Applied Deep Learning in Medicine

Who we are

- Institute for AI in Medicine (http://aim-lab.io/)
- Part of Departments of Informatics and Medicine
- Offices at MRI (TranslaTUM) and Garching
- Developing methods for the intersection of AI and medicine
- Close collaboration with medical experts

Courses at the Chair

- Lectures:
  - AI in Medicine I & II
  - Multimodal Deep Learning
- Seminars:
  - Trustworthy AI in Medicine
  - Implicit Neural Representation and Neural Fields
- Practical
  - Advanced Deep Learning in Medicine

What the practical is about

- Most uni projects are on toy data
- This does not represent real world in several aspects:
  - Messy/unprocessed data
  - Storage/Computing requirements
- Our goal is to train you to work on real-world data
  - How to preprocess data?
  - How to structure a project?
  - How to communicate with stakeholders?
- Two birds, one stone
  - You get real world experience
  - Also you will have excellent prerequisites for consecutive projects

How will this look like

- 24 students, 3 persons per team -> 8 teams
- Two supervisors for two groups
- Teams are assigned to tasks on a medical dataset
- Weekly informal updates
- Consultation with medical experts possible
- Computational resources are available (to some degree)

How will it be evaluated

- Grades are based on
  - 3 presentations during the semester
    - especially your problem solving skills
    - your interaction with other teams
  - your code
  - final presentation
  - project report
- Grades within teams can differ
- Individual grades will be team grade adapted by contribution

Current projects

Supervisor	Project Title
Anna	Self-Supervised Learning for Intra- and Cross-Domain Generalization in 3D Medical Image Segmentation
Jojo	Cascade Learning for Personalized Medicine: Enhancing Diagnostic Accuracy Through Population-Specific Models
Robert	Image Translation and Generation with LatentDiffusion
Hendrik & Sarah	Inherently interpretable deep learning models for semantic segmentation
Wenke	Evaluating Positional Encodings in Vision Transformers for Medical Image Data
Dima	Risk Assessment of Chronic Disease Using Images and Image-derived Features in UK Biobank
Matan	Diagnosing Intervertebral Disc Degeneration from MRI with Graph Neural Networks
Maulik	Vision-Language Pretraining on Medical Data

What we expect

- You don't need to be an expert
- You should have done related courses and have a background in machine learning
- To assess your knowledge we provide a google form which tells us about your background
- All data entered will be only used for the purpose of the practical and deleted right after
- Based on your answers we will prioritize for the matching
- People who are accepted to the practical need to be able to prove the listed courses and grades
- Questions?
    - https://forms.gle/JAnEsgtuLAPvqneh7