

**Earliest start  
01.02.2025**



Institute for Automation and Applied Informatics (IAI)

## Bachelor / Master's Thesis

### Title: Cell Contrastive Learning in Imaging Flow Cytometry

Do you have interest in self-supervised learning? Are you ready to dive into the fascinating world of biomedical innovation? Are you passionate about computer vision? Join us in advancing the field of cellular contrastive learning in imaging flow cytometry.

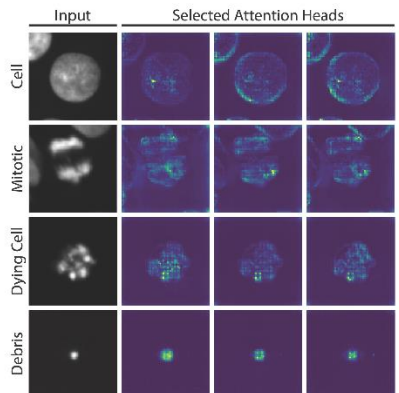
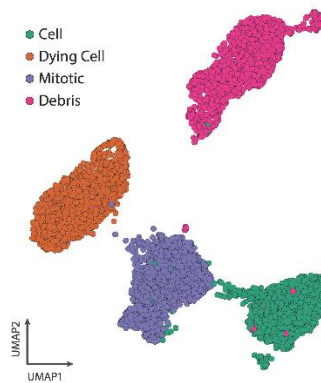
A critical step in understanding cellular structures and processes is indeed the identification and characterization of different cells. This is still a manual and very tedious process that can be modeled as a clustering problem.

This thesis offers the chance to work on cutting-edge computational techniques for analyzing biomedical images, contributing to innovations in medical research and diagnostics.

#### Tasks

The investigation should cover the following aspects:

- Literature research on state-of-the-art representation learning methods with focus on biomedical image data
- Benchmarking of the researched methods on dataset based on predefined KPIs (Key-Performance-Indicator)
- Ablation study of a selected method



Ramon Pfaendler, Jacob Hanimann, Sohyon Lee, Berend Snijder  
Self-supervised vision transformers accurately decode cellular state heterogeneity, 2023

#### Requirements:

The following skills, abilities, and knowledge are necessary:

- Studies in Computer Science / Engineering or related fields
- Basic knowledge in deep learning and image processing
- Experience with programming in Python
- Experience with image processing libraries in Python such as OpenCV
- Experience with Python-based deep learning frameworks (PyTorch, JAX, or TensorFlow)

#### Benefits:

- Thesis can be done in German or English
- Possibility to work from home
- Onboarding

Interesting for you? Please send an e-mail with your resume and transcript of records to the contact person below.