NEUBIAS 2023 OMERO: source for image analysis data on the cloud

The presentation and a PDF version of the workshop are available at
https://downloads.openmicroscopy.org/presentations/2023/Neubias

Software versions used for this workshop:

- OMERO: 5.6.4
- OMERO.web: 5.16.0
- OMERO.iviewer: 0.12.0
- omero-guides: 2021.11.09

Summary

Introduction to OMERO

OMERO core concepts
- Data management - Metadata
- Viewer -3D Viewer
- ROIs, OMERO.tables
- HCS data
Data mining using OMERO.parade
Analysis with 3rd party tools
- Analysis with Fiji: manual
- Analysis with Fiji: scripting
- Analysis in OMERO using Cell Profiler

IDR - short tour

OME-NGFF

Walkthrough

Data management and cooperation

See https://omero-guides.readthedocs.io/en/latest/introduction/docs/data-management.html

Viewing images (OMERO.iviewer)

https://omero-guides.readthedocs.io/en/latest/iviewer/docs/iviewer.html

Annotate data and filter using annotations

https://omero-guides.readthedocs.io/en/latest/introduction/docs/annotate.html

Analysis

1. Introduce python-based analysis environment with Jupyter
2. Fetch images with segmentation labels from IDR into that environment and segment these anew, then compare the results with original labels
3. Introduce cloud-optimized image format (ome-zarr) and python library for analysis in parallel threads (Dask)
4. Fetch large light-sheet microscopy image from ome-zarr stored in S3 into an analysis environment and analyze it in parallel using Dask

Analysis with CellProfiler

- Analysis with CellProfiler: Python
    - Analysis in the cloud: Python and using CellProfiler API

See for all CellProfiler workflows
https://omero-guides.readthedocs.io/en/latest/cellprofiler/docs/index.html
Note that local conda environment will be used for CellProfiler setup as described in
https://github.com/ome/omero-guide-cellprofiler

StarDist segmentation

1. Find the omero-guide python
2. Follow the README instructions there (video can also help to build the analysis environment using Google Colab).
3. Start your environment and select and run **idr0062_prediction_save.ipyb** notebook following the instructions in the video

Image Data Resource

1. Find idr.openmicroscopy.org
2. Search for “idr0062”, navigate to the image, open in OMERO.iviewer and inspect the labels in ROI tab.

OME-NGFF

1. Go to OME-NGFF public images catalog . Click on “sizeX” at the top to sort the images according to size. Click on the thumbnail of the first image (thumbnail in the second column).
2. Build and start the analysis environment if you did not do so already in step 1. above. Follow the setup steps in Ad 1. (StarDist segmentation) above if necessary.

3. Run **zarr-public-s3-multiscale.ipyb** to see an example of chunking of mulit-resolutions OME-NGFF image.
4. Run **zarr-public-s3-segmentation-parallel.ipyb** notebook to see a OME-NGFF image segmentation run in parallel threads using Dask.