MULTI OBJECT TRACKING

REPORT

Abstract:

Multiple Object Tracking (MOT) has gained increasing attention due to its academic and commercial potential. Although different approaches have been proposed to tackle this problem, it still remains challenging due to factors like abrupt appearance changes and severe object occlusions. In this work, we contribute the first comprehensive and most recent review on this problem. We inspect the recent advances in various aspects and propose some interesting directions for future research. To the best of our knowledge, there has not been any extensive review on this topic in the community. We endeavor to provide a thorough review on the development of this problem in recent decades. The main contributions of this review are fourfold: 1) Key aspects in an MOT system, including formulation, categorization, key principles, evaluation of MOT are discussed; 2) Instead of enumerating individual works, we discuss existing approaches according to various aspects, in each of which methods are divided into different groups and each group is discussed in detail for the principles, advances and drawbacks; 3) We examine experiments of existing publications and summarize results on popular datasets to provide quantitative and comprehensive comparisons. By analyzing the results from different perspectives, we have verified some basic agreements in the field; and 4) We provide a discussion about issues of MOT research, as well as some interesting directions which will become potential research effort in the future

INTRODUCTION: Multiple Object Tracking (MOT), or Multiple Target Tracking (MTT), plays an important role in computer vision. The task of MOT is largely partitioned to locating multiple objects, maintaining their identities and yielding their individual trajectories given an input video. The interesting objects to track in MOT should be homogeneous in the video. For example, the multiple objects can be pedestrians on the street, sport players in the court, cars, or a flock of animals (birds, fishes, etc.). As a mid-level task in computer vision, multiple object tracking grounds high-level tasks such as action recognition, behavior analysis, etc.

LITERATURE SURVEY:

Nii Longdon Sowah, Qingbo Wu, Wu Bo "Strongly Connected Component Multi

Object Tracking ", 2016 2nd IEEE International Conference on Computer and Communications.

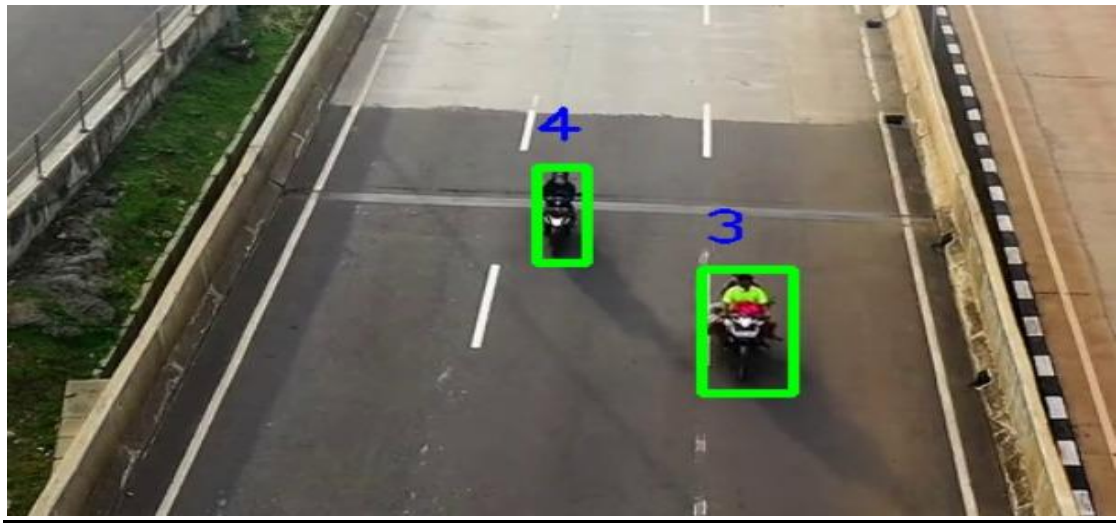
Multi-object tracking (MOT) continues to gain more attention due to its relevance in the field of computer vision. Tracking-by-detection is one of the most used techniques in multi-object tracking, and this work follows that trend. Many methods generate tracklets in the initial step of tracking and generate final trajectories by optimization algorithms. An important challenge of such approaches is how to generate reliable tracklets which is crucial for generating final trajectories. Bounding box overlap and optical flow are two of such methods. A new clustering method is proposed for tracklet generation in our multi-object tracking algorithm. We present a novel approach that uses strongly connected component clusters in a K-NN directed graph with no defined class number for tracklet generation. We propose that such clusters of detections can accurately represent the tracklets of targets in a video. Binary Integer Programming is used to merge initial tracklets into their final trajectories.

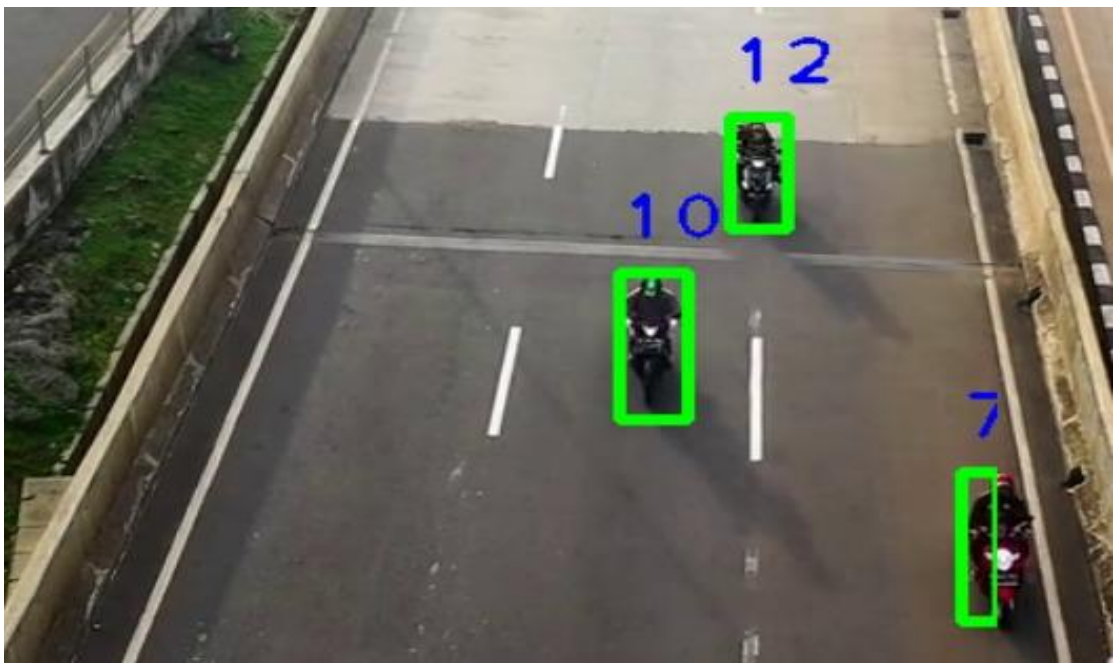
METHODOLOGY:

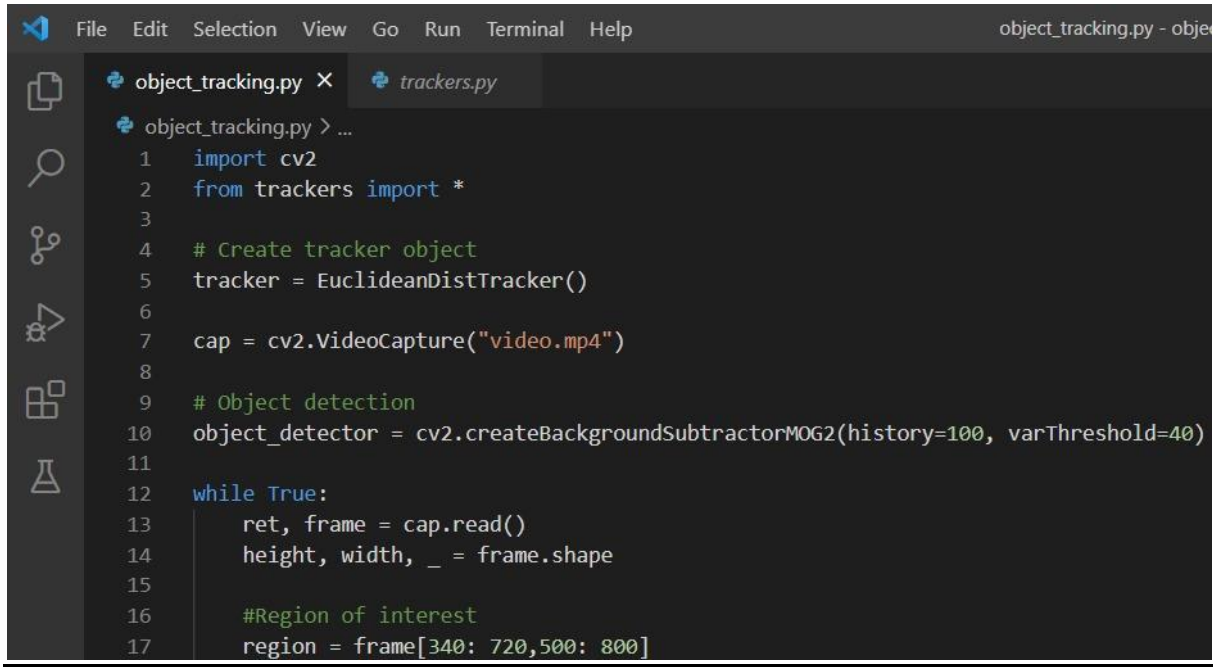
Our method adopts a two layer tracking framework, in which initial shorter tracklets are merged into longer tracklets. Based on detection results obtained from a reliable object detector, we generate the tracklets via a couple of steps as shown in Fig. 1. In the first step, 3D color histogram features for each object detection are extracted. A K-NN directed graph is constructed for each segment of the video to represent the similarities between the objects (based on their features). In the next step, a novel directed graph clustering method is applied to the graph to cluster similar object detections.

The clusters obtained are the lowlevel tracklets. We compute the similarity of these tracklets and merge similar tracklets. In the next step, we discard all the tracklets within a segment which are less than the minimum allowable length. In the final step, we use BIP (Binary Integer Programming) to generate the final trajectories.

RESULTS:








```
31
32      # 2. Object Tracking
33      boxes_ids = tracker.update(detections)
34      for box_id in boxes_ids:
35          x, y, w, h, id = box_id
36          cv2.putText(region, str(id), (x, y - 15), cv2.FONT_HERSHEY_PLAIN, 2, (255, 0, 0), 2)
37          cv2.rectangle(region, (x, y), (x + w, y + h), (0, 255, 0), 3)
38
39      cv2.imshow("region", region)
40      cv2.imshow("Frame", frame)
41      cv2.imshow("Mask", mask)
42
43      key = cv2.waitKey(45)
44
45      if key == 30:
46          break
47
48  cap.release()
49  cv2.destroyAllWindows()
```

CONCLUSION AND FUTURE WORK:

This paper has presented a comprehensive review of Multiple Object Tracking (MOT). The review is done in the following way of developing a MOT system: the current state of this topic, all the key issues under consideration, evaluation metrics and data sets. The state of the topic is discussed by its scenarios and approach categorization. As for the key aspects of MOT approaches, we have given the recent developments in details with classification and case study. Some popularly employed metrics and data sets, along with public algorithms are listed for evaluation of MOT approaches. Although great progress in MOT has been recently achieved, there are still remaining issues to be tackle.

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