Cellpose + Trackmate

Wednesday, August 21, 2024 11:23 AM

Setting up cellpose ----------

1. Install Anaconda or Miniconda
2. Install Visual Studio https://visualstudio.microsoft.com
3. Install Microsoft C++ Build Tools https://visualstudio.microsoft.com/visual-cpp-build-tools/
    a. The package you want to install is this the one on the workloads tab called: "Desktop Development with C++
4. Update your graphics driver. We all have NVIDIA -> https://www.nvidia.com/en-us/drivers/
5. Install CUDA Toolkit 12.6 : https://developer.nvidia.com/cuda-downloads
6. Make a new anaconda environment (name it as you please), BUT MAKE SURE IT'S PYTHON VERSION 3.8.XX

In the command prompt for your new python environment where you want to install cellpose AND cellprofiler, copy and paste **ONE** of these sets of commands (depending if you have a GPU to use with cellpose):

conda activate urenvironment

CPU VERSION: If running cellpose on the CPU use this chunk of code:

python -m pip install cellpose[gui]
python -m pip install cellprofiler

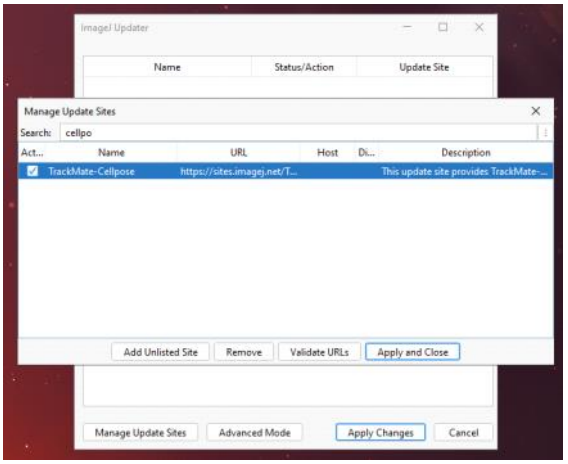
OR

GPU VERSION: If using a GPU to run cellpose run these lines:

python -m pip install cellprofiler
python -m pip install cellpose[gui]
python -m pip install cuda-python
python -m pip uninstall torch -y
python -m pip install torch torchvision torchaudio --index-url https://download.pytorch.org/whl/cu121

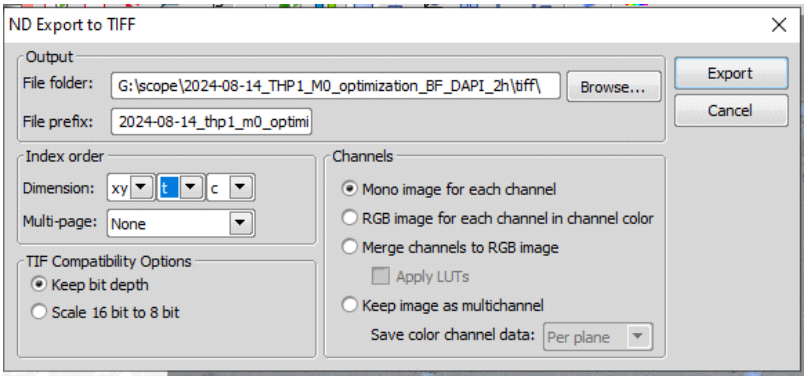
Adding cellpose to TrackMate in Fiji ----------

Install FIJI
Open Fiji and go to Help > Update
Once Fiji has updated, click on the bottom left of the new update window : Manage Update Sites
Check the TrackMate-Cellpose box:



Using TrackMate ----------

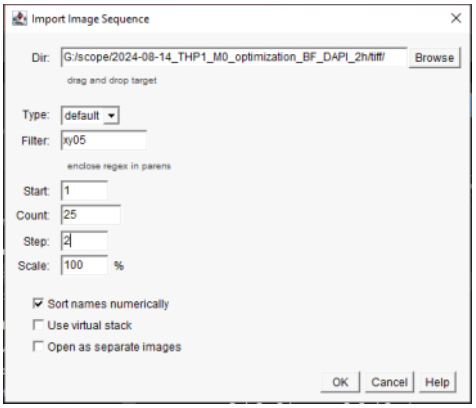
From NIS:
File > Import/Export > ND export to TIFF



I have 2 channels, the brightfield and the DAPI, they're gonna be saved as _c1 and _c2

From Fiji:

File > Import > Image Sequence



Your images should open as a video, frame by frame, brightfield only (I trained the model on brightfield exclusively).

Plugins > Track > TrackMate

Path to the cellpose/python executable if installed with anaconda: C:/Users/mhardy/AppData/Local/anaconda3/envs/cellpose/python.exe

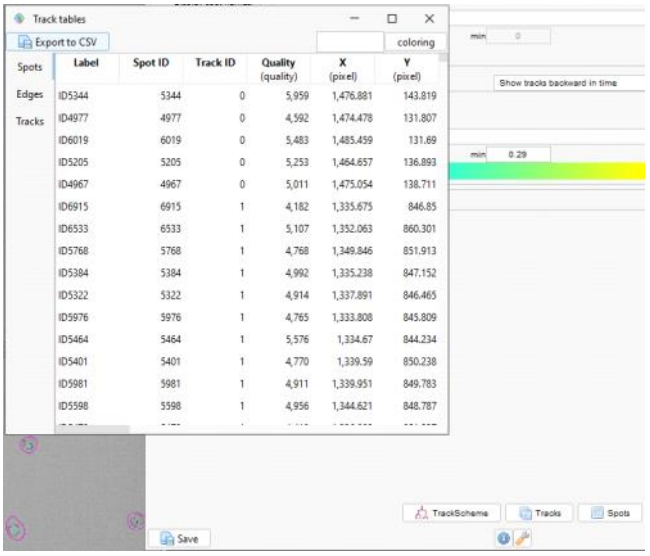
```
Configured detector Cellpose detector with settings:
 - target channel: 0
 - cellpose model: Custom
 - cellpose model filepath: G:\scope\2024-08-
14_THP1_M0_optimization_BF_DAPI_2h\tiff\training\models\THP1_BF_2
 - simplify contours: true
 - use gpu: true
 - optional channel 2: 3
 - cell diameter: 60.0
 - logger: LogPanelLogger
 - cellpose python filepath: C:/Users/mhardy/AppData/Local/anaconda3/envs/cellpose/python.exe

Starting detection process using 20 threads.
Saving single time-points.
Running Cellpose with args:
C:/Users/mhardy/AppData/Local/anaconda3/envs/cellpose/python.exe -m cellpose --dir C:
\Users\mhardy\AppData\Local\Temp\TrackMate-Cellpose_5421205060791547441 --chan 0 --chan2 3 --use_gpu
--diameter 60.0 --pretrained_model G:\scope\2024-08-
14_THP1_M0_optimization_BF_DAPI_2h\tiff\training\models\THP1_BF_2 --save_png --no_npy
Reading Cellpose masks.
Converting masks to spots.
Found 2307 spots.
Detection done in 473.7 s.
```

Then explore the options you want to use

- Coloring of edges and tracks
- Filtering of objects and tracks

To export data:

- Click Tracks or Spots
- The new window appears
- Export each to csv



Spots = the cells periphery (in pink)
Edges = the line of the tracks, frame by frame
Tracks = the tracks over time

Process in batches ----------

1. Install the TrackMate Batcher plugin through the Help > Update button. Once Fiji has updated, click on the bottom left of the new update window : Manage Update Sites and scroll to TrackMate additional plugins
2. Run the Macro I wrote to turn your tiff frames into movies (it also takes care of switching z for t)
3. Plugin > Tracking > TrackMate Batcher
    a. Input file should be a .tiff with multiple t and one z
    b. Top right panel, load in a .xml file you've used to process your data.
        i. You might need to adapt the path to the python executable version in anaconda depending on your computer and where you installed it
        ii. You might need to adapt the path to your pre-built cellpose model
    c. Bottom left panel: Which outputs do you want
    d. Console