Co-hosted by:

ALLEN INSTITUTE for BRAIN SCIENCE

ALLEN INSTITUTE for CELL SCIENCE

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Allen Institute
615 Westlake Avenue N
Seattle, WA 98109

Software:

Napari: https://github.com/napari/napari
Scientific visualization tool - kinda like a Python ImageJ

DeepCell 2.0: http://deepcell.org/
Automated deployment of deep learning models for large-scale cellular image analysis
(https://www.biorxiv.org/content/10.1101/505032v1.full)

StarFish: https://github.com/spacetx/starfish
Python library for image based transcriptomics analysis (ie FISH data)

CSBDeep: https://github.com/csbdeep/csbdeep
Implementation of Content-Aware fluorescence restoration
(https://www.biorxiv.org/content/10.1101/236463v5)

LimeSeg: https://bmcbioinformatics.biomedcentral.com/articles/10.1186/s12859-018-2471-0
Fit surfaces within 3D volumes

Agave: https://www.allencell.org/pathtrace-rendering.html
Allen 3D volume viewer with pathtrace option

Allen Cell Segmenter: https://www.allencell.org/segmenter.html
ML for segmenting parts of cells from images - similar to CellProfiler

TeraVR: https://www.nature.com/articles/s41467-019-11443-y
VR for 3D neuron reconstruction, part of Vaa3D
Related: *Virtual Finger* (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4104457/)

Immersive Science's ConfocalVR: https://www.immsci.com/

VR for visualizing 3D volumes, and flow cytometry point clouds

pyLattice: https://github.com/JohSchoeneberg/pyLattice
Lattice light sheet image processing, including 3D puncta tracking

Divelab: https://github.com/divelab
A bunch of tools, including non-local UNet GAN for sub-cellular structure guessing

µManager: https://micro-manager.org/
ImageJ plugin for microscope management (like a Java scanimage)

Piximi: https://github.com/piximi/application
Web-based image classification dataset generation & training

Neuroglancer: https://github.com/google/neuroglancer
Web-based visualization of volumes. Supports Jupyter Notebooks (https://github.com/funkey/nyroglancer) Demo

Workflow:

Apeer: https://www.apeer.com/home/
Zeiss' workflow management tool - chainable & reusable microscope data processing in the cloud

Datajoint: https://datajoint.io/
Both database and pipeline management and execution

ImJoy: https://imjoy.io/#/
Deep learning data processing in the cloud

Wetware:

Cell painting: https://www.nature.com/articles/nprot.2016.105
Standardized assay: 'we selected six fluorescent stains, imaged in five channels, revealing eight cellular components or compartments in a single microscopy-based assay'

L1000 Assay: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5990023/
Includes database of expression under perturbation: https://clue.io

Fucci cells:
https://www.thermofisher.com/ca/en/home/life-science/cell-analysis/cell-viability-and-regulation/cell-cycle/live-cell-imaging-of-cell-cycle-and-division.html
Fluorescently tagged red & green to show cell cycle position

GEDI: https://www.biorxiv.org/content/10.1101/726588v1.full
Genetically encoded death indicator, check for super high calcium

DNA Fluorocubes: https://www.biorxiv.org/content/10.1101/716787v1
Combine four ssDNA into a cube - brighter, less

Multiplexed Ion Beam imaging:
https://www.alzheimersanddementia.com/article/S1552-5260(18)30943-9/fulltext

Papers:

Sugihara 2012: http://doi.org/10.1126/science.1227079
Detecting Causality in Complex Ecosystems

Haehn 2018:
http://openaccess.thecvf.com/content_cvpr_2018/papers/Haehn_Guided_Proofreading_of_CVPR_2018_paper.pdf
'*Proofreading*' = manual fixing of automated segmentation

Bock 2011: https://www.nature.com/articles/nature09802
Large scale network connectomics of visual cortex using EM

Linsley 2019: https://www.nature.com/articles/s42003-019-0411-9
Timelapse single-cell imaging, look at development & death in diseased culture cells

Misc:

The Human Protein Atlas: https://www.proteinatlas.org/
Swedish-based project to map all human proteins in various cells and tissue types
The project has antibodies for almost all human proteins

IARPA MICrONS: https://www.iarpa.gov/index.php/research-programs/microns
Large collection of imaging data and tools for processing (mostly EM?)

Edge preserving smoothing:
https://arxiv.org/pdf/1503.07297.pdf

Topology preserving thinning:
https://arxiv.org/pdf/1309.1628.pdf

"Training Assay": Assay with expensive collection for ground truth, used to train ML that predicts this assay in the future.

"Eroom's law": Reverse of Moore's law
Drug discovery keeps getting exponentially more expensive

Phenotype - Wildtype ≠ F(perturbation)

Conferences:

Cytodata / SBI2 = Both for data science from cell profiling