



Workshop 4: Connectome generation and data pipelines

March 17, 2021

Overall goal: To identify the current state of the art, challenges and opportunities associated with connectome generation and data pipelines.

Agenda:

11:00 am ET **Welcome and Series Overview**

John Ngai, Ph.D.

Harriet Kung, Ph.D.

11:10 am ET **Welcome and Introduction**

Nicola Ferrier, Ph.D. (Workshop Co-Lead)

Viren Jain, Ph.D. (Workshop Co-Lead)

11:20 am ET **Workshop Logistics**

11:25 am ET **Speaker Sessions**

Each speaker will address three questions:

- a) What are the prospects and challenges you see in scaling your approach (and/or analysis goals in general) to volumes comprising hundreds of petavoxels of imaging data?
- b) What kinds of general improvements in technical infrastructure (hardware and/or software) would mostly dramatically aid in scaling your analysis?
- c) What new frontiers of analysis (especially as may be enabled by, or complementary to, a whole mammalian connectome) are you most excited by? What challenges do you see in pursuing those frontiers?

11:25 am ET **Session 1 – Volume assembly (stitching, alignment, registration)**

11:25 am ET Volume Assembly in the context of a large scale Connectomics pipeline
Gayathri Mahalingam, Ph.D.

11:35 am ET Scalable stitching and alignment for 3D electron microscopy
Stephan Saalfeld, Ph.D.

11:45 am ET Alignment of serial section EM for automated reconstruction
Thomas Macrina, B.S.E.

11:55 am ET **Break**

12:05 pm ET **Session 2 – Automated reconstruction and annotation (segmentation, synapses, types, compartments)**

12:05 pm ET Automated dense reconstruction of neural tissue
Michal Januszewski, Ph.D.

12:15 pm ET Synapse Detection in a Fly Brain
Julia Buhmann, Ph.D.

12:25 pm ET Towards a parts list for a whole mouse brain
Nicholas Turner, M.A.

12:35 pm ET **Break**

12:45 pm ET **Session 3 – Connectome proofreading, verification, crowd-sourcing**

12:45 pm ET Proofreading the Drosophila Hemibrain Connectome
Patricia Rivlin, Ph.D.

12:55 pm ET Connectome querying and verification
Joergen Kornfeld, Ph.D.

1:05 pm ET Crowdsourcing Connectomics at Scale
Amy Sterling, B.S.

1:15 pm ET **Break**

1:25 pm ET **Session 4 – HPC, data infrastructure, visualization**

1:25 pm ET Research Data Management at Scale
Rachana Anathakrishnan, M.S.

1:35 pm ET Connectomics at ALCF
Tom Uram, B.S.

1:45 pm ET Scaling Pipelines for EM Connectomics
Eric Perlman, Ph.D.

1:55 pm ET **Q & A Session**

2:40 pm ET **Break**

3:00 pm ET **Discussion Panel**

Panel Discussion topic: *Reflections on how experience as a computer scientist might inform an 'exascale' project aimed at generating comprehensive maps of brain connectivity*

Panel Chairs: *Nicola Ferrier, Ph.D.; Viren Jain, Ph.D.*

Discussants: *Frances Chance, Ph.D.; Adrienne Fairhall, Ph.D.; Ian Foster, Ph.D.; Eugene Myers, Ph.D.; Olga Ovchinnikova, Ph.D.; Andreas Talias, Ph.D.*

4:00 pm ET **Closing remarks / End of workshop**