CRG Barcelona OMERO Workshop

Summary

Day 1
Import into OMERO
- Cover the various import options
OMERO core concepts
- Data management - Metadata
- Viewer -3D Viewer
- Search
OMERO figure
- How to use figure
End of Day 1

Day 2
Analysis with 3rd party tools
- Analysis with Fiji: manual
- Analysis with Fiji: scripting
- Data mining using OMERO.parade (Project/Dataset/Image)
Image Export
- Client export
- omero-cli-transfer
Image data resource (IDR) - source of image data using OMERO API
Analysis environments & OMERO
- Analysis in OMERO/IDR using Cell Profiler
        - Data mining using OMERO.parade (Plates)
- R: Image segmentation and statistical analysis
Server side scripts (Python)
Look into future: OME-NGFF (optional)
New demo: napari workflows (for interested)

Content

Import

In this section we will cover the various import options such as the import with or without data transfer and synchronous vs. asynchronous.

Desktop client install and import

For these 2 workflows shown in the workshop, see https://omero-guides.readthedocs.io/en/latest/upload/docs/import-desktop-client.html and https://omero-guides.readthedocs.io/en/latest/upload/docs/import-desktop-client.html#import-for-another-user

Command line import, bulk import, in-place import

These import sections not covered in the workshop can be found at https://omero-guides.readthedocs.io/en/latest/upload/docs/import.html

OMERO core concepts

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

Search

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

Viewing images (3D viewer: OMERO.FPBioimage)

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

Export

https://omero-guides.readthedocs.io/en/latest/download/docs/index.html
https://github.com/ome/omero-cli-transfer

OMERO parade

Data mining using OMERO.parade on Projects and Plates

See https://omero-guides.readthedocs.io/en/latest/parade/docs/omero_parade.html

OMERO figure

Fast creation of publication figures using OMERO.figure

See https://omero-guides.readthedocs.io/en/latest/figure/docs/omero_figure.html

Analysis

This part constitutes the core of the training and we will explore the different means OME provides to interact with image and non-image data and how to best integrate these into your workflows.

Analysis with Fiji

- Analysis with Fiji: Java
  - Fiji client side: manual Analysis via UI
  - Fiji client side: scripting: Groovy and Macro
  - Fiji: Analysis in the cloud: Java and Macro

For setup of the Fiji plugin see
https://omero-guides.readthedocs.io/en/latest/fiji/docs/installation.html
For the walkthrough in this workshop, see Fiji chapters
https://omero-guides.readthedocs.io/en/latest/fiji/docs/installation.html
https://omero-guides.readthedocs.io/en/latest/fiji/docs/threshold_manual.html
https://omero-guides.readthedocs.io/en/latest/fiji/docs/threshold_scripting_macro_language.html

Analysis with CellPose

For the basic setup for CellPose, either
- (easier, environment will be set up on the cloud) Click on the Google Colab badge in
  https://github.com/ome/EMBL-EBI-imaging-course-05-2023/blob/main/Day_4/setup.md
  or
- (more rewarding, local setup) Follow the instructions in
  https://github.com/ome/EMBL-EBI-imaging-course-05-2023/blob/main/Day_4/setup.md

Analysis with CellProfiler

For the basic setup for CellProfiler OMERO binding follow the instructions in setup.md, using the option `Day_4/environment_cp.yml`
- To understand better the rationale of the CellProfiler workflow, read: https://omero-guides.readthedocs.io/en/latest/cellprofiler/docs/index.html

Analysis in R

See for R analysis: https://github.com/ome/rOMERO-gateway
In particular we'll go through the examples:
- Fitting model for yeast replication using idr0040: Yeast_Replication.Rmd
- Reanalyse idr0021: IDR0021-Segmentation.Rmd

Server-side scripts (Python)

Python script for FRAP analysis and conversion to a server-side script:
https://omero-guides.readthedocs.io/en/latest/python/docs/index.html

Analysis in napari (first-time shown)

Install napari-omero plugin

1. Install napari-omero as per https://github.com/tlambert03/napari-omero#from-pip
2. In case you are using mamba (faster way), you can install using following commands:

```
mamba create -y -n napari-ome  -c conda-forge python=3.9 omero-py
mamba activate napariome
pip install "napari-omero[all]"
```

For OS X arm64 Apple Silicon:
```
CONDA_SUBDIR=osx-64 mamba create -y -n napariome -c conda-forge python=3.9 omero-py
mamba activate napariome
pip install "napari-omero[all]"
omero login -s workshop.openmicroscopy.org
omero napari view Image:11093
```

3. The above opens napari user interface with the Image in it - now it is ready to be worked on.

4. Draw ROIs in napari and save these in OMERO using the
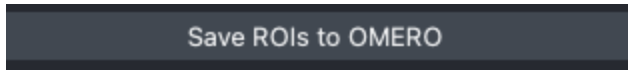
button in bottom-left corner.
5. Check that the ROIs are visible in OMERO.iviewer.

Segment image in napari (only for interested)

6. Find the segmentation code in https://github.com/ome/omero-guides/issues/280 and

paste it into the napari console. Expand the console using the bottom-left button.
7. Find the dataset "image-for-napari" in the trainer-1's data and open the image inside. Note its ID.

```
omero napari view Image:90455
```

8. Run the code in https://github.com/ome/omero-guides/issues/280 to get the segmentation labels and save these to OMERO using the Save ROIs to OMERO button.
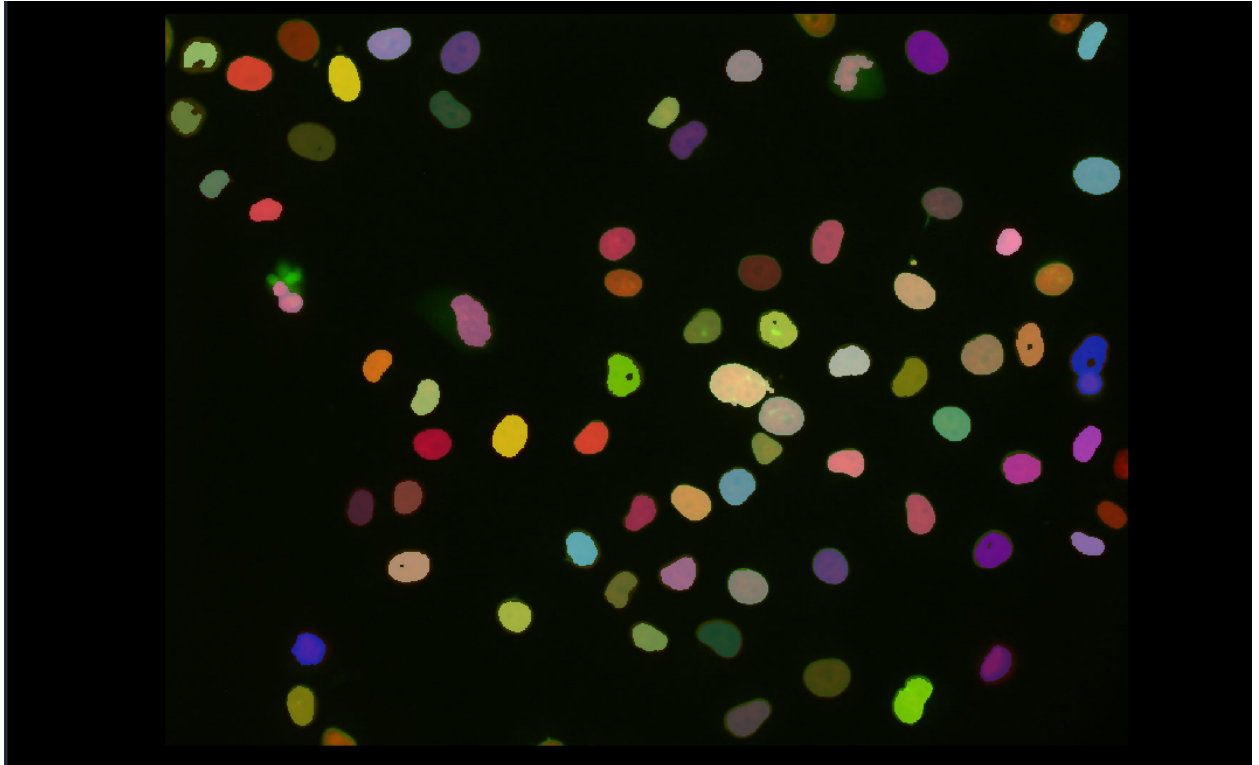
9.
10. Check the ROIs in OMERO.iviewer.

Open OME-NGFF in napari (for interested only)

1. Install https://github.com/ome/napari-ome-zarr plugin
2. Run
3. `napari "https://uk1s3.embassy.ebi.ac.uk/idr/zarr/v0.3/9836842.zarr/"`

4. Which opens an OME-NGFF image from S3 in your local napari.

OME-NGFF resources

See ngff.openmicroscopy.org