**Training**

-when creating a new project select "has body tracking." This utilizes the trx.mat file generated by FlyTracker to get fly trajectories that are made up of the centroid position and/or orientatin of each animal in each frame

-used sequential labeling mode- which basically just allows you to click and label all points in sequential order (must remember the order of each part). Most commonly used mode by developers

-the tracking algorithm I used is ***Cascaded Pose Regression (CPR)***, which was recommended if you aren't using an external GPU

-***target ROI = 30***. This setting could be messed around with, this is just what I chose first as an eyeball. There are a couple of advantages to using a smaller ROI, so it should be as small as possible without losing the fly. Advantages: reduces the size of the image the tracker searcher over and operates on. Important because the deep learning algorithms are memory limited, and prevents downsampling/loss of tracking resolution. Also prevents other animals from being wrongfully tracked.

-***Align using trajectory theta*** should be checked: this makes it so the tracker will work the same no matter what direction the fly is facing, since direction is independent of the behavior. Tracking is invarient to orientation. In otherwords, the orientation of the animal will not affect tracking.

-APT's data augmentation settings are used to introduce variability in the data set that would be expected to be observed between experiments. The most important perturbations for us would be ***contrast range*** and ***scale range***. Thus far, I haven't seen the deep learning menu, so may need to dig around for this

-we should downsample as little as possible, this is affected by the target ROI size.

-the recommended ***batch size*** for training is ***2 to 8*** images (whoops)

-you can set the ***N. iterations of traning*** in the Tracking parameters GUI. Higher numbers means longer tracking, more iterations through sample data, and can increase performance but takes longer to process and has diminishing returns. You can examine whether traning has converged and stop at anytime.

-landmark flip pairings: if doing any flip augmentations, you must choose **select landmark flip pairings**from the Track menu

-the ***Training Monitor*** window allows you to watch training progress. 1st plot is the training loss should steadily decrease: it is a function of number of traning iterations on the current training batch. If it plateaus, traning has converged and the tracker will not improve with more iterations of training.

-second plot is the Euclidean distance between the current landmark predictions and the manual labels. Shold trend down with more iterations of training.

-Once the tracker is trained, clicking the ***Track*** button will track the frames that are selected. The tracking monitor window shows information on which tacker is being used, tracking progress, tracking job status, etc.

-Track -> Export will export the predicted tracks for the current movie to a trk file.

The only thing I didn't take notes on is the validation techniques: groundtruthing and cross-validation

useful tips for APT

-you can use the ***left and right arrow keys*** to move one frame backwark/forward

-should always work with "***center video on target***" under ->View

-slider bar on top left sets the current amount of ***zoom***

-you can select landmarks using the ***1-9,0*** keys which correspond to labels 1-10, respectively

-***remove*** labels by clicking the clear button

-to label a part that is occluded, hold down the ***shift*** key while clicking