**Tutorial on how to use BehaviorCoder GUI**

Written in python by Brian Cary

* **Opening the GUI**
  + Navigate to the folder with the python scripts containing the program
  + Find “main.py” and open it in spyder (e.g. by dragging and dropping it into the Spyder window)
  + Run the main.py script by pressing the green triangle play button in spyder
  + It should look like this:
  + A screenshot of a computer

    Description automatically generated
  + A picture containing graphical user interface

    Description automatically generated
* **Load the Config .yaml file**
  + Click on File in top left and select open config file (Ctrl+F is shortcut)
  + Table

    Description automatically generated
  + Navigate to and find the config .yaml file in the window that appears and select it
    - **Yaml file must have all expected keyword arguments within that the given version of the GUI code is expecting. The yaml template file located in the GUI code folder should include everything.**
* **Load in a video file**
  + Click on File in top left and select open video (Ctrl+O is shortcut)
  + Table

    Description automatically generated with medium confidence
  + Navigate to and find a video file in the window that appears. This should open up the video and create many buttons along with the label viewer windows:
  + Graphical user interface, application

    Description automatically generated
  + You can resize window by dragging corners like a normal program window.
  + You can also resize the left column and the video window and label viewer windows by clicking and dragging the darker grey borders:
  + Graphical user interface, application

    Description automatically generated
* **Navigating video**
  + To navigate the video you:
    1. can click the keyboard arrows keys to move one frame at a time
    2. can drag the scroll bar right below the video
    3. can click in the text box to the right of the scroll bar, change the frame text, and press enter to jump to a new frame
  + The + and – buttons to the right of the scrollbar change the left and right range of the bar to allow finer scrolling movements
  + The 🡨 and 🡪 arrow buttons shift the scrollbar ranges without changing the frame position
* **Labeling behaviors**
  + You can either click and press the label buttons in the bottom left of the GUI to select on/off a label or as is recommended use the hotkeys in brackets
  + When a label is selected and the frame is changed by any of the above means (1 through 3 in navigation) the selected labels will be filled in for those frames
  + **Multiple labels can be selected at the same time for each frame**
  + If you click the “no label” button then you can freely move around the selected frame without changing labels
  + You can save the labels through the file menu in top left or with shortcut. The filename will be automatically chosen based on video file’s name. A label save will create two files. A “label bout” and a “labeled inds” file. The labeled inds file can be reloaded into the GUI through the file menu. This means you can start labeling a video, save your label progress, and reopen it up later to continue working on it.
  + **Label files from the same previously labeled video will be overwritten**
  + To see all the labels for the entire video click the “Show full labels” button
  + **To undo one or more labeling segments press the “Undo labels” button**
* **Machine Learning model**
  + To start training a ML model on the labels you first have to click the “Load DLC” button once to locate the associated DLC output .csv file for this exact video.
  + After the DLC file is loaded, click “Add data and train model” to train the labels you’ve made on this currently open video using DLC pose information.
  + After doing this once, the next video you open in this current session a DLC file will automatically be searched for and loaded when you load the video. If this doesn’t work (check the text output in Spyder) you can manually press the “Load DLC” button again.
  + As long as this session is open – that is the GUI window is not closed and opened again – every time you add data and train the model a video’s data will be added to an ever-growing list of training data, which should get better with each video you add.
  + You can save a ML model that you’ve been training through the file menu much like labels. A name will be chosen automatically. You can then load back in a previously trained model at the beginning of a session.
  + If you have a trained model in the session you can press the “Predict behaviors” button to load in predicted behaviors in the label viewer. “Copy predicted labels” copies these labels onto the manually defined labels in the label viewer. This will overwrite any manual labels you’ve done here before so do this carefully.
  + Subsequent videos in this sessions should automatically search for DLC files and then automatically predict the behaviors