

## PhD thesis in Bio-image Data Science for understanding Human Pathomechanisms

The Bio-image Analysis Technology Development Group at the Cluster of Excellence "Physics of Life" (PoL) at TU Dresden lead by Dr. Robert Haase is searching for a PhD student in the field of bio-image data science. The project is part of a collaboration with the Retina Regeneration and Degeneration Research Group headed by Prof. Dr. Mike O. Karl at the Center for Regenerative Therapies Dresden (CRTD) and at the German Center for Neurodegenerative Diseases (DZNE) Dresden.

### Goal of the project

Cell extrusion is the process of physical displacement of cells within or out of a tissue or organ. It happens for example during age-related retina degeneration, a pathology which is not fully understood yet. Standardized computational methods for detecting and characterizing cell extrusion from experimental live imaging and clinical imaging data are not established yet and have a huge potential for early disease detection and therapy response prediction. Goal of the project is to characterize cell extrusion quantitatively as observed in microscopy images in space and time and establish a digital fingerprint of cell extrusion related processes based on classical image-derived features (see Figure 1) or newly developed features. The applicant who accepts this challenge will work closely together with computer scientists, biologists, clinicians and biophysicists to establish algorithms and tools to study cell extrusion in microscopy imaging data. This is an opportunity to become expert in bio-image analysis, feature extraction, feature engineering, unsupervised machine learning, graph neural networks and research software engineering.

### Requirements

Applicants must fulfil all these conditions:

- Master's degree in Biomedical Engineering, Computer Science, Data Science, Biology, Biophysics or similar
- Proven Python programming skills and experience with common libraries such as scikit-image and scikit-learn
- English skills on level approximately B2

### Optional requirements

Applicants should have experience in at least one of the following aspects

- wet-lab biology or [pre-]clinical studies
- contributing to open-source projects
- data science or high-performance-computing
- GPU-acceleration techniques (OpenCL, CUDA, Pytorch, Tensorflow, clesperanto)

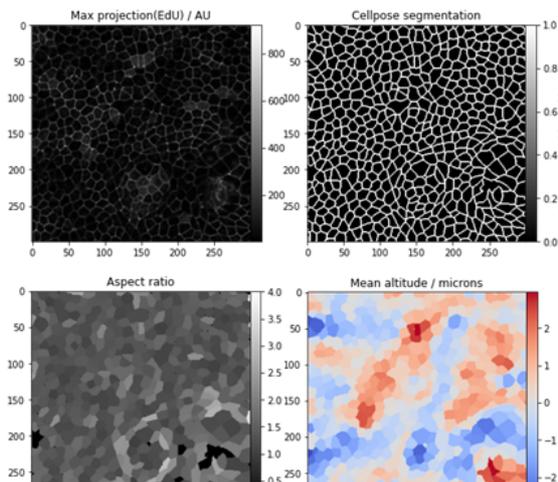


Figure 1: Imaging data, cell-segmentation, shape and altitude measurements allow tissue characterization

Applications are only accepted via online platform of the Dresden International Graduate Schools for Biomedicine and Bioengineering (DIGS-BB): <https://www.digs-bb.de/join> . In case of further questions, please contact [robert.haase@tu-dresden.de](mailto:robert.haase@tu-dresden.de)