**Social Mouse Protocol Part I: how to train the network**

**Pre-Label the social mouse videos**

1. Currently taking the video, placing it in PowerPoint, using an “x” as markers of where I want labels to be

* Making the “x” as small as possible while also making it the lightest gray that can still be distinguishable
* Take a screen record of the video running while in PowerPoint to have the video completely labeled.
* Then use Cropping video tool (clideo) to crop the video so that only the original video is shown

**DeepLabCut Use**

1. Open Anaconda Prompt by searching for it in the bottom left search bar.

* Type “activate DLC-GPU”, press enter, and type “python -m deeplabcut” A screenshot of a computer

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1. DeepLabCut welcome page will open

* Click on manage projectGraphical user interface, text, application, email

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1. Fill out name of project, name of experimenter, import videos ,and click the “copy the videos” tab

* Make sure that you do not change the file location of the videos once you have imported them
* Press okay once all fields are filled.

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1. Edit Configuration File

* Click the edit configuration file on the bottom left of the interface
* The blue box is predetermined by the information imported in the last step and cannot be changed in the file
* The information in the red box needs to be changed for each project. These are the names of the desired labels you would like to use
* The start and stop portion do not need to be altered
* The numframes2pick represents the number of frames being extracted. For accurate analysis, a couple hundred frames should be picked.
* The green box represents the skeleton. It is basically the connection between each label and can be displayed in the final video.
* Make sure to save the file
* bodyparts:
* - nose
* - one
* - two
* - three
* - four
* - five
* - six
* - seven
* - eight
* - tail
* start: 0
* stop: 1
* numframes2pick: 100
* skeleton:
* - - nose
* - one
* - - nose
* - two
* - - nose
* - three
* - - nose
* - four
* - - nose
* - five
* - - nose
* - six
* - - nose
* - seven
* - - nose
* - eight

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1. Extract Frames

* Click on the tab in the top called “Extract Frames”
* All the settings are set to default and are fine to use in this setting
* The green box represents the cropping parameters. For better analysis, it is good to crop the frame by GUI. A different interface will pop up with a frame of the video, draw a box around the area the mouse is in, and then press the crop button.
* Once done press okay in the bottom left
* When all the frames are extracted, the anaconda prompt will tell you to move to the next step

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1. Label Frames

* Click the tab on the top that it called “Label Frames”
* Click on the bottom left corner button that is called “Label Frames”
* A different interface will appear. Load the file that has the extracted frames
* In order to label, right click on the picture. In order to move a label, hold it down and drag, the marker size should be adjusted to be appropriate for scenario. Zoom can be used to zoom into a spot, home to return to full screen and pan to move along the zoomed in picture.
* The next button is used to move to the next frame.
* Once all labels are completed, click the save button. Return to the main interface

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1. Create a training set

* Click the tab in the top that says “Create Training Set”
* All parameters are default and do not need to be changed
* Click “Okay” in the bottom right of the interface

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1. Train the network

* Click “train network” tab at the top
* Three things need to be changed here: display iterations, save iterations, and maximum iterations.
* The following values should be changed to: display iterations=20,000,save iterations=50,000 , maximum iterations= 1,000,000
* Then press okay. This can take a variety of time and is all dependent on the labeling and video length. The anaconda prompt will provide an update of how many iterations it has completed every 20,000 iterations

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1. Evaluate Network

* Click the tab in the top that says “evaluate network”
* Then press okay “Step1” in the bottom right

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1. Analyze Videos

* Click “analyze video” tab in the top
* Press the “select video” tab and import the videos that you would like analyzed
* Make sure to press “yes” when asked if you want the results saved as a csv (this is the important excel file)
* Click “Step1” in the bottom right

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1. Create Video

* Click “create video” tab in the top tab
* Upload the videos that you have previously uploaded for the analyze video step
* Click “yes” for including the skeleton in the video
* Press “Run”

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1. OPTIONAL/Dependent on analysis

* If the analysis is good based off of looking at the excel file and visually at the video, these steps are not needed
* If the analysis is not good go to the “extract outlier frames” tab at the top and select the videos that need to be analyzed. Then specify the algorithm. I use manual which opens up a different interface and I am able to go through each frame of the video and determine which frames need to be relabeled. Then press okay.
* Go to the “refine labels” tab and press “launch”. This will open up a different interface and have you move the labels on the specified frames from the previous step. Once all labels are fixed, press “merge” and then the software will automatically bring you back to step 7.

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1. MATLAB

* Open up MATLAB social code
* Import the excel file generated from DeepLabCut, which are also saved in the shared drive
* Import the numeric matrix
* Make sure the variables are named properly according to the name of the file,

On the line that said “a=WIN20200103190249Pros44975fullearsporouss32DLCresnet50DLCTest41”,

Will need to change this to the file name you are analyzing, usually it will pop up as the first option after you deleted the original one

* Alter the social distance (threshold)(see code)FindThreshnose=compact(:,2)>15, change 15 to however number of pixels you find suitable
* that is wanted for the specific simulation
* Run the program, it will generate the bar graph automatically

1. Other

* At any point you can come back to the project by pressing “load existing project” on the manage project interface from step 3, the master network named:…. Is saved in the shared drive

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Post Processing

1. MATLAB

* Open up MATLAB social code
* Import the excel file generated from DeepLabCut
* Make sure the variables are named properly according to the name of the file
* Alter the social distance that is wanted for the specific simulation
* Run the program

This is not a permanent solution and will be easier to explain in person based off of experience with matlab.

**Social Mouse Protocol Part II: evaluate video using master network**

1. Normally, the master network should be able to analyze all kinds of video, in the case that it can’t, a new network needs to be created to a specific type of the video. See steps in part I.
2. Using the master network, you only need to follow the step 10 in part I and import whichever video you like.
3. Check the excel file generated (it will be in the video file), MATLAB bar plot and cross check with the original video to see whether the data generated is good enough

C:\Users\Tammy Haut Donahue\Desktop\MOUSEWALKING>python scorer.py CollectedData\_Alex.csv

CollectedData\_Alex.csv

{'frontjointupperx': [], 'frontjointupper': [], 'frontjointmiddlex': [], 'frontjointmiddle': [], 'frontjointlowerx': [], 'frontjointlower': [], 'backjointupperx': [], 'backjointupper': [], 'backjointmiddlex': [], 'backjointmiddle': [], 'backjointlowerx': [], 'backjointlower': [], 'frontpawfrontx': [], 'frontpawfront': [], 'frontpawmiddlex': [], 'frontpawmiddle': [], 'frontpawbackx': [], 'frontpawback': [], 'backpawfrontx': [], 'backpawfront': [], 'backpawmiddlex': [], 'backpawmiddle': [], 'backpawbackx': [], 'backpawback': [], 'frontrodonex': [], 'frontrodone': [], 'frontrodtwox': [], 'frontrodtwo': [], 'frontrodthreex': [], 'frontrodthree': [], 'frontrodfourx': [], 'frontrodfour': [], 'backrodonex': [], 'backrodone': [], 'backrodtwox': [], 'backrodtwo': [], 'backrodthreex': [], 'backrodthree': [], 'backrodfourx': [], 'backrodfour': []}

Score: 25

Missed Front: 71

Missed Back: 64

Slipped Front: 2

Slipped Back: 5

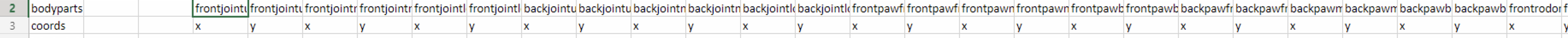
Landed Front: 2

Landed Back: 7

C:\Users\Tammy Haut Donahue\Desktop\MOUSEWALKING>

Instruction to clean up the data set that the deeplabcut generated

1. delete line 1, delete original line 3 as well, delete all lines that don’t have numbers, including the partial empty, have to be full line of data, delete the first three columns on the left, for original line 2, combine two lines below



**Please please Don’t turn off the computer or close deeplabcut , thank you so much:**