ELMI 2022 Achieving FAIR vision in imaging Workshop

The presentation and a PDF version of the workshop are available at
https://downloads.openmicroscopy.org/presentations/2022/ELMI

Software versions used for this workshop:

- OMERO: 5.6.4
- OMERO.web: 5.14.0
- OMERO.iviewer: 0.11.1
- OMERO.mapr 0.5.1
- omero-guides: 2021.11.09
- Bio-Formats: 6.5.1
- Fiji/ImageJ: 2.0.0-rc-69/1.52p

Summary

Introduction to IDR
Searching in IDR

1. From publication to IDR study, viewing images and ROIs

Analysis

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

Walkthrough

- **Searching in IDR**:
    1. For similar walkthroughs and accompaying videos see notebook (Not shown in the workshop).
    2. **From publication to IDR study, viewing images and ROIs**
        - Start from PubMed search engine. Search for three terms, “Blin”, “Lowell” and “segmentation”. First result will be a paper from Blin et al from Sally Lowell’s lab published in PLOS Biology in 2019.
        - Click on the icon in top-right for full text of the paper in PLOS Biology
        - Inside the paper, navigate to the Data availability section and then go from there to the starting page at http://idr.openmicroscopy.org/ and

search for a “Name (IDR number)”. (the default option). Enter the “62” into the second search box. Accept the suggestion and click on the thumbnail. This gives you all the images contained in the idr0062 study..This workflow shows one of the main uses of IDR for data visibility, Quality Control for publishers and community.

- In the idr0062 study, on the image http://idr.openmicroscopy.org/webclient/?show=image-6001239 we can see the attached tiff file with ROIs. These ROIs were extracted into OMERO ROIs (masks), which can be seen overlaid onto the images.
- To see the ROIs, double-click onto the thumbnail of the image in the central pane. This will open the full viewer, called OMERO.iviewer.
- Select the ROIs tab inside OMERO.iviewer. The mask ROIs will load.
- Return to OMERO.web in the next tab of your browser.
- Click on the Experiment (named idr0062-blin-nuclearsegmentation/experimentA) and expand the “Attributes”' harmonica in the right-hand pane. Find and click on the DOI of the paper link.

- **Analysis**:

1. StarDist segmentation.

   The data we worked with in previous section (idr0062) will now be reanalyzed using python environment and StarDist.

   a. Find the omero-guide python
   b. Follow the README instructions as indicated in the video to build the analysis environment.
   c. Start your environment and select and run **idr0062_prediction.ipyb** notebook following the instructions in the video

1. OME-NGFF

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