CS 490/548: Assignment 03

Programming Assignments (80%)

Given a subset of videos from the Large-scale Single Object Tracking (LaSOT) dataset, your goal is to successfully track the object bounding box across the frames of the video.

WARNING: You will have to run the script Prepare_A03.py to download the data. This will take up approximately 4 GB of space.

ANOTHER WARNING: ADD* assign03/output/ *and* data/ *to your .gitignore file!

A03.py

In this module, you must write a function, **track_doggo(video_frames, first_box)**.

The list video_frames has the color images of the video.

The list/tuple first_box contains the first bounding box of the first frame,
given in the form (ymin, xmin, ymax, xmax).

You must return a LIST of these bounding boxes (including the first one). Each bounding box corresponds to the current location of the object in the frame.

Note that you are responsible for tracking only ONE object.

The way you approach the problem(s) above is largely up to you. HOWEVER, your approach should definitely get better results than just repeating the first bounding box:

Section	Average Accuracy	Average IOU
CS 490	0.246	0.3120
CS 548	0.245	0.2831

Unlike some of the other assignments, **you are permitted to use OpenCV, Numpy, Scikit-Learn, and scipy functionality**. This includes Meanshift, Camshift, Kalman filters, Histogram Backprojection, Correlation/Filtering, etc.

You are trying to MAXIMIZE:

- **IOU (Intersection Over Union)**
  - A measure of how much your bounding box overlaps with the true one.
  - 1.0 = perfect, with 0 meaning no overlap.
- **Accuracy**
  - We will consider IOU >= 0.5 to be a successful detection.

Prepare_A03.py

This script must be run ONCE to download the dog videos from HuggingFace:
https://huggingface.co/datasets/l-lt/LaSOT

General_A03.py

This contains the core functionality of both testing programs.

Test_A03.py

The main program (together with dataset loading and evaluation code) has been provided: **Test_A03.py**:

- Loads up the dog videos required for all students.
- (Re)creates an "assign03/output" directory.
- For each video, calls your tracking algorithm and computes the IOU and accuracy.
    - It also saves the output images with ground truth (black) and predicted (green) boxes.
- Prints the metrics as well as saves them to a file, assign03/output/RESULTS.txt.
    - It also computes the average results.

Test_A03_Grad.py

CS 548 only: This runs the same process as Test_A03, BUT it also includes some more difficult videos.

Results (20%)

After running the training programs, copy your result txt file to the MAIN directory of your repository.

BONUS POINTS

For the entire assignment, bonus points will be awarded to the submission that has the following (these will be evaluated ***separately*** for the CS 490 and the CS 548 sections):

- (+%5) Best accuracy in class
- (+%5) Best IOU in class

Submission

You must include the following in your repo:

- A03.py
- Result txt file(s) **(COPIED TO MAIN PROJECT FOLDER)**

Grading

Your OVERALL assignment grade is weighted as follows:

- 80% - Programming assignments
- 20% - Results