CS584 - Homework 3
(15 points)

This is individual homework, no collaborations are allowed.

Homework Description
The homework 3 requires deliverables of a label file, software implementation, and a written report. All the components should be submitted together in a compressed file by the due date. Late submissions are not allowed.

All required data and documents are in the google drive folder:
https://drive.google.com/drive/folders/1nROhxLU1TmrO35kjNJbm6YA2X3tYSAWS?usp=sharing

For each student, you should work on your own data. Please look at the document in the google drive 'folder_list.xls' for your individual data folder. For example, if your folder number is 0001. Please go to 'group_frames/0001/' to download your data.

This homework aims to train a model to localize the mice in the video. You will first annotate the video frame by frame, then train a model to predict mice locations, and finally evaluate your model. Please follow the following steps:

- Create the dataset for model training.
    - Raw data should not be used for model training. Mouse videos are stored frame by frame in a folder in the google driver. For each frame, use the annotation tool **(see the document "Instruction for annotation")** to label mice. You should label joints and bounding boxes for each frame.
    - Use the annotation tool to mark the location of 7 joints: "nose", "left ear", "right ear", "left hip", "right hip", "tail base", "tail end".
    - Use the annotation tool to mark 2 corners, "left top" and "right bottom" of the bounding box. The mouse should be inside the bounding box constructed from 2 corner points (not visible in the annotation tool), as shown in figure 1 below.

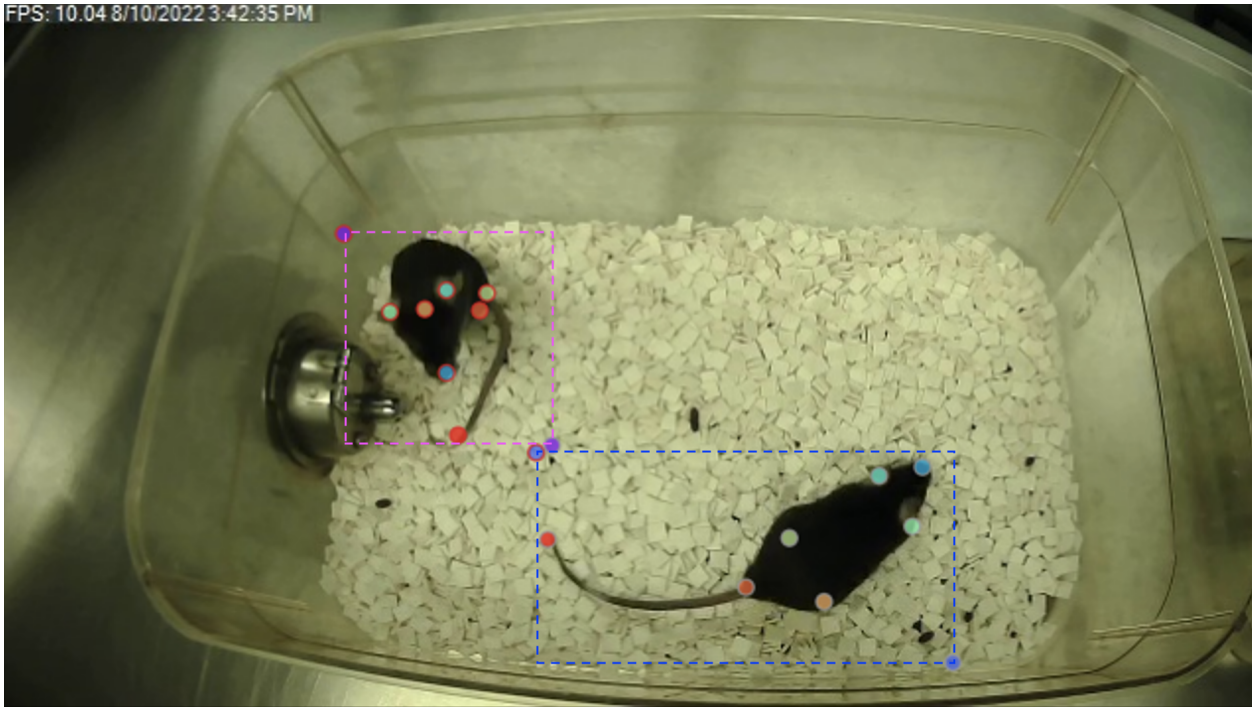

Figure 1. Labeling example

- Split the frames and the corresponding annotations to 70% for training and 30% for evaluation.

- Train a model to predict mouse location and evaluate your model.
  - Train a neural network model to predict the mouse location. The program should be written in python.
  - The inputs of the model are 7 joints' coordinates.
  - The mouse location ground truth is defined as the average of the corner coordinates of the bounding box, i.e., center = ((x1+x2)/2, (y1+y2)/2).
  - Loss function and evaluate metric are both L2 loss.

Report instructions

Write a report to summarize what you've done in the project, which should include the following:

1) A brief project description and data analysis.
2) The structure of your machine learning model.
3) The experiment results, including overall performance and the analysis of results.
4) Instructions for running your code on the data to reproduce your results.
5) Conclusions.

Submission instructions (please see 'instruction for annotation' for detailed submission procedures)

1) The project should be submitted through a folder named "firstname-lastname-cs584". Create the following folders: src, doc, and data in your project folder. Organize the required submission materials inside the sub-folders as follows:

    - data: The produced annotation files.
    - src: All program files.
    - doc: the written report in pdf file.
2) Do not upload original image files in the data folder.
3) The quality of your annotations contributes more to your score, so we will check the annotation work.
4) Late submissions are not allowed.

Please contact zzhao48@hawk.iit.edu and wkang11@hawk.iit.edu if you have any questions.