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Object Detection and Tracking

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Abstract: *A crucial and difficult topic is the recognition and tracking of objects in computer vision systems. Due to the rising use of autonomous robots and vehicles, object identification and tracking is being used in a variety of industries, including surveillance, robot navigation, and vehicle navigation, access to large public databases and computational power. The object tracking algorithm used for image analysis. The objective of the algorithm is to partition the area of interest, track its movement, and locate any blobs. An object detection system is required for every tracking, either in each frame or whenever an object appears in the video sequence for the first time. The necessity for automated object tracking video sequences has increased with the advent of high-performance computers and cheap cost, high quality video cameras. Recent advances in computer vision research have made tracking and identification of multiple objects in dynamic environments a top priority. The various object identification and tracking techniques are covered in this publication.*

Keywords: tracking of objects

I. INTRODUCTION

An boom in study into automated video analysis for object recognition and tracking is being driven by growing concerns about safety and security. This research is being made possibleby the exponential rise in hardware facilities such camera processing machines and cell phones. The field of ongoing research in object recognition and tracking a computer vision study that aims to recognize and track things throughout a series of frames and also describes an object's behavior. Currently, the vast majority of the streets, parks, and residential areas are Modes:

Modern surveillance systems use a variety of different technologies to watch over malls, subway stations, schools, and houses. Object identification and tracking are essential for efficient traffic management, the fight against terrorism, crime, and public safety, as well as for precisely identifying diseases in the medical field.

The first step in the video analysis process is object detection [1]. Object detection occurs in every picture or video frame where a certain object first appears [2]. Images are taken in real-time noise that makes object recognition challenging under various environmental conditions. processing images. The ability to recognize an object depends directly on quality. The production of a video dataset takes taking various factors relating to picture quality into consideration. Degradation of the imaging process, including noise, blur, and low image resolution [3].Object classification is the next phase of video analysis. A technique for categorizing or predicting the class of particular items in a video frame is called object classification. The Humans, animals, birds, autos, and moving things are the differentcategories of objects [4]. The last action is the connection of target objects in subsequent video frames is referred to as object tracking [5]. In addition, Identifying and understanding the items in a video with precision is the problem of object tracking trajectories. The study of automated objects changed due to the advancement of technology, tracking and detection.

II. RELATED WORKS

Various techniques to recognize and follow the items in the video frames have been suggested by numerous writers. Few algorithms are based on image process approaches, although deep learning-based methods are showing promise as technology has recently advanced.In this article, we offer a few techniques for object object tracking and detection.

2.1 Object detection and tracking using image processing methods.

The three main stages in image processing are object detection, classification, and object tracking.

Object Detection Techniques: the author suggested background subtraction-based images for object detection.

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detection method that identifies the object that differs from the current video frame and the predecessor frame in terms of pixels.A background with many models is incompatible. The input frames have all beenaccustomed to iterating.update the author's [7] single background model without maintaining a background estimation buffer. The background image was made using a sliding window approach in [8] based on the temporal change of each individual pixel in the buffer that contained L Video frames.
The writer [9]suggested a technique for determining the optical flow field of an imageand carrying out a procedure known as based on optical flow distribution features in the image grouping.It is evident from the foregoing that the Frame difference, optical flow, and background subtraction are the foundations for object detection.

Methods of Object Classification: The following stage of object tracking is object classification. This approach allows for the identification of moving items in the video frame, including people, animals, birds, and other mobile things. The author [10] has proposed a classification based on motion that does not template for established patterns, but it struggles to recognize stationary objects. The movement-based categorization accuracy is average.Author developed texture-based picture classification in [11].who determined the gradient orientation that appears in particular areas of the image, resulting in enhanced quality.at the expense of increased computing time.The author presented a shape-based classification in [12], which is a straightforward pattern matching strategy that may combine with graph matching strategy.

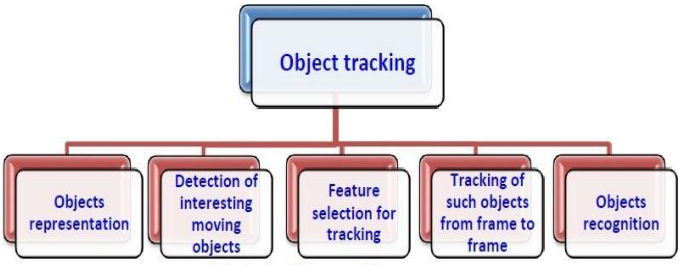

Fig 1. 1. Object tracking steps.

Deep learning-based object tracking: Deep SORT is one of the most extensively used object tracking frameworks and algorithms. A Simple Online Real-Time Tracking (SORT) hasbeen proposed by Bewley et al [16]. By assigning a distinctive id to each bounding box, SORT keeps track of each detection. when the item is misplaced. Due to obstruction, misidentification, or other reasons, the tracker issues a new id and starts tracking new objects uncovered items. In [17], the author suggested utilizing the K mean algorithm for object detection and tracking. He utilized the "good feature to track" technique to extract thefeature points from each frame. The Expanding. The competitive neural network (GCNN) technique created by Lobitoetal
a method for competitive neural networks is shown for following moving targets when usingvideo surveillance. The method for tracking various objects with a human-centered perspective was proposed by Fan et al. in [19]. Convolutional neural networks are used to learn spatial and temporal characteristics during the offline training phase. The greatest studies on object tracking and detection based on deep learning may be found in [20-21].

Process flow for Object Detection and tracking Using Deep Networks:
Applications involving computer vision Object tracking and object detection go hand inhand. Finding a specific instance of interest among a group of questionable frames is donethrough the process of object detection. The method of locating an object is called "tracking." a trajectory is the course an object takes across several frames. Block representation of broad object detection. Figure 3 below displays tracking. The dataset is split into two to help in object detection sections.20% of the photos are used for testing, while the remaining.80% are used for training. In order to find items within an image, deep learning techniques are used. The object has a bounding box drawn around it.
The neural network is given the detected bounding box as a reference to help them track.Object Bounding boxes are tracked across numerous frames using tracking.

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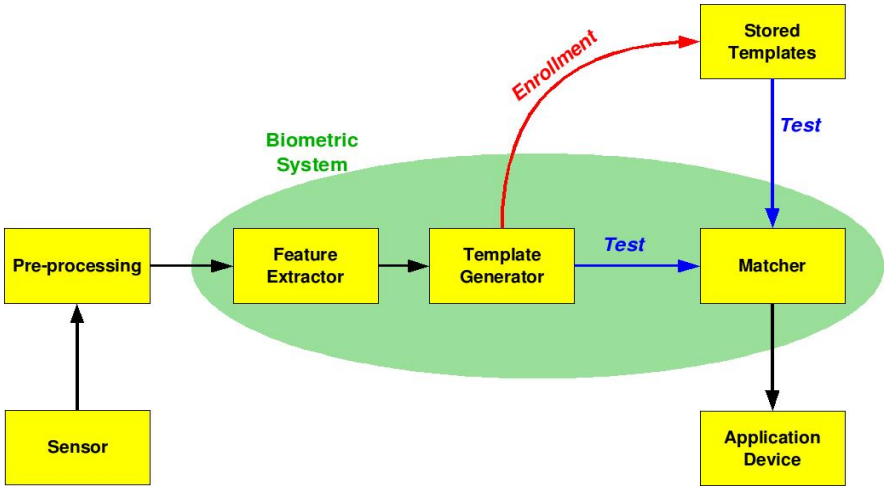

Methodologies:

1. Haar cascades: This technique detects objects based on a sequence of classifiers trainedon certain features, such as edges, lines, or textures.
2. Convolutional Neural Networks (CNN): CNNs are a preferred option for object recognition.thanks to their capacity to successfully learn and extract information from photos.
3. Methods based on regions: These strategies make use of region proposal algorithms, asSelective To find prospective object locations for further investigation, use search or region proposal networks (RPN). classification.
4. The You Only Look Once (YOLO) and Single Shot MultiBox Detector (SSD) tools: These two are the most well-known real-time object identification methods that integrate object localization and a single framework for classification.

Databases:

1. COCO (Common Objects in Context): COCO is an extensively used dataset for large-scale object identification, segmentation, and captioning. It offers a huge number of tagged photos and 80 different object categories.
2. Another widely-used dataset is PASCAL VOC (Visual Object Classes), which includes annotations for object detection and segmentation as well as a variety of objecttypes tasks.
3. ImageNet: ImageNet is a big collection with millions of photos from a variety of sources,including thousands of categories for objects. Pre-training models for transfer learning inobject systems utilize it frequently.detectable actions.
4. KITTI: KITTI is a dataset created especially for applications involving autonomous driving. It delivers 3D point clouds and tagged photos that were gathered from a sensor suite deployed on the vehicle.

REFERENCES

[1]. Redmon, J., Farhadi, A., & Co. (2018). YOLOv3: A slight advancement.
[2]. Ristani, E., Solera, F., Zou, R, Cucchiara, & Tomasi, C. (2016). For multi-target, multi-camera tracking, performance metrics and a data collection are provided. Preprintavailable at arXiv:1609.01775.
[3]. Kalal, Z., J. Matas, & K. Mikolajczyk (2010). Bootstrapping binary through P-N learning classifiers based on structural restrictions. conference on computers held by the IEEE Computer Society in 2010 (Pp. 49–56) Vision and Pattern Recognition Workshops. IEEE.
[4]. In 2019, Chen, K., Wang, J., Pang, J., Cao, Y., Xiong, & Li. Closed MMDetection Benchmark and Detection Toolbox for MMLab. the preprint 1906.07155 of the arXiv.
[5]. Liu, W., Anguelov, D., Erhan, D, Szegedy, C, Reed, S, Fu, C. Y., and Berg, A. C. (2016). Single-shot multibox detector (SSD). (Pages 21–37) in European Conference on ComputerVision.

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[6]. Proceedings (pg. 2411–418) of the IEEE conference on computer vision and pattern recognition.

[7]. In the IEEE Conference on Computer Vision and Pattern Recognition Proceedings, Choi, W.,Shahid, K., and Savarese, S. present stereo photography is used to create 3D object suggestions for accurate item class identification. 7. Li, S. Z., Wen, L., Bian, X., Lei, Z., andZhang, S. (2016). single-shot neural refinement network for detecting objects. 420-436 in European Conference on Computer Vision. Cham Springer