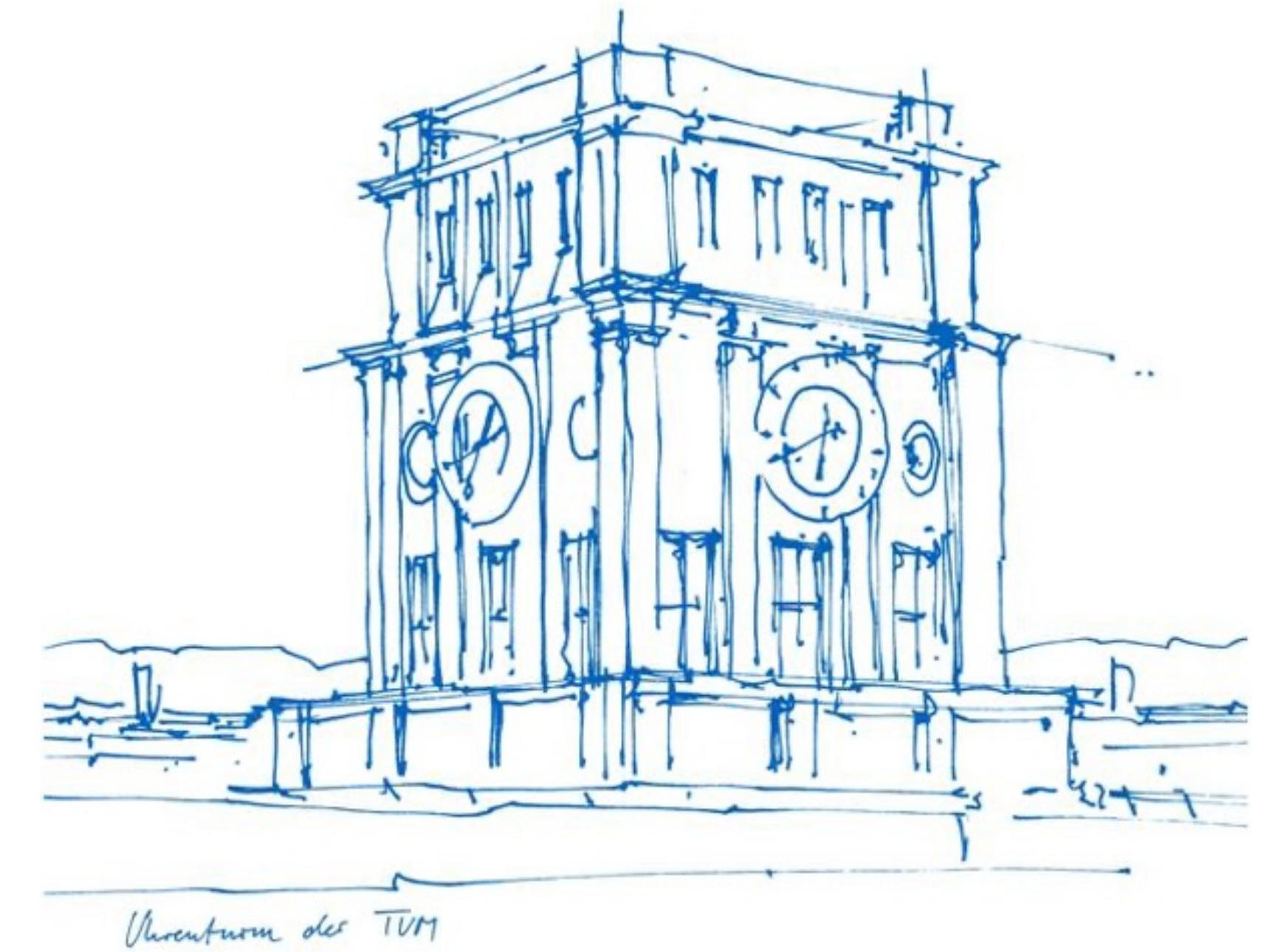


Master Seminar Unsupervised Anomaly Detection in Medical Imaging (IN2107, IN45010)

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

Outline

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

Intro

Who we are



Cosmin I. Bercea

PhD Student

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Julia A. Schnabel

Professor for Computational Imaging and
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Machine Learning in Biomedical Imaging



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Prerequisites

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 **MAs** at our chairs)

Registration

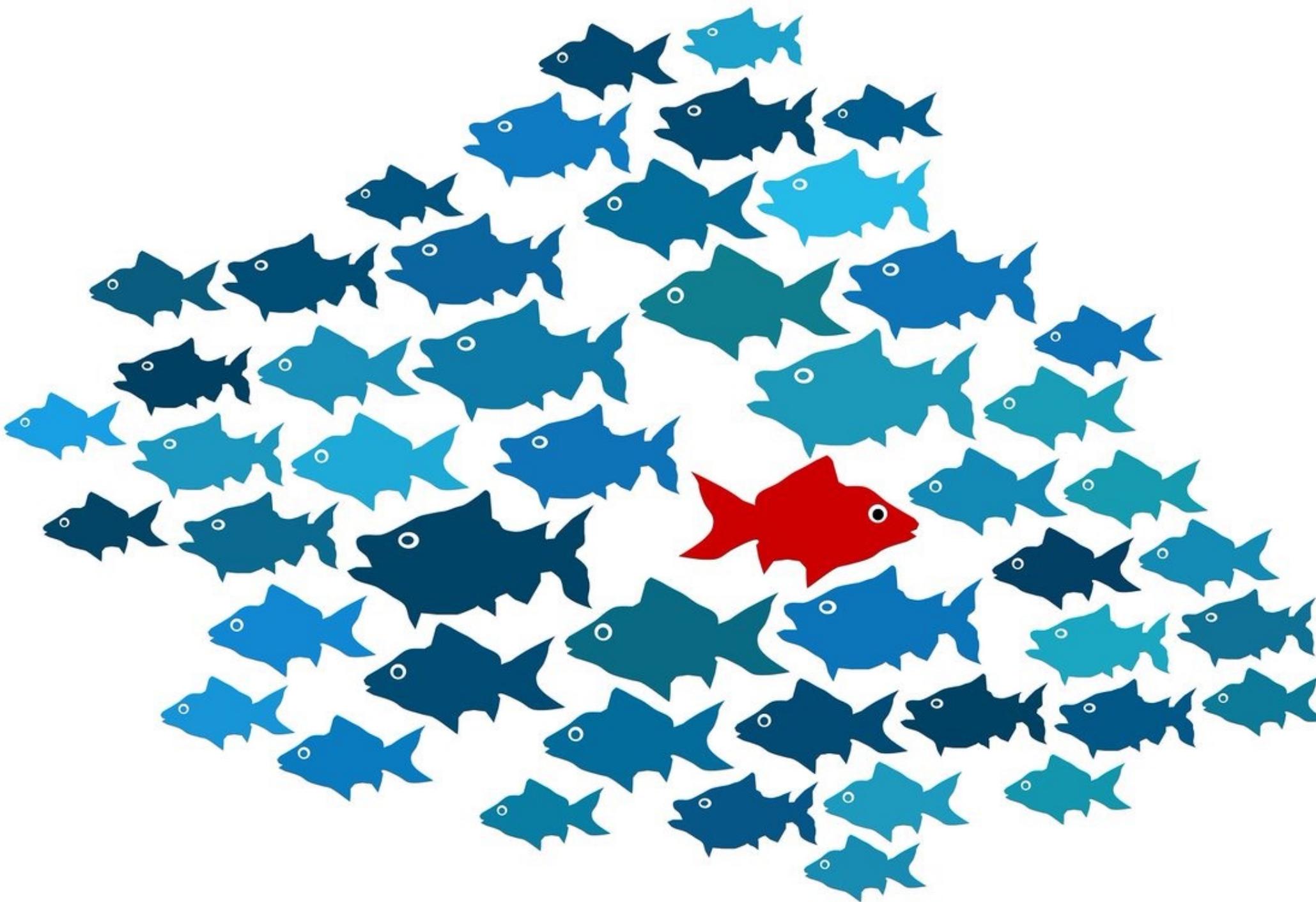
Where?

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

Anomaly Detection

What is it?

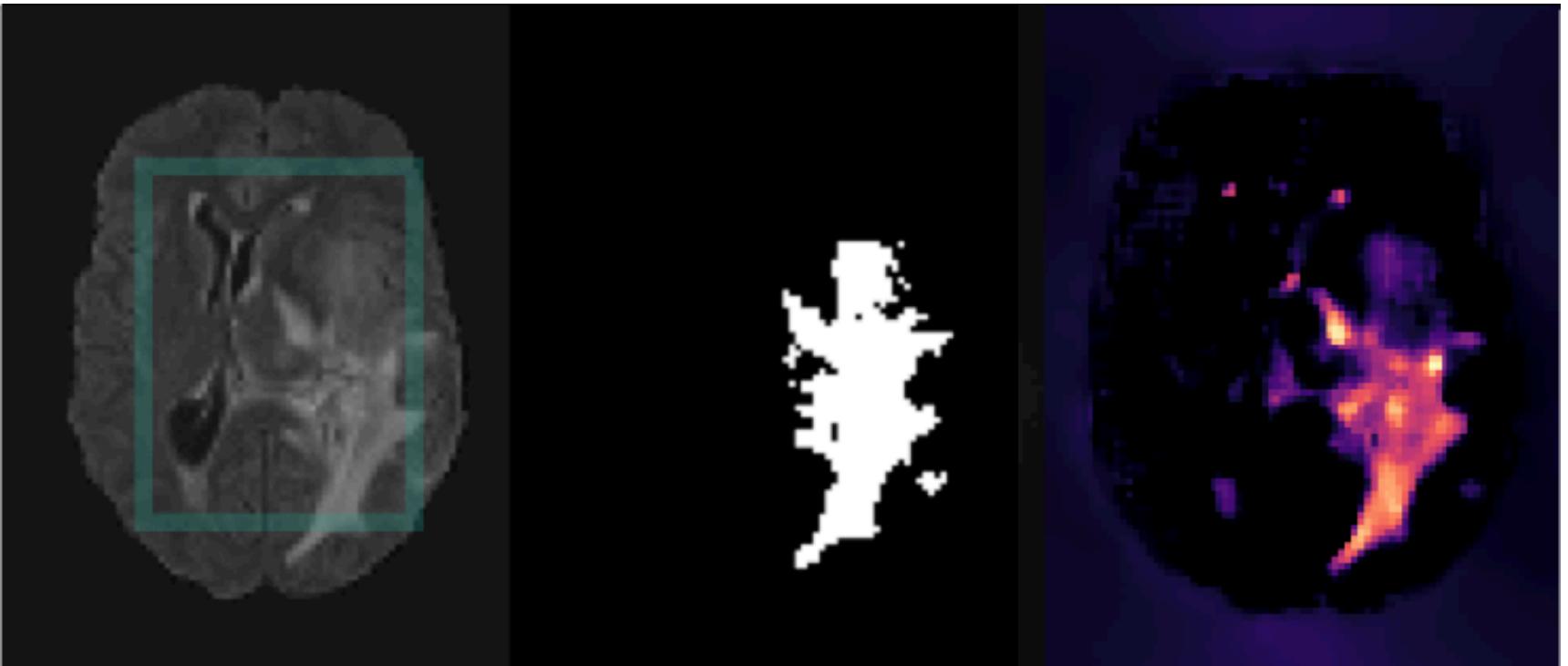
- detect **irregular**, rare instances that deviate from the **normal**, expected distribution
- Use-cases in medicine:
 - Outlier / domain shift detection
 - Automatic detection of critical findings
 - Disease evolution monitoring
 - Clinical screening



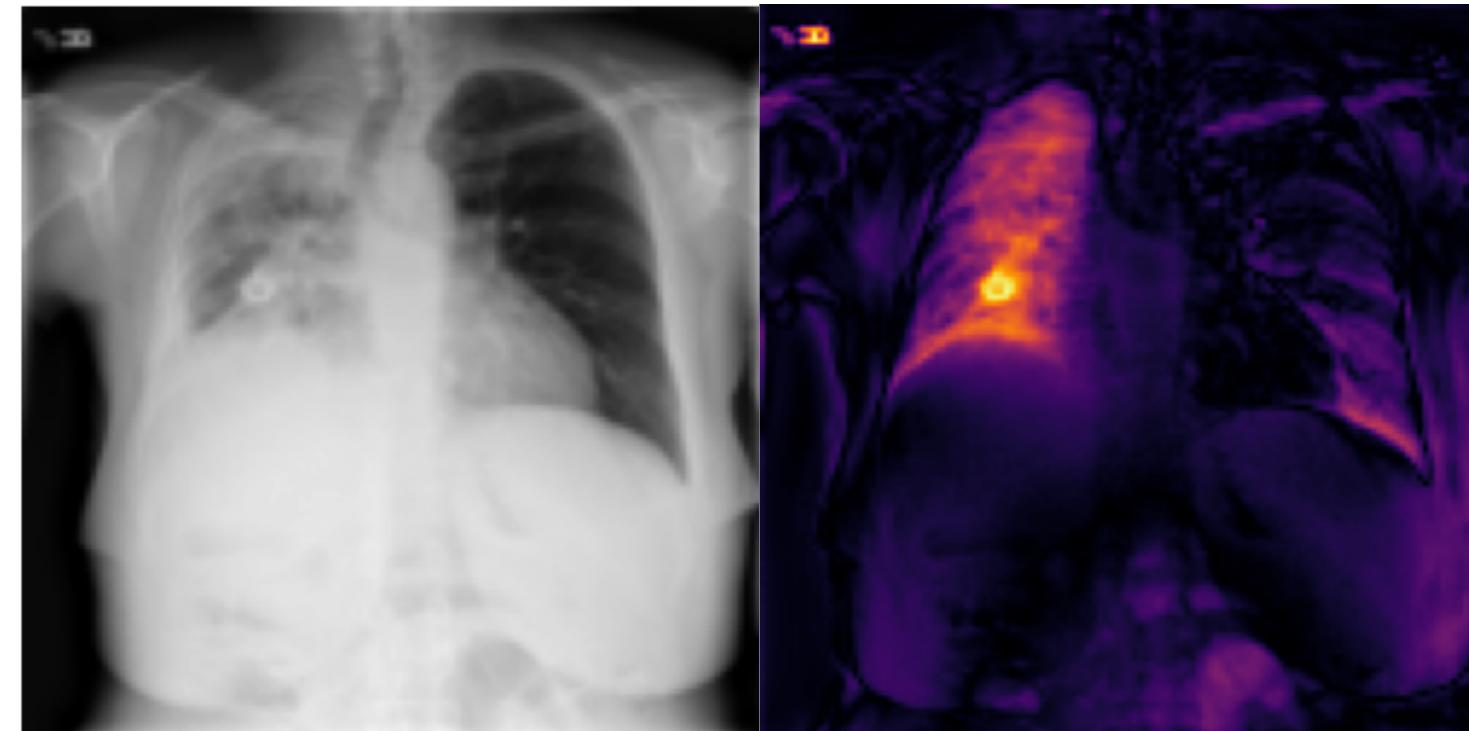
Anomaly Detection

Applications to medical imaging

Brain Tumors [MRI]

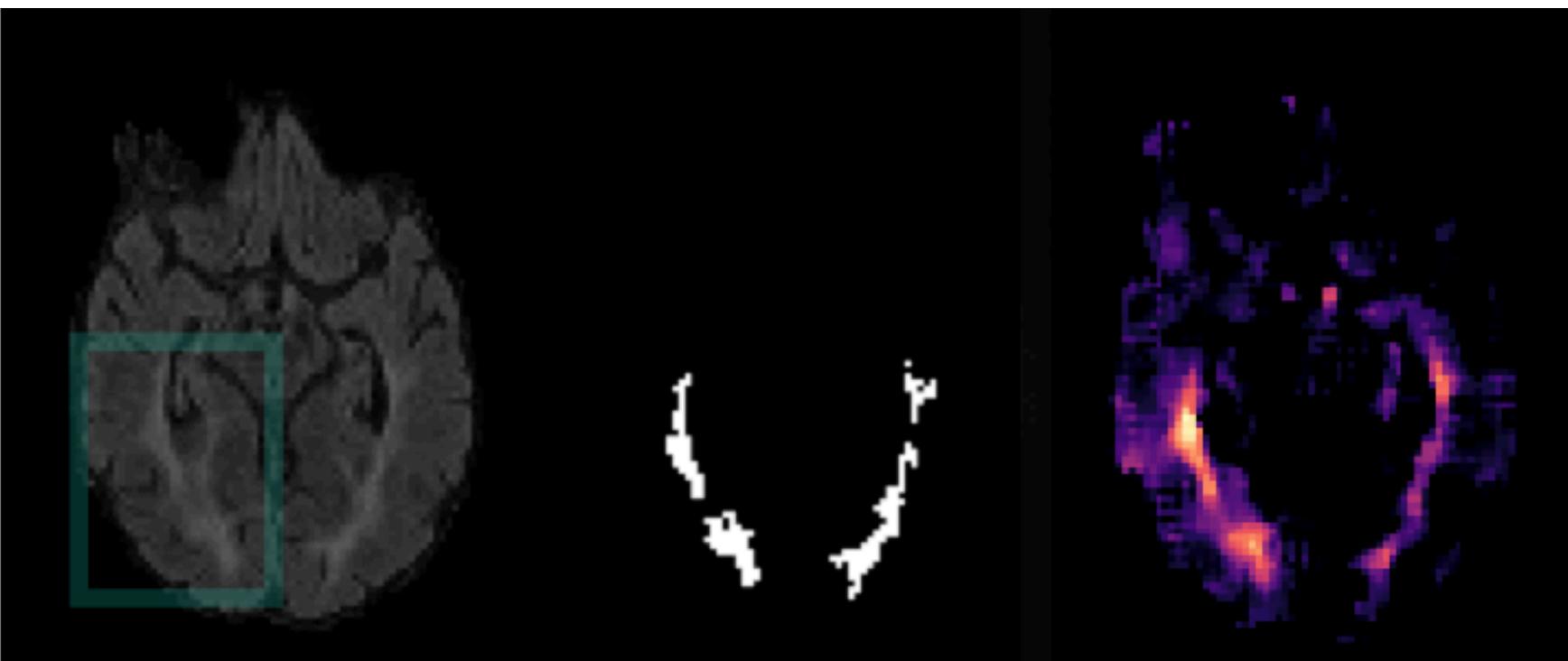


Pneumonia [chest X-ray]

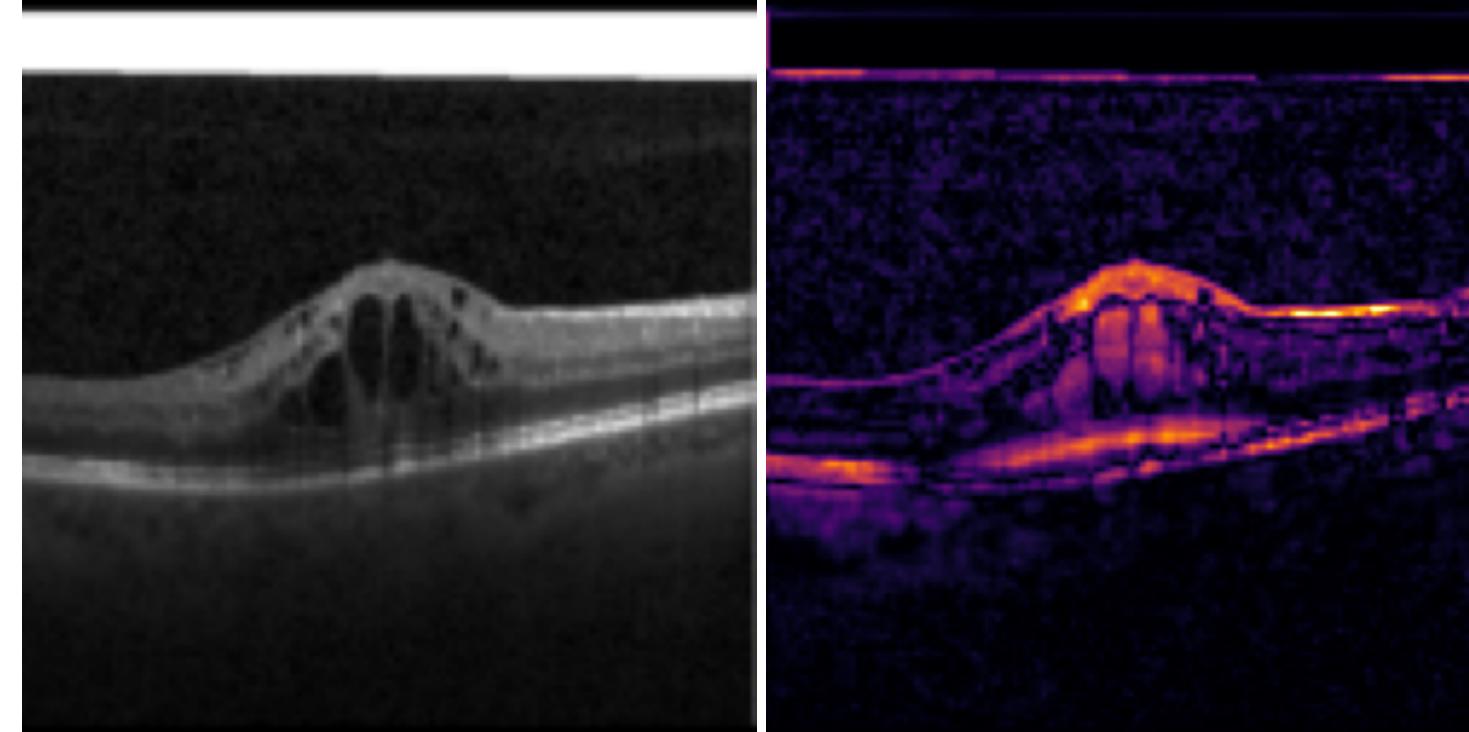


Abnormal

Multiple Sclerosis [MRI]



Choroidal Neovascularization [OCT]



Normal

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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