**Skilled Reaching Analysis Workflow**

1. crop raw videos
   1. make sure the RXXXX\_sessions.csv file is up to date in the DLC output folder for the relevant rat
   2. make sure the raw videos have been uploaded to corexfs/data/Skilled Reaching/SR\_Opto\_Raw\_Data/RXXXX run script\_extract\_vidROI\_DL. Make sure the loops are set to extract the correct videos. Set the repeatCalculations flag at the top of the m-file to false if you want to skip any videos that have already been cropped, true if you want to re-crop them. If you want to create the metadata files without actually cropping videos (for example, if you already ran DLC but need the metadata files for 3D reconstruction), just comment out the line “cropVideo(vidName,destVidName,frameTimeLimits,triggerTime,ROI);”
   3. copy cropped videos to umms-dleventh/Skilled Reaching/RXXXX\_cropped
2. run DLC on the cropped videos. Eventually, this will be streamlined and done entirely in DLC beginning with the cropping step
3. copy DLC output files into the local DLC output folder (from corexfs) along with cropping metadata files
4. recalibrate the boxes for each session. Run script\_recalibrateBoxes. Make sure that the relevant box calibration file for that session has already been calculated; otherwise, the script will go back in time until it finds a calibration file for that box.
5. Reconstruct the 3D trajectories. Run script\_reconstruct3Dtrajectories. Make sure the repeatCalculations flag is set appropriately.
6. Run script\_calculateKinematics, which will move the origin to the initial pellet location and calculate a variety of kinematic features (velocity, aperture, etc.)
7. Interpolate the trajectories. Run script\_interp\_trajectories
8. Run script\_analyze\_interp\_trajectories. This will identify individual reaches from each trial and calculate some summary statistics for each session (average trajectories, variances, etc.). see script comments for details

script\_calculateRatSummaries

???

script\_plotRatReachSummaries

script\_plotSessionReachSummaries

???

script\_analyzeAlternateStimSessions will look through all sessions for ones that have laserTrialSetting == 'alternate' and create an “alternateKinematics” data structure

script\_plotAlternateStimResults

script\_collectRatSummaries\_by\_experiment

**Raw Data File Structure**

* *Parent directory*
  + *Rat folder, named with rat identifier (e.g., “R0186”)*
    - *Sessions folders RXXXX\_YYYYMMDDz (e.g., “R0186\_20170921a” would be the first session recorded on September 21, 2017 for rat R0186)*

Each sessions folder contains a .log file (read with readLogData) with session metadata, and videos named with the format RXXXX\_YYYYMMDD\_HH-MM-DD\_nnn.avi, where *RXXXX* is the rat identifier, *YYYYMMDD* is the date, *HH-MM-DD* is the time the video was recorded, and *nnn* is the number of the video within the session (e.g., 001, 002, etc.). Sometimes the software crashed mid-session, and the numbering restarted. However, each video still has a unique identifier based on the time it was recorded.

Each rat has a RXXXX\_sessions.csv file associated with it, which is a table containing metadata for each session (e.g., was laser on/occluded during that session, training vs test session, etc.)

**DLC Output File Structure**

Similar to *Raw Data File Structure*

* *Parent directory*
  + *Rat folder, named with rat identifier (e.g., “R0186”)*
    - *Sessions folders RXXXX\_YYYYMMDDz (e.g., “R0186\_20170921a” would be the first session recorded on September 21, 2017 for rat R0186)*
      * *Subfolders RXXXX\_YYYYMMDDz\_direct/left/right that contain the actual DLC output files and metadata from cropping (i.e., cropping coordinates, frame rate, etc) that particular view (left mirror, right mirror, or direct view)*

**Calibration Files Directory Structure**

* *Parent directory*
  + *Year (e.g., ‘2018’)*
    - *YYYYMM\_calibration (e.g., ‘201810\_calibration’ would contain calibration images/files for October, 2018)*
      * *YYYYMM\_all\_marked – contains images/.mat files with coordinates of all checkerboard points (automatically detected and manually marked)*
      * *YYYYMM\_auto\_marked – contains images/.mat files with coordinates of all automatically detected checkerboard points*
      * *YYYYMM\_calibration\_files – calibration files. These are .mat files containing fundamental, essential matrices, etc.*
      * *YYYYMM\_manually\_marked – calibration images that have been manually marked in Fiji, as well as .csv files containing checkerboard corner coordinates*
      * *YYYYMM\_original\_images – original calibration images*