

Video Streaming and Tracking

Homework 3 – Tracking

Deadline: 2023/12/10 23:59

Objective

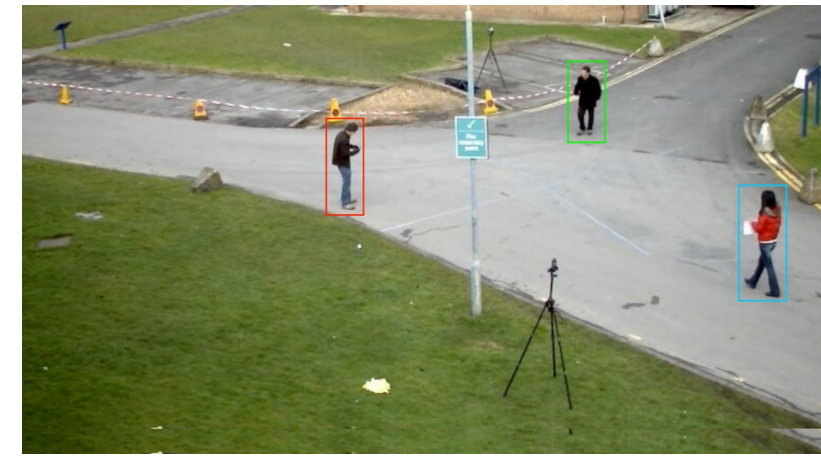
- Implement visual multiple object tracking on videos.
- Using **detection model + Hungarian algorithm**.
- Calculate the total number of people appearing in the video.
- Output the tracking result video and the count result.



Frame 1



Frame 2



Frame 3

Count: 3

Steps

- Choose a **detection model** and do detection for each frame.
 - You can use pre-trained weights or train by yourself.
 - It is only necessary to detect the 'human' category.
- Use the **Hungarian algorithm** to match the bounding boxes of the current frame with those of the previous frame to achieve the tracking effect.
 - Different object's bounding boxes should be colored with different colors.
 - Decide on the cost factor for the Hungarian algorithm by yourself. (For example, IOU, distance, size difference, ReID similarity, etc.)
 - If same person leaves and re-enters the frame, they should be counted as a different individual.
- Calculate the total number of people in the video.
 - Output the count result in the terminal. (For example, 'count: 5').
- Save the video with the tracking results (including the drawn box on the screen).

Benchmark

- The compressed assignment file provides the following data:
 - **'easy_9.mp4'**: A video with a simple scene (no overlapping), used to check if tracking is successfully implemented.
 - **'hard_9.mp4'**: A complex scene (with overlapping), used to evaluate the handling of intersecting bounding boxes.
 - The number after the underscore in the filename represents the correct answer.
 - You can also test with other videos of your choice.
- You **don't** need to save your output to a text file, just display it directly in the terminal.
- However, you **must** save the video with the tracking results, including the bounding boxes drawn on the screen.

Grading policy (1/2)

- **Online DEMO**

- We will have DEMO in 12/11 & 12/14 & 12/15 via Google Meet.
- The procedure requires you to share your screen and turn on your microphone.
Please ensure that these functions are working properly.
- Please go to [Google sheet](#) and fill demo time you prefer. (it will be open at 11/20 12:10)
- The meeting link and detailed procedures will be announced a few days before demo.

Grading policy (2/2)

- **Model implementation -- 50 points**
 - Show the result video of tracking 'easy_9.mp4'.
 - Different objects must be tracked with boxes of different colors.
 - Incomplete tracking may result in the deduction of some points.
 - If a tracking model is used instead of a detection model + Hungarian. → -20 points
- **Counting accuracy : Easy case -- 10 points**
 - The counting result of 'easy_9.mp4' must be equal to the answer.
- **Counting accuracy : Hard case -- 20 points**
 - During the DEMO, you will get a video 'demo.mp4' which features a similar scene.
 - Run the video, display the count on the terminal. And show the result video.
 - The closer your answer is to the correct answer, the more points you can earn.
 - For example: $\pm 3 \rightarrow 20$ points, $\pm 6 \rightarrow 15$ points, $\pm 9 \rightarrow 10$ points, and so on.
 - Incomplete tracking may result in the deduction of some points.
- **Q&A -- 20 points**
 - TA will ask some questions about your implementation.

Hand in Rules

- Your submission should contain:
 1. **Code** (DO NOT contain any model weights or videos)
- Compress into **one zip** file name **HW3_[studentID].zip**

Penalty

- Format penalty : **10 points**
 - Submit in wrong name, format, etc.
- Late penalty : **20% per day**
 - 1 day → 80%, 2days → 60%, and so on.
- **You can use any code from Github, but DO NOT copy from your classmate!**
 - Any copying will result in a score of zero.

References

- <https://zh.wikipedia.org/zh-tw/匈牙利算法>
- <https://hackmd.io/@computerVision/S18nD20Vq>
- <https://alu2019.home.blog/2021/01/20/edge-ai-multiple-object-tracking-mot-duo-ge-wu-ti/>
- https://blog.csdn.net/your_answer/article/details/79160045