Master Seminar: Machine Learning in Neuroimaging

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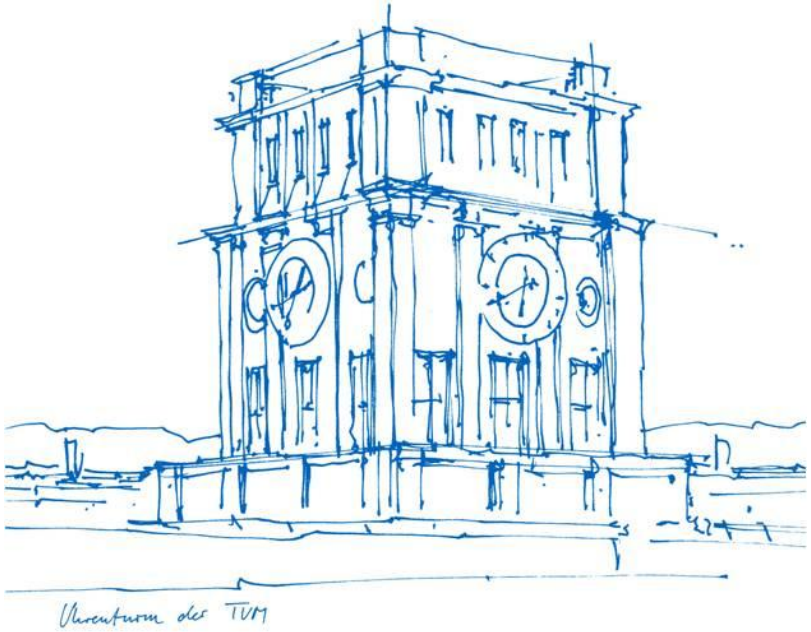
www.AI-Med.de



03.07.2023, 1pm

Lab for Artificial Intelligence in Medical Imaging

@TUM Informatics

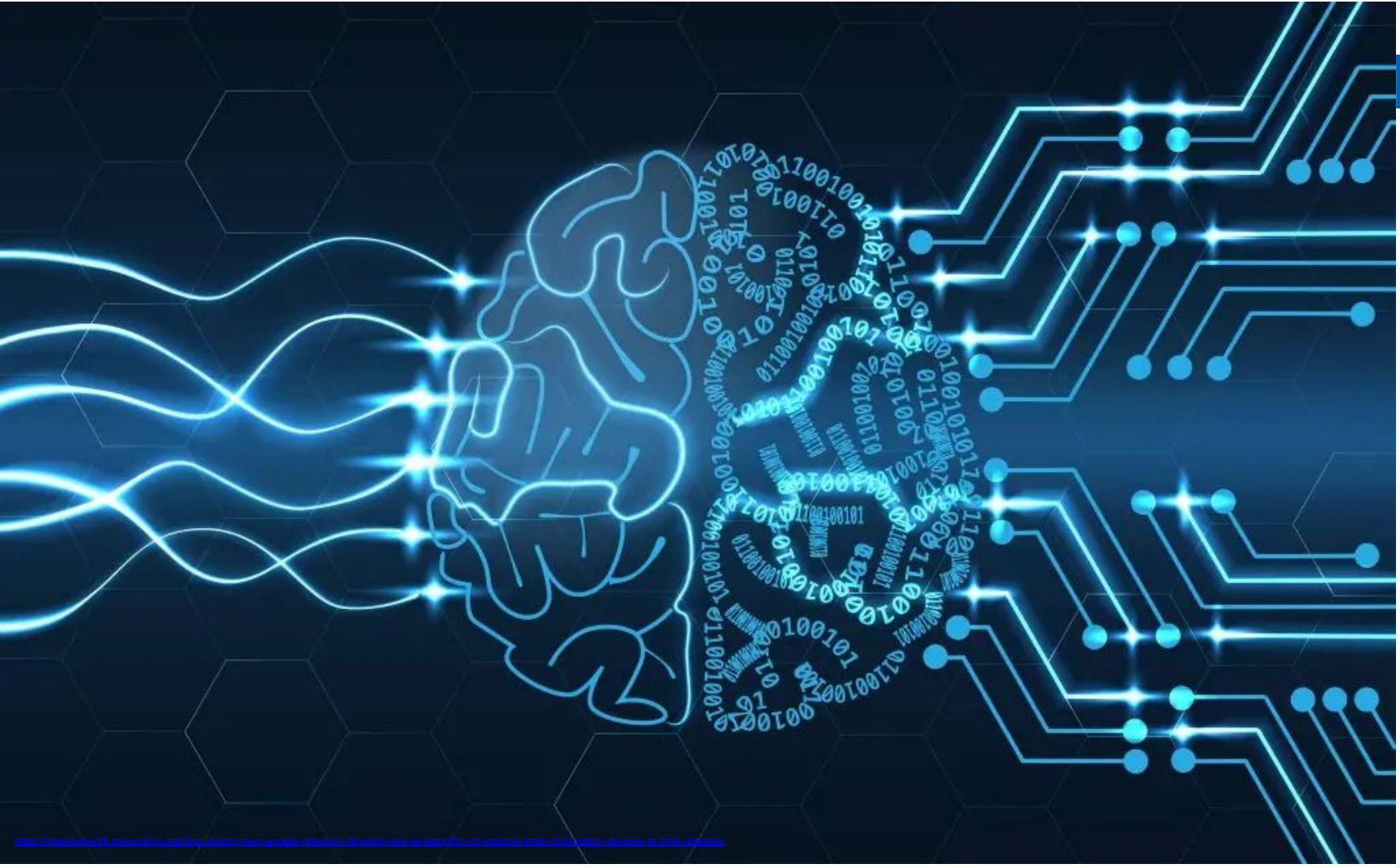
@Klinikum rechts der Isar, Department of Radiology

@Munich Center for Machine Learning

@LMU Department of Child and Adolescent Psychiatry

[ai-med.de](ai-med.de)

github.com/ai-med

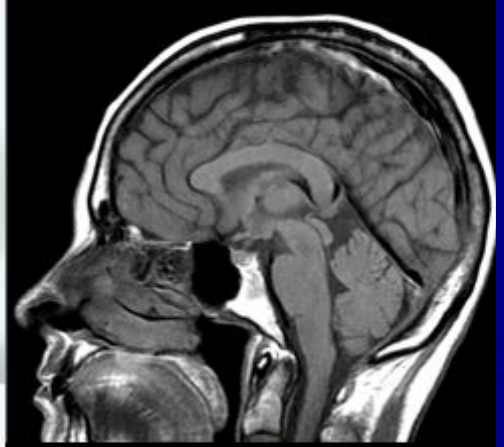


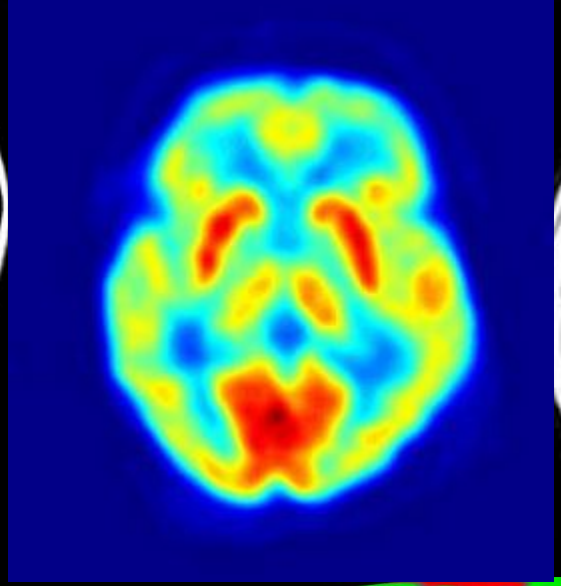
https://newsnetwork.mayoclinic.org/discussion/mayo-google-research-develop-new-ai-algorithm-to-improve-brain-stimulation-devices-to-treat-disease/

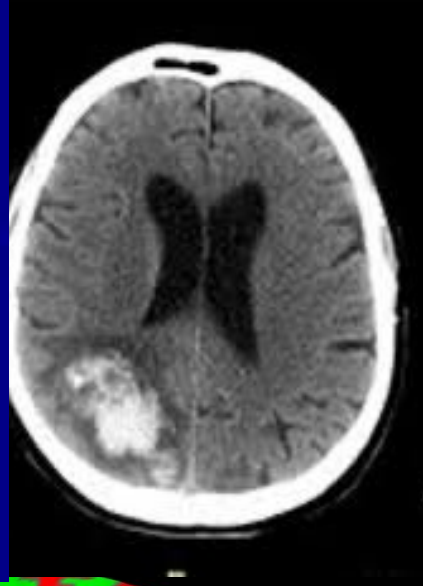
MRI

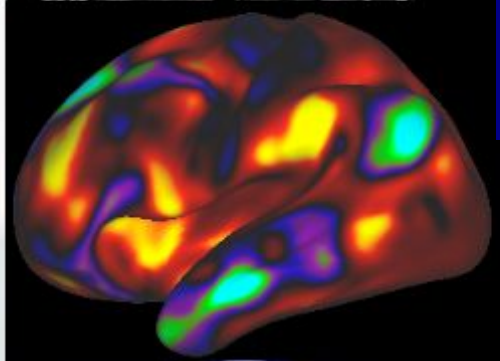
CT

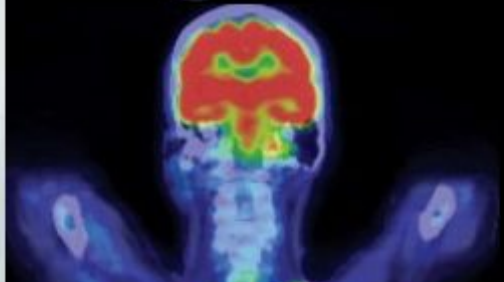
PET

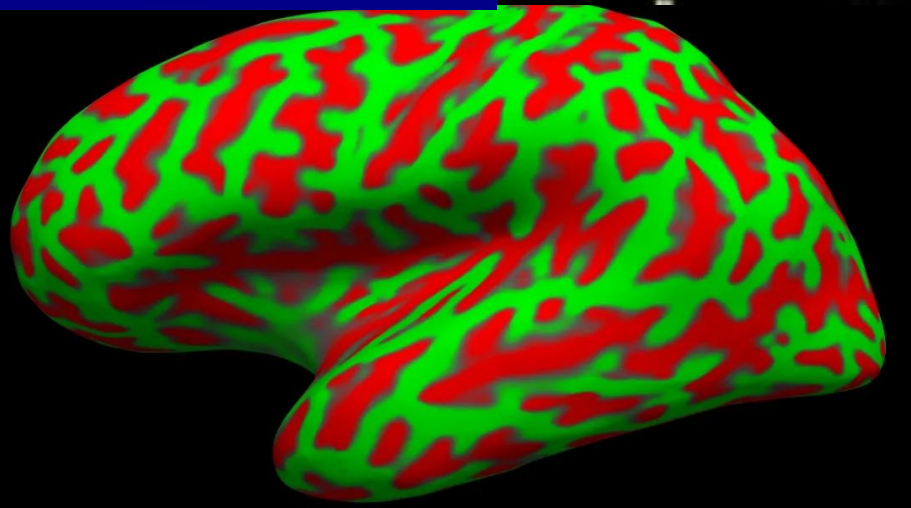


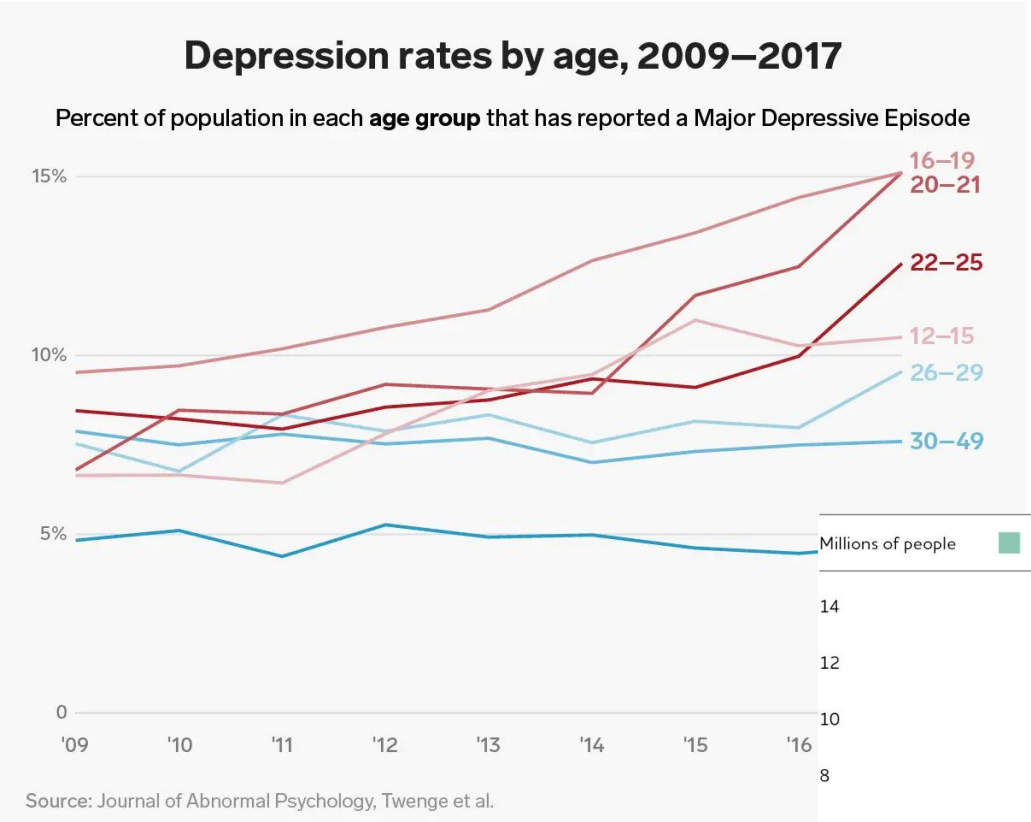




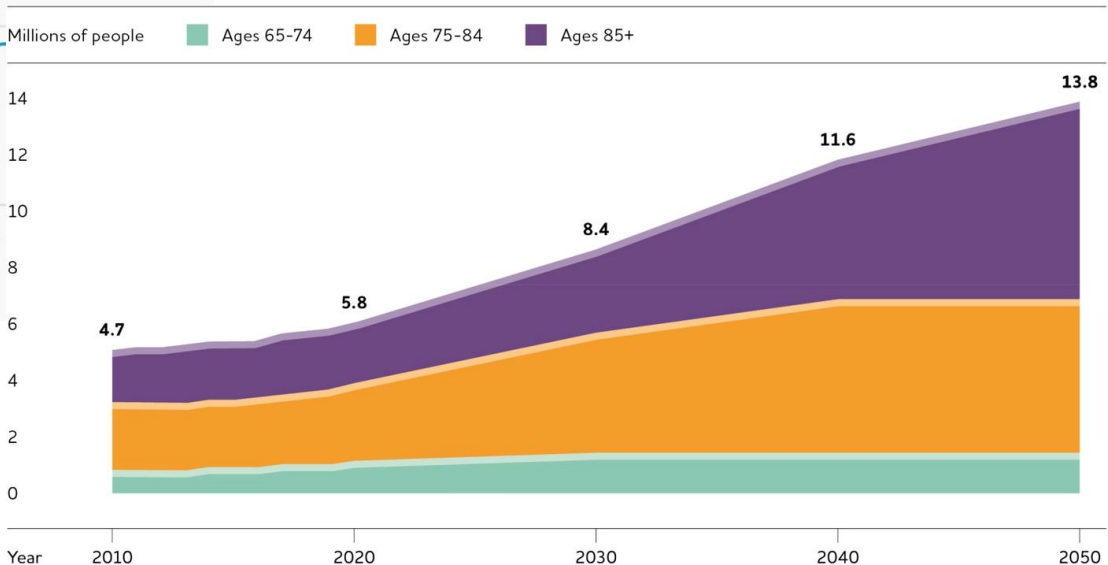


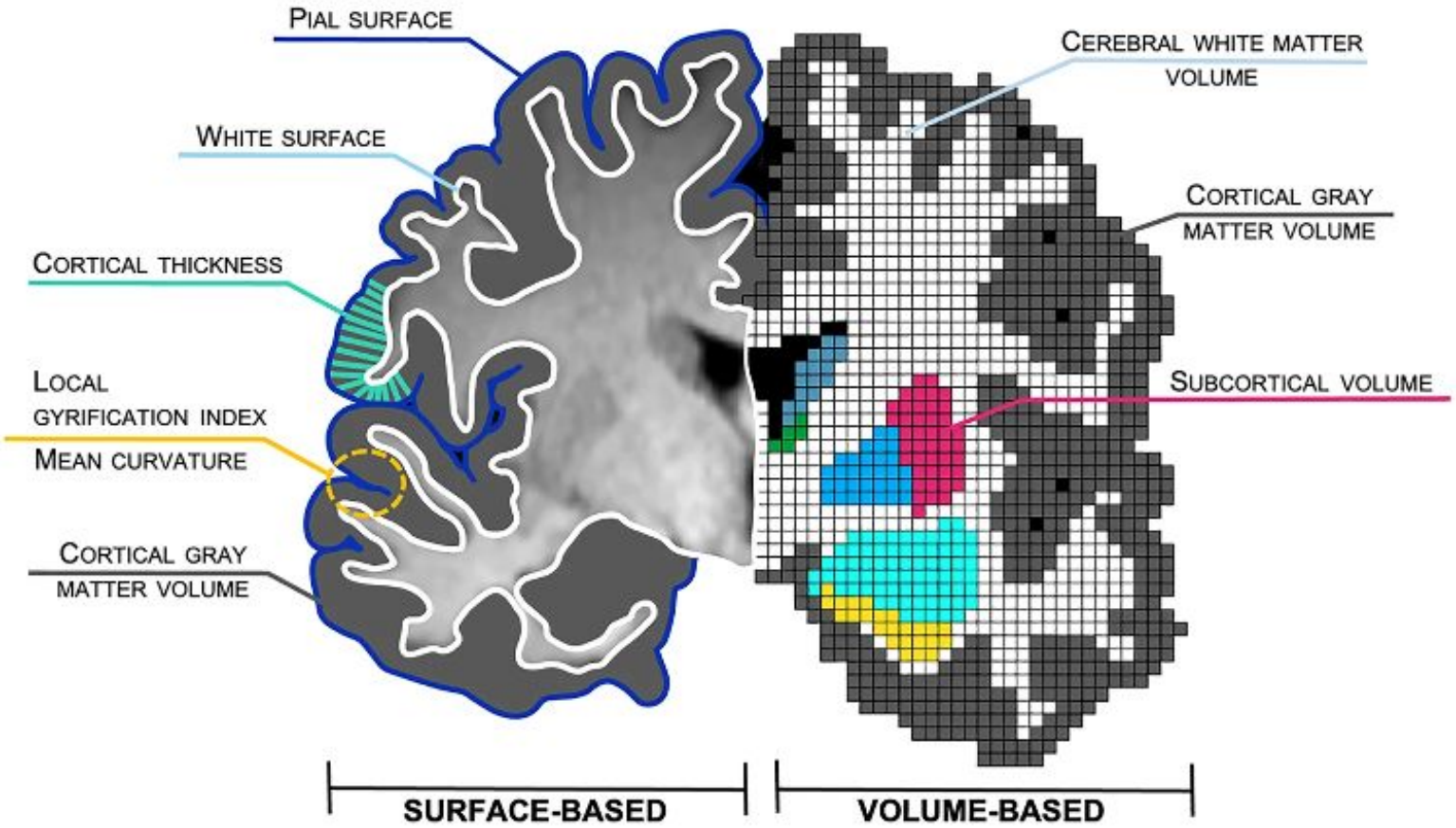






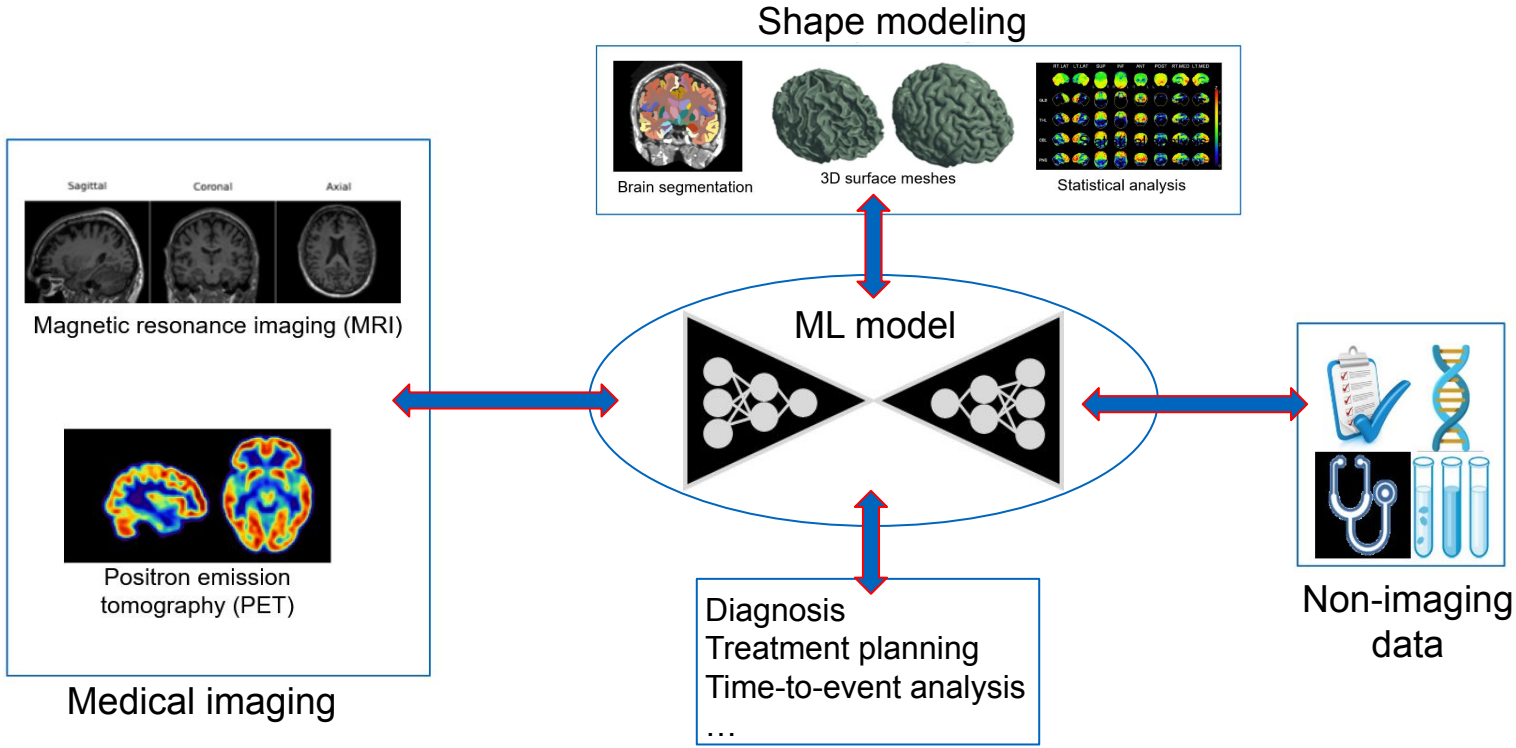
Alzheimer's disease





https://link.springer.com/article/10.1007/s11065-021-09496-2#Fig1

Machine Learning in Neuroimaging: Overview



Exemplary Topics

- Deep learning architectures (CNN, GNN, Transformer)
- Multi-modal data analysis
- Generative models
- Disease prediction (e.g. Alzheimer’s)
- Supervised and unsupervised learning strategies (and in-between, e.g., semi-supervised)
- Shape analysis, geometric deep learning
- Explainable AI
- Causal inference

See also topics from last semester (the wiki is the central platform)

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)

  70% of final grade
- Blog post (~4 pages DIN A4, working with ChatGPT encouraged) about the selected paper

  30% 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

03.07.23: Pre-course meeting (today)

28.07.23: Matching results

October 4, 2023, 23:59: Deadline for deregistration

October: Kickoff (online, attendance mandatory), assignment of papers. Exact dates TBA.

Before Christmas: Meet your supervisor (not mandatory but recommended)

January (2 days, 9-14h): Block seminar (LUTZ /Nigerstr., close to Klinikum rechts der Isar)

Attendance on both days 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)!