Center for Integrative Bioinformatics (CIBI Dresden)
Dresden Analysis-of-Images Suite (DAIS)

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Short description of the project

DAIS provides tools and services for biological image analysis. We develop and maintain the **Fiji platform** which is consistently recognized as one of the most widely used open source platforms for biological image analysis worldwide. We provide a powerful, stable, and user-friendly software stack for bio-image analysis.
The **Fiji community** is actively working towards tight integration with the **KNIME workflow engine**, that is developed and maintained by CIBI. This allows for direct dissemination into the de.NBI network through collaboration with an established center.

ImageJ2 Fiji CLIJ ImgLib2 KNIME

de.NBI services

DAIS offers **tools for expert image analysts** (typically biologists). We transfer state-of-the-art methods from prototypes into user-friendly, interactive tools.
We maintain **key libraries for algorithm developers** doing state-of-the-art bio-image analysis research.
We provide extensive documentation, teaching materials, tools, support, and consultation on:

- Availability in Fiji/KNIME
- Big (*n*-D, image) Data
  - Visualization
  - Processing
- Image registration/fusion
- Image restoration
- Segmentation + tracking
  - Leveraged editing
  - Life-long learning
  - Evaluation measures
- Cluster computation
- Tool interoperability

Progress report

New Fiji + KNIME software

- *Labkit* – interactive segmentation framework based on BigDataViewer and WEKA machine learning.
- *Mastodon* – large-scale tracking + curation framework based on BigDataViewer and TrackMate.
- *Imglib2-cache* – processing of arbitrary large images.
- *Imglib2* data transport for KNIME / Fiji integration.
- Fiji plugins for quality-evaluation of tracking results.
- CSBDeep (CARE and Neural Network support)
- CLIJ (GPU-accelerated image processing for everyone)

Courses and events:

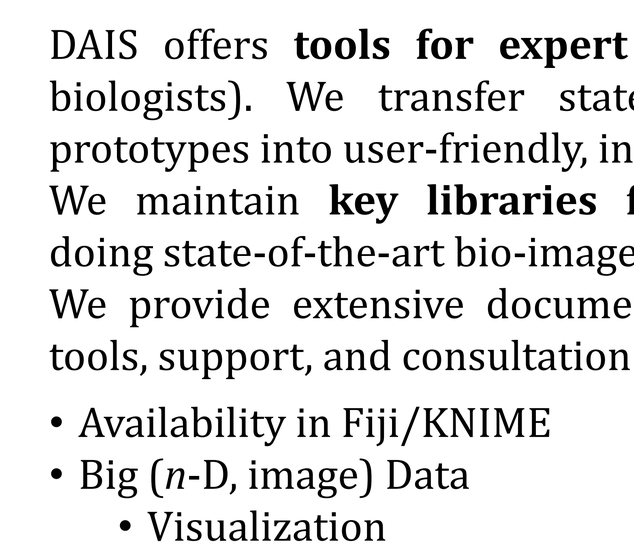
- We co-organized www.celltrackingchallenge.net
- We participate and teach in 3rd party events (past year: SciView, IJ2, and KNIME hackathons, NEUBIAS Training Schools, EMBO Light Sheet Course.)

de.NBI training and education

DAIS supports the de.NBI community by organizing training events and **workshops for image analysts**, and by hosting **hackathons for developers**:

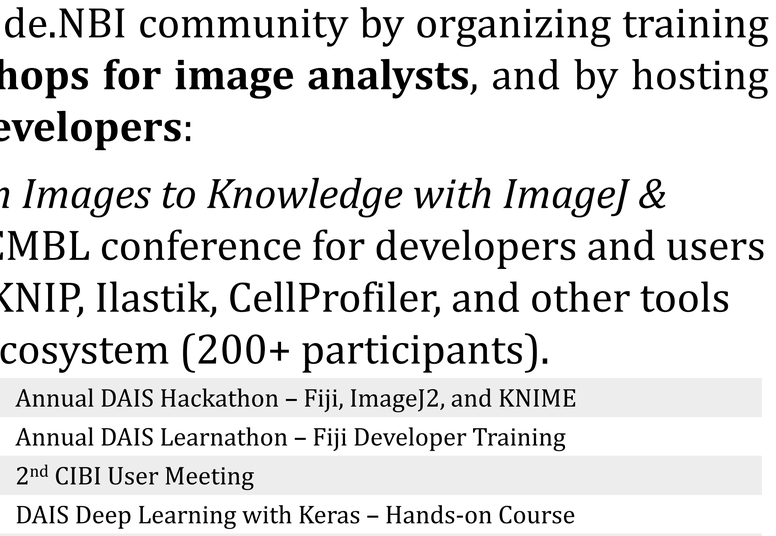
We organized *From Images to Knowledge with ImageJ & Friends (I2K),* the EMBL conference for developers and users of ImageJ, KNIME KNIP, Ilastik, CellProfiler, and other tools in our expanding ecosystem (200+ participants).

Dec 2017	(Dresden, DE):	Annual DAIS Hackathon – Fiji, ImageJ2, and KNIME
Jun 2018	(Dresden, DE):	Annual DAIS Learnathon – Fiji Developer Training
Sep 2018	(Berlin, DE):	2nd CIBI User Meeting
Sep 2018	(Dresden, DE):	DAIS Deep Learning with Keras – Hands-on Course
Dec 2018	(Heidelberg, DE):	I2K conference (From Images to Knowledge with ImageJ & Friends)
Jan 2019	(Ostrava, CZ):	Annual DAIS Hackathon – Fiji, ImageJ2, and KNIME
Jun 2019	(Dresden, DE):	Annual DAIS Learnathon – Fiji Developer Training
Dec 2019	(Dresden, DE)	Annual DAIS Hackathon – Building bridges to Python & others
June 2020	(Dresden, DE)	Annual DAIS Learnathon – Fiji Developer Training
Aug 2020	(Ostrava, CZ)	Annual DAIS Hackathon – Parallel processing



DAIS-contributed KNIME nodes and views

UI of *Labkit* interactive segmentation framework



UI of *Mastodon* tracking & curation framework

Staff

- Until recently 2 FTE (1,5 FTE de.NBI, 0,5 FTE own contribution)
- All positions were filled throughout the funding period.
- Furthermore, two doctoral students in Jug group and postdocs in Tomancak and Myers groups contribute.

Selected Publications

CLIJ: GPU-accelerated image processing for everyone.
Haase, R., Royer, L.A., Steinbach, P. *et al. Nat. Methods (2020)*
Analysis of Actomyosin Dynamics at Local Cellular and Tissue Scales Using Time-lapse Movies of Cultured Drosophila Egg Chambers.
Viktorinová, I., Haase, R., Pietzsch, T., Henry, I., Tomancak, P. *J. Vis. Exp. (148), e58587 (2019)*
Content-aware image restoration: pushing the limits of fluorescence microscopy.
M. Weigert, U. Schmidt, P. Tomancak, F. Jug, E. Myers, et al. – *Nat. Methods (2018)*
An Objective Comparison of Cell Tracking Algorithms.
V. Ulman, …. F. Jug, P. Tomancak et al. – *Nat. Methods (2017)*

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www.denbi.de