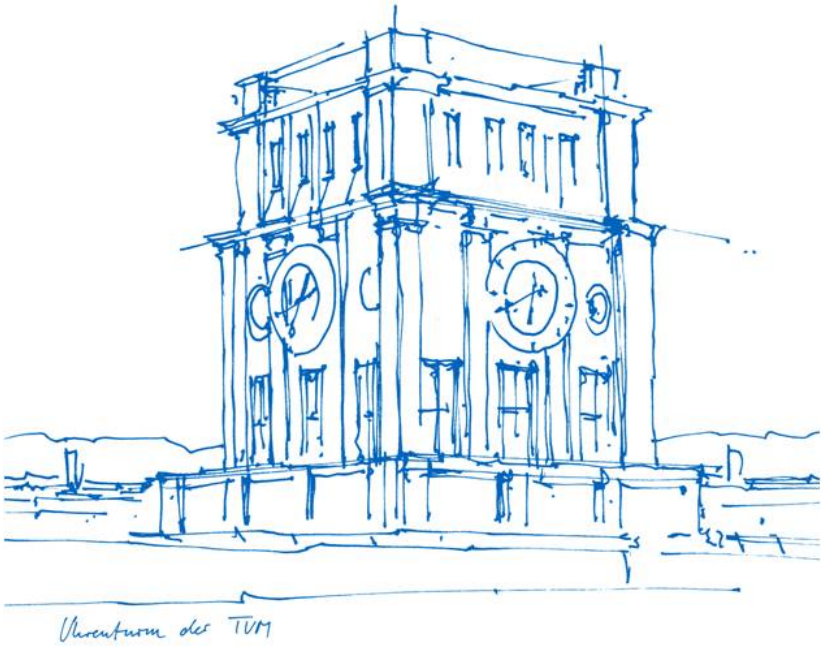
Masterseminar:

Self-supervised Learning in Medical Imaging: Theory and Applications

Dr Maxime Di Folco, Dr Daniel Lang

Chair for Computational Imaging and AI in Medicine

SS 25



Who are we?

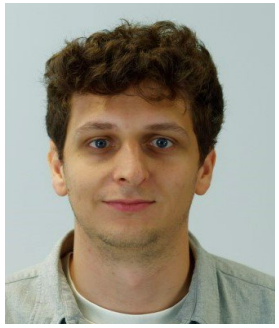
Computational Imaging and AI in Medicine
Prof. Dr. Julia Schnabel

CompAI
Computational Imaging and AI in Medicine

IML
Institute of Machine Learning in Biomedical Imaging

Who are we?

Dr. Maxime Di Folco
maxime.di-folco@tum.de



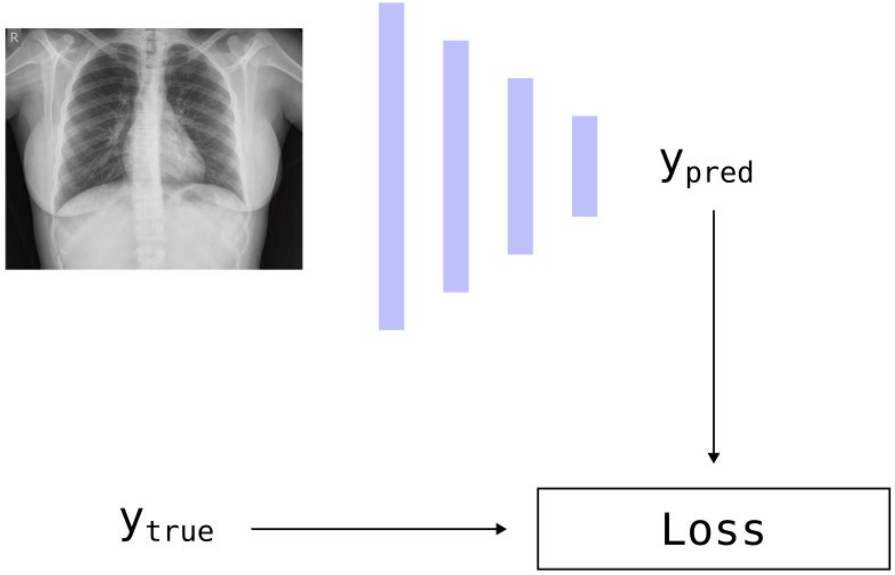
- Research interest:
  - Representation learning
  - Cardiac imaging

Dr. Daniel Lang
daniel.lang@tum.de

- Research interest:
  - Self-supervised learning
  - Transfer learning
  - Survival Analysis

Supervised Learning

- Requires labeled data
- Weights are adjusted until the model is fitted appropriately



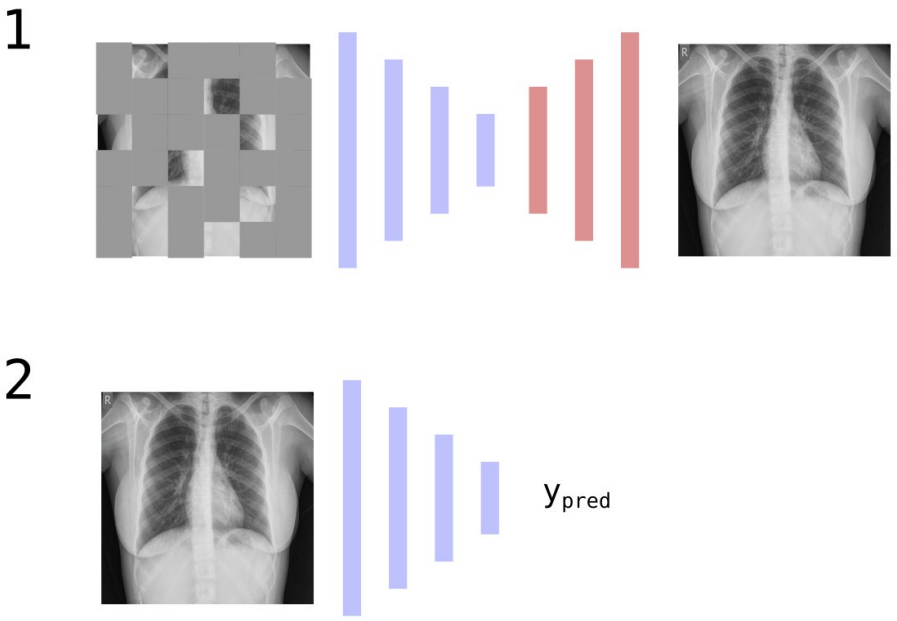
Downsides:

- Huge amounts of data are needed
- Labeled data is often hard to acquire (for certain tasks)
- Models can struggle to generalize

Self-supervised Learning

What is Self-Supervised Learning?

- (Pre-)train on unlabeled data
- Models will acquire more general knowledge
- Systems yield considerably higher performance than when solely trained in a supervised manner.



Why Medical Imaging?

- Medical data is scarce
- Medical labels are scarce
- Unstructured medical images are relatively easy to acquire

Goals of the Seminar

- **Understand**:

  Theory of **self-supervised learning**
  Challenges of these methods **in medical imaging**

- **Learn**:

  How to read and present a scientific paper
  How to design and present a scientific poster

- **Know better**:

  Wide range of **medical imaging applications**

- International **guest speaker** talks on the topic

General Information

- **Requirements:**

  Background in machine learning/ deep learning
  Interest in medical image analysis
  Interest in research

- **Each student:**

  Will work with 2 papers
  Will present one paper in class
  Will present one poster in session

- **Grading** will be based on:

  Attendance
  Presentation and Q&A
  Poster design and presentation
  Active participation during the seminar

Poster session at end of semester