From Images to Knowledge with ImageJ & Friends

virtual conference

Nov 30 - Dec 2, 2020

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hhmi | janelia
Conferences

Deep learning assisted image analysis using ZeroCostDL4Mic

Tutors: Guillaume Jacquemet (guillaume.jacquemet@abo.fi)
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Session 1:   2020-12-01 07:00 UTC – 2020-12-01 11:00 UTC
Session 2:   2020-12-02 10:00 UTC – 2020-12-02 14:00 UTC

Title: Deep learning assisted image analysis using ZeroCostDL4Mic
Tutors: Lucas von Chamier, Romain F. Laine, Ricardo Henriques and Guillaume Jacquemet

Abstract:
Deep Learning (DL) methods are increasingly recognized as powerful analysis tools for microscopy. Despite the enthusiasm and innovations fuelled by DL technology, the need to access powerful and compatible resources and the complexity in setting up the necessary computational tools all lead to an accessibility barrier that most biology-focused laboratories find challenging to cross. We created ZeroCostDL4Mic, a platform simplifying access to DL by exploiting the free, cloud-based computational resources of Google Colab. ZeroCostDL4Mic allows researchers with little or no coding expertise to train, evaluate, and apply critical DL networks to perform tasks including segmentation (using U-Net and StarDist), object detection (using YOLOv2), denoising (using CARE and, Noise2Void), super-resolution microscopy (using Deep-STORM) and image-to-image translation (using Label-free prediction - fnet, pix2pix and CycleGAN). In this workshop, we'll provide a walkthrough on how to use ZeroCostDL4Mic to train DL networks.

Outline:
During the workshop, participants will have a chance to follow live walkthroughs using ZeroCostDL4Mic, with test data made available online (denoising and segmentation). The walkthroughs will be of the "follow along" nature, where the participants are encouraged to repeat the same procedures as the tutor. Participants will be encouraged to ask questions and interrupt as much as needed. They will also be encouraged to try these algorithms on their data, with the tutors' support.

Requirements:
Users will need to have a computer equipped with a modern web browser (Chrome preferentially) and an internet connection. To test the algorithms with their images, the students will also need a (free) Google account (e.g. Gmail, Google Drive). To follow the last part of the tutorial, users should also have Fiji pre-installed and the "CSBdeep" and "StarDist" and "LOCI" repositories enabled in the Fiji updater.

Breakdown of the practical:

Introduction of the topic, presented by the tutor (40min)

Introduction of each student, presented by the students (2-5min each, 50min)

Practical work and training (2h 30)

- 15 min: Walkthrough through the ZeroCostDL4Mic platform, Google Colab and Google Drive
- 30 min: Train your first DL network: Noise2VOID
- 30 min: Train your first segmentation network: StarDist 2D

- 30 min: Transfer learning, Data augmentation, and QC
- 30 min: Annotate data in Fiji using networks trained using ZeroCostDL4Mic
- 15 min: outlook on ZeroCostDL4Mic

Summary and questions (30 min)

Time of the day:
Anytime between 8 AM and 3 PM CEST.