Biomedical Informatics Grand Rounds

Wednesday, April 3, 2024

3:00 pm – 4:00 pm

From Content-Aware Denoising to Semantic Unmixing of Microscopy Data - How AI is and will Transform Scientific Image Data Analysis in the Life Sciences

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Location: Mart 7th floor, 7M-0602

Remote Access
Join Zoom Meeting https://stonybrook.zoom.us/j/95617197636?pwd=KytzZ2pVRG9SZGpKZUtpNXJISjNjZz09
Meeting ID: 956 1719 7636 Passcode: 924293

Bio: Dr. Florian Jug holds a PhD in Computational Neuroscience from the Institute of Theoretical Computer Science at ETH Zurich. His research aims at pushing the boundary of what AI and machine learning can do to better analyze and quantify biological data. At HT, Dr. Jug covers the full breadth of bio-image computing, from research on novel methods for computer vision and machine learning, all the way to offering bio-image analysis as a service.

Florian Jug is a strong proponent of open access science, open AI and ML methods, and open source software. His team is a core contributor to Fiji (~100,000 active users) and collaboratively develops open methods such as CARE, Noise2Void, PN2V, DivNoising, etc. He organizes scientific conferences (e.g the I2K conference), workshops (e.g. the BIC workshops at top-tier computer vision conferences) and various practical courses on machine learning for bio-image analysis (e.g. DL@MBL in Woods Hole) or microscopy (e.g. Quantitative Imaging at Cold Spring Harbor).

Abstract: The necessity to analyze scientific images is as old as the ability to acquire such data. While this analysis did initially happen by observation only, modern microscopy techniques enable us to image at unprecedented spatial and temporal resolutions, through the 'eyes' of many and diverse imaging modalities. The unfathomable amounts of data acquired in the context of life science research cannot any longer be analyzed by manual observation alone.

Instead, algorithmic solutions are helping researchers to study and quantify scientific image data. In the past years, our abilities to use artificial intelligence (AI) for the automated analysis of scientific image data gained significant traction, and many important analysis problems have now much improved solutions based on ANNs. At the same time, we start being aware of limitations that come with this new set of machine learning approaches. To overcome those, it will require a community effort, and I will be happy to make this case in my talk. Additionally, I would like to give an update on some of the latest algorithmic developments from our and other labs. More specifically, I will talk about our latest analysis methods and the efforts of our community as a whole to store, share, and run AI based methods via the BioImage Model Zoo -- a Horizon Europe funded infrastructure we are establishing.

Educational Objectives:

1. Introduce current challenges and advances in image analysis in scientific imaging.
2. Cover community efforts in overcoming current challenges in AI integration in image data analysis.
3. Introduce a free to use, open source online resource to host and share AI scientific imaging models.

Disclosure Statement: The faculty and planners have no relevant financial relationship with ineligible companies, whose primary business is producing, marketing, selling, reselling, or distributing health care products used by or on patients.

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