Project description

Pupil diameter can be used to assess internal states of an animal. We will look at how pupil diameter changes during behavioral states (resting and running) and under different drug conditions. The drug we used here was psilocybin which is a product of specific mushrooms belonging to the *Psilocybe* genus (a.k.a. “Magic mushrooms”). Psilocybin is known to increase pupil diameter in humans but in rodents this has not been tested yet (as far as i can tell).

I recorded multiple sessions of pupil videos with the following general setup:
Baseline recording -> psilocybin injection -> one or multiple sessions of pupil recording while the mouse is under the drug’s effect. I started to assemble the useful data in a google spreadsheet. This needs to be cleaned further.

Some of the videos were analyzed with an open source software package called deeplabcut. Our protocol can be read here.

For videos which have not analyzed yet, we want to go according to the following:
We already have a network trained for this so we will try to use it. It means that you can skip several steps. You will still need to log in to our deeplabcut account as described under step 9 then open this notebook and create a copy of it for yourself. You will need to do the installation steps but you can skip the training and evaluation and start from the “Start Analyzing videos:” section. You will need to edit the config file so it uses the pretrained network. The data can be found here. I would pick 3 random videos (skip sert38b_3 videos altogether for now) and see how the network performs on them.

We have a notebook that contains the code of calculating the diameter based on the tracking but this other Deeplabcut package can be also useful:
https://github.com/DeepLabCut/DLCutils/tree/master/pupilTracking

When the pupil diameter is calculated, we want to add the mouse locomotory behavior and break down the analysis to motionless and running epochs. Finally we want to see whether psilocybin does anything with pupil diameter at the dose i used during motionless and running epochs.
We need to use stats to compare diameter before and after in these states.

All the analysis should be done in Google Colab notebooks and deposited to a github repo in an organized manner.

Reference papers:
https://pubmed.ncbi.nlm.nih.gov/30127430/
https://pubmed.ncbi.nlm.nih.gov/31227823/
NY Times
https://pubmed.ncbi.nlm.nih.gov/32243793/