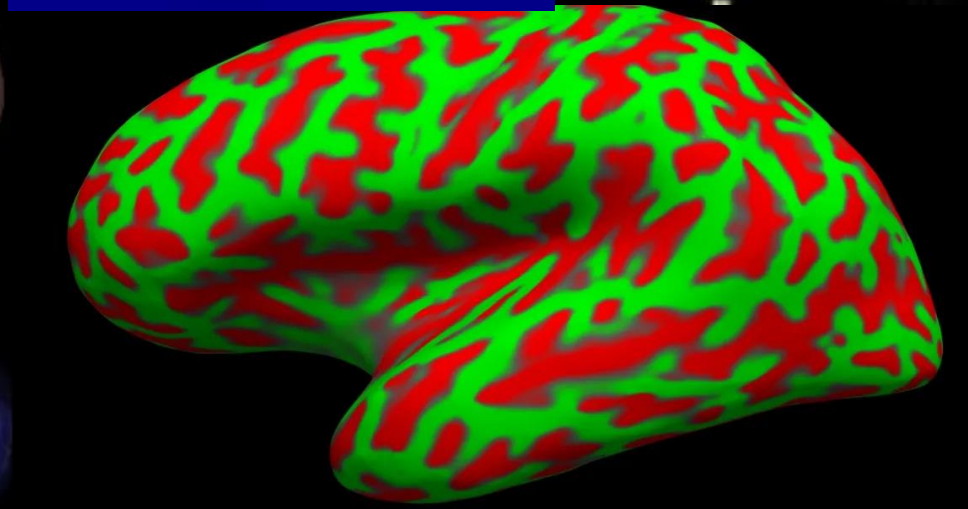




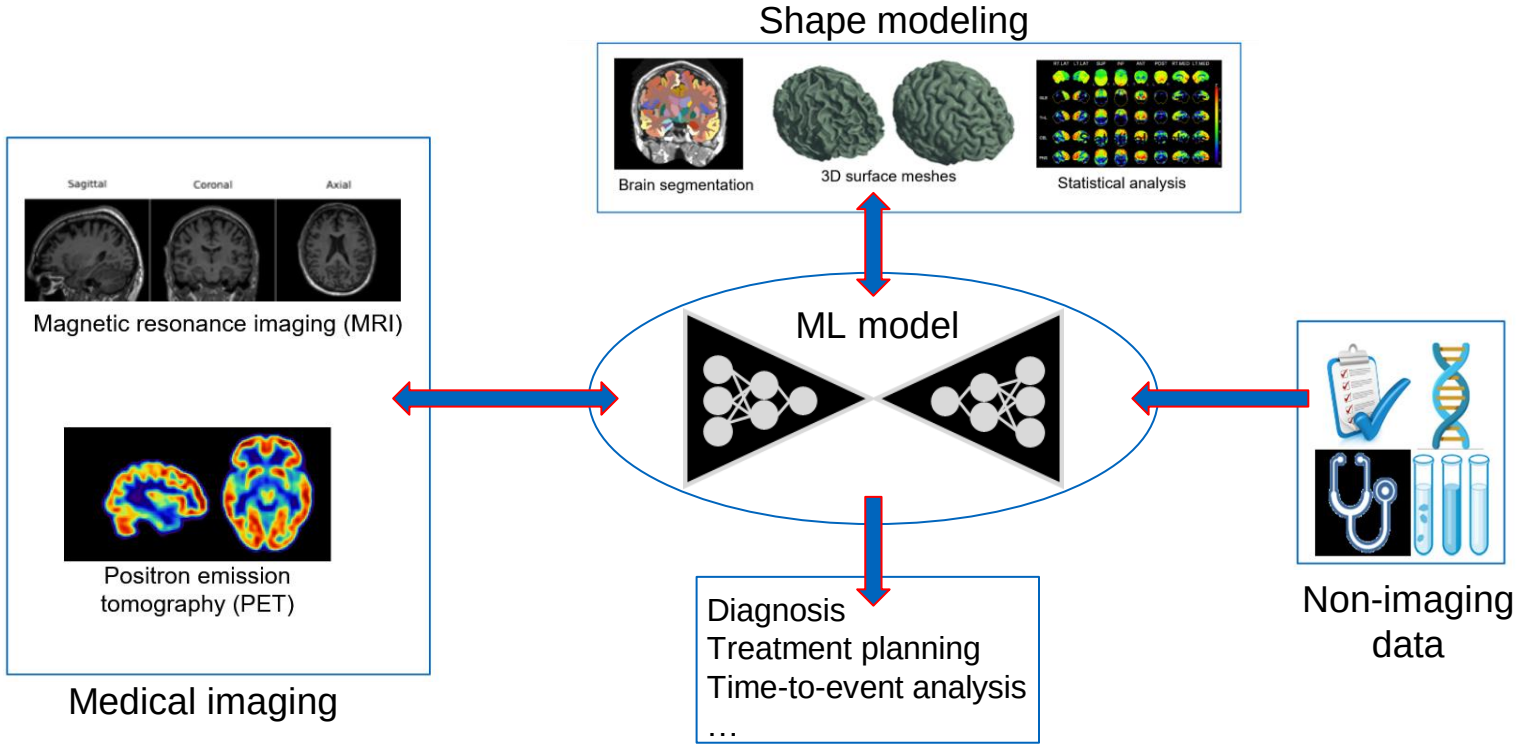








Machine Learning in Neuroimaging: Overview



Exemplary Topics

- Deep learning architectures (CNN, GNN, Transformer)
- Optimization techniques
- Multi-modal data analysis
- Disease prediction (e.g. Alzheimer’s)
- Supervised and unsupervised learning strategies (and in-between, e.g., semi-supervised)
- Statistical shape modeling
- Explainability of deep neural networks
- Causal inference

Learning outcomes

- How to read a paper in a structured way?
- How to phrase complex ideas in an understandable blog post?
- How to present research findings to an audience?

What to deliver?

- Paper presentation (20 min. presentation, 10 min. discussion) **50% of final grade**
- Blog post (~4 pages DIN A4) about the selected paper **50% of final grade**

Preliminaries (recommended)

- Machine learning principles (e.g. IN2357 Machine Learning for Computer Vision, IN2064 Machine Learning)
- Fundamentals of deep learning (e.g. IN2346 Introduction to Deep Learning)
- Good understanding of computer vision (e.g. IN2228 Computer Vision II: Multiple View Geometry)

Schedule

18.07.22: Pre-course meeting (today)

05.08.22: Matching results

05.08.22 - 19.08.22: Assignment of papers

24.10.22, 13:00: Kickoff, Attendance is mandatory

Before Christmas: Meet your supervisor (optional but recommended)

9./10.01.23, 9-13: Block seminar (LUTZ /Nigerstr., Seminarraum 2)

Attendance is mandatory

Contact

seminars@ai-med.de

Find these slides at https://wiki.tum.de/display/mlneuro (TUM Wiki)

Don’t forget to register in the matching system (matching.in.tum.de)!