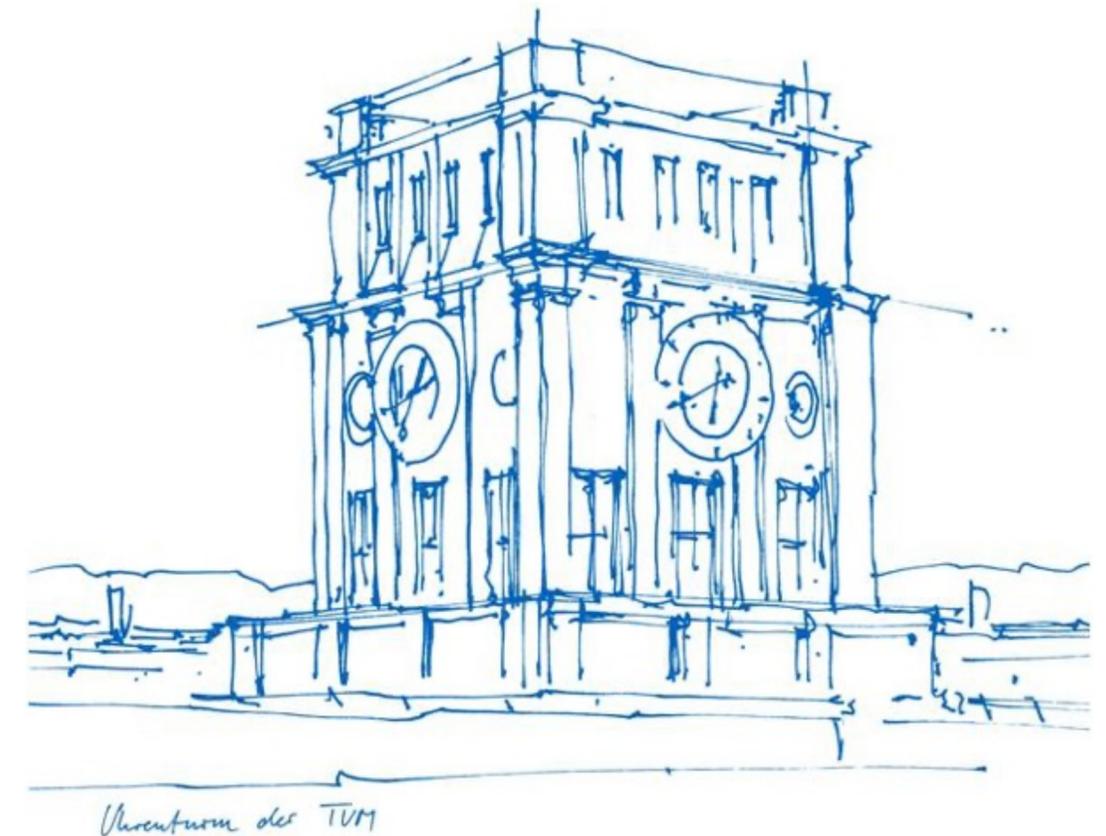


Master Seminar Unsupervised Anomaly Detection in Medical Imaging (IN2107, IN45010)

Professor Julia Schnabel,
Cosmin Bercea,
Felix Meissen



I32 – Chair for Computational Imaging and AI in Medicine - **CompAI**
Faculty of Informatics and Institute for Advanced Study

I31 – Chair for Artificial Intelligence in Healthcare and Medicine - **AIMED**
Joint Appointment of the Faculties of Informatics and Medicine

19.07.2023

- Introduce ourselves
- Prerequisites
- Brief intro Anomaly Detection
- (Preliminary) Semester timeline
- Deliverables
- Organisation and questions

Who we are



Cosmin I. Bercea

PhD Student

[L32: compai.io](https://l32.compai.io)

cosmin.bercea@tum.de



Julia A. Schnabel

Professor for Computational Imaging and
AI in Medicine, Director of the Institute of
Machine Learning in Biomedical Imaging



Felix Meissen

PhD Student

[L31: aim-lab.io](https://l31.aim-lab.io)

felix.meissen@tum.de

Who you are

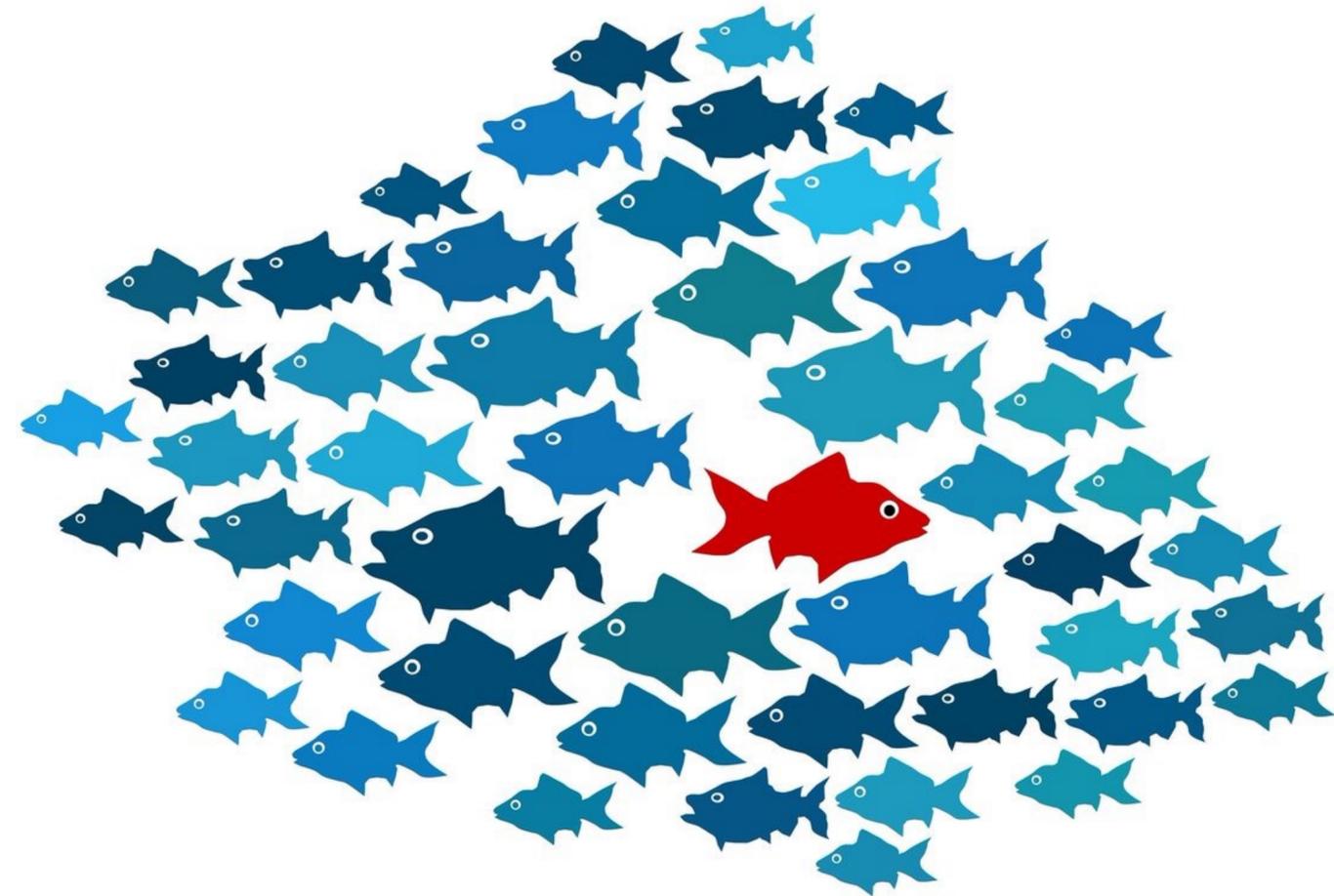
- You are a **masters student** in **informatics** or a related program
- You have programming experience in Python and **PyTorch**
- You ideally took the **AI in Medicine I** lecture (IN2403) already
- You want to start your academic career in ML and AI for Medicine
(A good grade in this seminar will help you find **IDPs**, **GRs**, or **MA**s at our chairs)

Where?

- Please register through the matching system ([https://
matching.in.tum.de/](https://matching.in.tum.de/))

What is it?

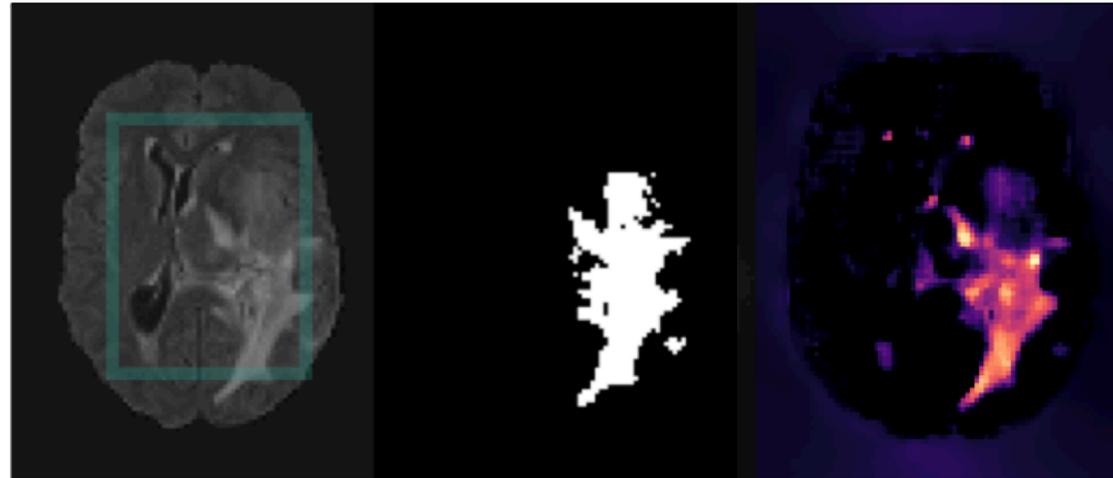
- detect **irregular**, rare instances that deviate from the **normal**, expected distribution
- Use-cases in medicine:
 - Outlier / domain shift detection
 - Automatic detection of critical findings
 - Disease evolution monitoring
 - Clinical screening



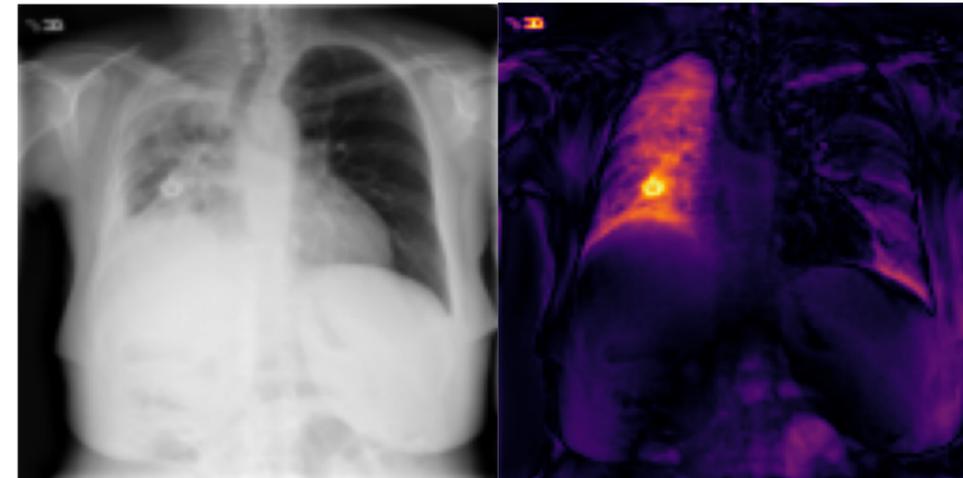
Anomaly Detection

Applications to medical imaging

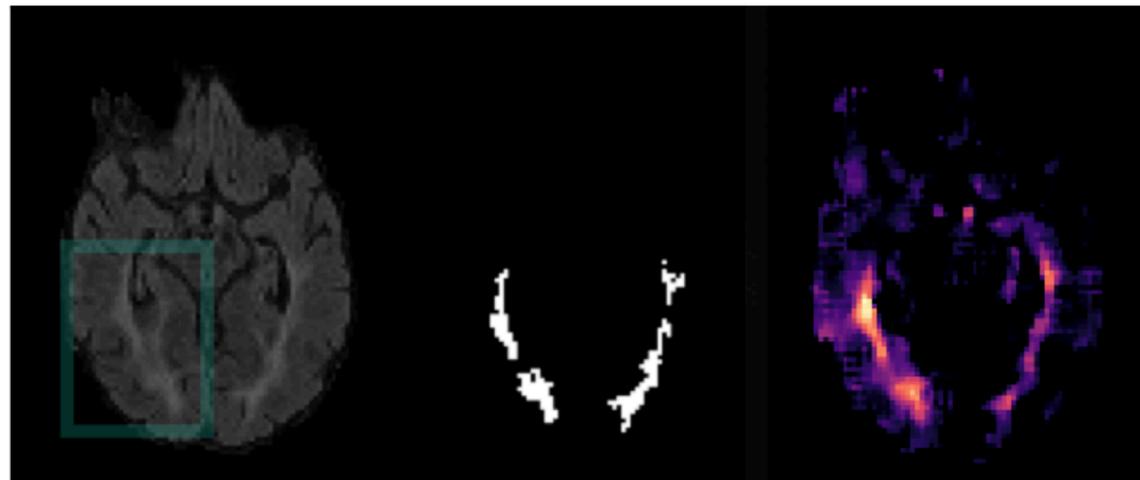
Brain Tumors [MRI]



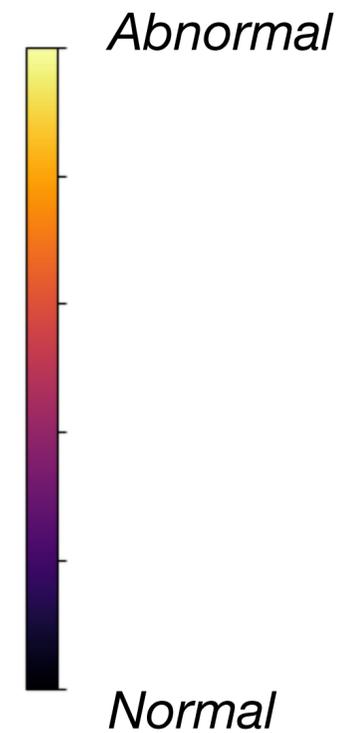
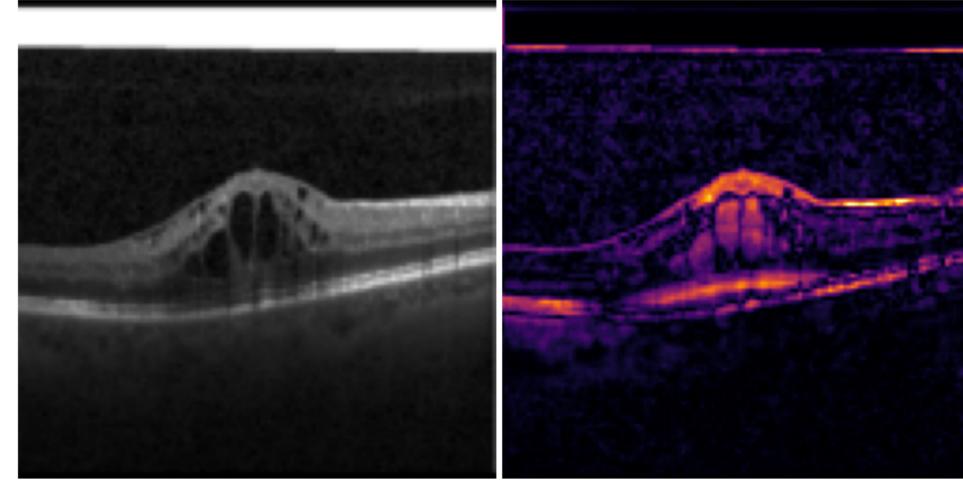
Pneumonia [chest X-ray]



Multiple Sclerosis [MRI]



Choroidal Neovascularization [OCT]



Seminar structure (Preliminary)



Outlook

| | |
|-----|---|
| TBD | Lecture 1: Orga + Intro Anomaly Detection |
| TBD | Lecture 2: How do we evaluate anomaly segmentation? |
| TBD | Lecture 3: 'How to' critically read paper / make a poster |
| TBD | Lecture 4: Live intro to our Coding Framework |
| TBD | Guest Talk I: Prof. TBD |
| TBD | Paper Presentations (Groups A, B) |
| TBD | Guest talk II |
| TBD | Paper Presentations (Groups C, D) |
| TBD | Guest talk III |
| TBD | Paper Presentations (Groups E, F) |
| TBD | Guest talk IV |
| TBD | Paper Presentations (Group G) |
| TBD | Poster Session (All groups) |

Your tasks

- Paper presentations: Present a **summary and critical evaluation** of your selected paper (we give a selection, but you can propose your own)
- Experiment presentations: **Implement** your selected papers in **groups of two** using **our framework** and **compare their strengths and weaknesses** in experiments
- **Active Participation:** Engage and interact during the presentations and guest lectures

Throwback to last semester



Questions?



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PhD Student

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PhD Student

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felix.meissen@tum.de