

Moving Object Tracking Using Multiple Cameras in Network

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Abstract— In real time object tracking is an important task in various surveillance application. Nowadays, surveillance system very common in offices, collage campus, shopping malls etc. In this paper, an automated video surveillance system presented. Although tracking and counting system are commercially available today; there is need for further reaserach to address the challenges of real world scenarios. There is lot of surveillance cameras installed around us but there are no means to monitor all of them continuously. It is necessary to develop a computer vision based technologies that automatically process those images in order to detect situations or unusual behavior. In order to solve the problem of poor real time tracking performance using convolutional neural network. This paper proposes a fast and accurate real time video detection and tracking algorithm.

Keyword: - Video surveillance system, Moving object detection, Tracking, Background subtraction.

I. Introduction

Real time human body detection and tracking in indoor environment deals with the concept of higher level application of image processing and computer vision. The following key components of identify to path of real time tracking are extracting a feature, background image subtraction. If two similar color objects come to close the tracker of one object can jump to associated object. The problem is called hijacking problem. Drifting problem occur when an object abruptly changes its direction to reverse. In that case it's become very difficult to track the object because the motion model does not work. An object tracking can be understood as the problem of finding the path (i.e. Trajectory).

In real time object detection and tracking in video and live video streaming can be a complex and daunting task as it deals with different problem challenges.

- Projection from 3D to 2D may lead to loss of information.
- Noisy image may hide some implementing feature.

- Occlusions between object and background surface.

In this paper we propose multiple cameras using real moving object tracking using multiple cameras in a network. We focus on the detection and tracking of pedestrians and vehicle. In this project we used multi cameras network architecture with an inter camera hand off protocol for cooperative people tracking. We have an approach to improve the detection and tracking performance in multi cameras scenarios with overlapping field of view which allows for better handling of occasion problem. Here we have novel approach for multiple cameras object detection and tracking in video. We have compared four different method of object detection and modified frame differencing approach which deal with the less misdetection rate. Non rigid object detection and then its tracking using the multiple cameras was the main proposed of this work. The algorithm is tested for different video set. The detected object is represented by its centroid and rectangular shape around the object boundary. This would be helpful in surveillance system.

Surveillance cameras can be an effective technique to protect public safety and detect or deter criminal activity. Now a day, it is seen that surveillance cameras are already prevalent in commercial establishments, with camera output being recorded to tapes that are either rewritten periodically or stored in video archives. To extract the maximum benefit from this recorded digital data, detect any moving object from the scene is needed without engaging any human eye to monitor things all the time. Real-time detection of moving regions in image sequences is a fundamental step and critical task in many vision applications. Motion detection is usually a software-based monitoring algorithm which will signal the surveillance camera to begin capturing the event when it detects motions. Most image-processing techniques involve treating the image as a two dimensional signal and applying standard signal-processing techniques to it. The video captured by the camera is being processed by the MATLAB program that helps in motion detection. Frame difference used in this paper, which calculates the differences between 2 frames at every pixel position and store the absolute difference. It is used to visualize the moving objects in a sequence of frames. This done according to threshold value whiles the vedio recorder still work.

II. Literature Review

"Moving Object Detection and Tracking by Event Frame from Neuromorphic Vision Sensors", Jiang Zhao, et.al. In this paper author shown that fast movement of object and illumination changes may lead to a negative effect on camera image for object tracking and detection. This paper proposed a new solution to moving object detection and tracking using an event frame bio-inspired event cameras. This method is used YOLO algorithm. For mathematical solution they used Gaussian function, sine function and kernel function for matrix solution. We hope that the YOLO algorithm presented by the author will help us in our project.

"A New Real-Time Detection and Tracking Method in Videos for Small Target Traffic Signs", Shaojian Song, et.al. In this paper we observed that, it is challenging task of self- driving vehicles in real word traffics scenario. They found that the trade-off between the real-time performance and the high accuracy of the detection. Author used YOLO v3 algorithm and detection and tracking algorithm. In this paper author used loss function. After studying this paper we can conclude that an improved YOLO v3 object detection and tracking method is gives better result. For detection on tacking on pedestrian and vehicles movement, this

algorithm may be more suitable.

“Moving Object Detection with Transformers”, Eslam Mohamed, et.al. About that paper author proposed moving object detection with transformers network, comprised of multi-stream transformer. The whole architecture is trained end to end using by partite loss. Identifying static and dynamic object in the scene is crucial for the mapping and planning tasks. In this paper author used bi-partite matching algorithm. Some methods are used in this paper that is flow of and state of the art. Their proposed a two stream transformer based network for moving object detection. In future implementation we will be performances to deteriorate with the increase window size.

"Real-Time Embedded Object Detection and Tracking in Zynq Soc", Qingbo Ji, et.al. In this paper authors shown that with the increasing application of computer vision technology in autonomous driving, robot and other mobile devices, more and more attention has been paid to the implementation of target detection and tracking algorithm on embedded platforms. In this paper real-time video detection algorithm and tracking algorithm are used. This paper has presented a real-time object detection tracking algorithm for embedded platforms. We will improve tracking performance by tracking with deep features and improving hardware implementation.

“Human And Object Detection Using Surveillance System”, Ms. K. Suitha, et.al. In this paper we observed that object detection is a subfield of computer vision that deals with the localization and identification of object. Object localization means the process of specifying the location of an object in an image or video used in a surveillance camera. Identification means that it is a process of assigning the object to specified label, class or description. We observed that the advantages of this paper is to overcome the detection issue, tracking related to object movement and appears is used. In this paper the R-CNN algorithm and YOLO algorithm are used. Author used open CV library with several built in function for image processing. It is useful for detecting object and faces. In this paper review on different object detection and tracking recognition techniques. It is based on video a frame and various tracking technology. We will be developing training and testing of human object detection referring this paper.

III. Block Diagram

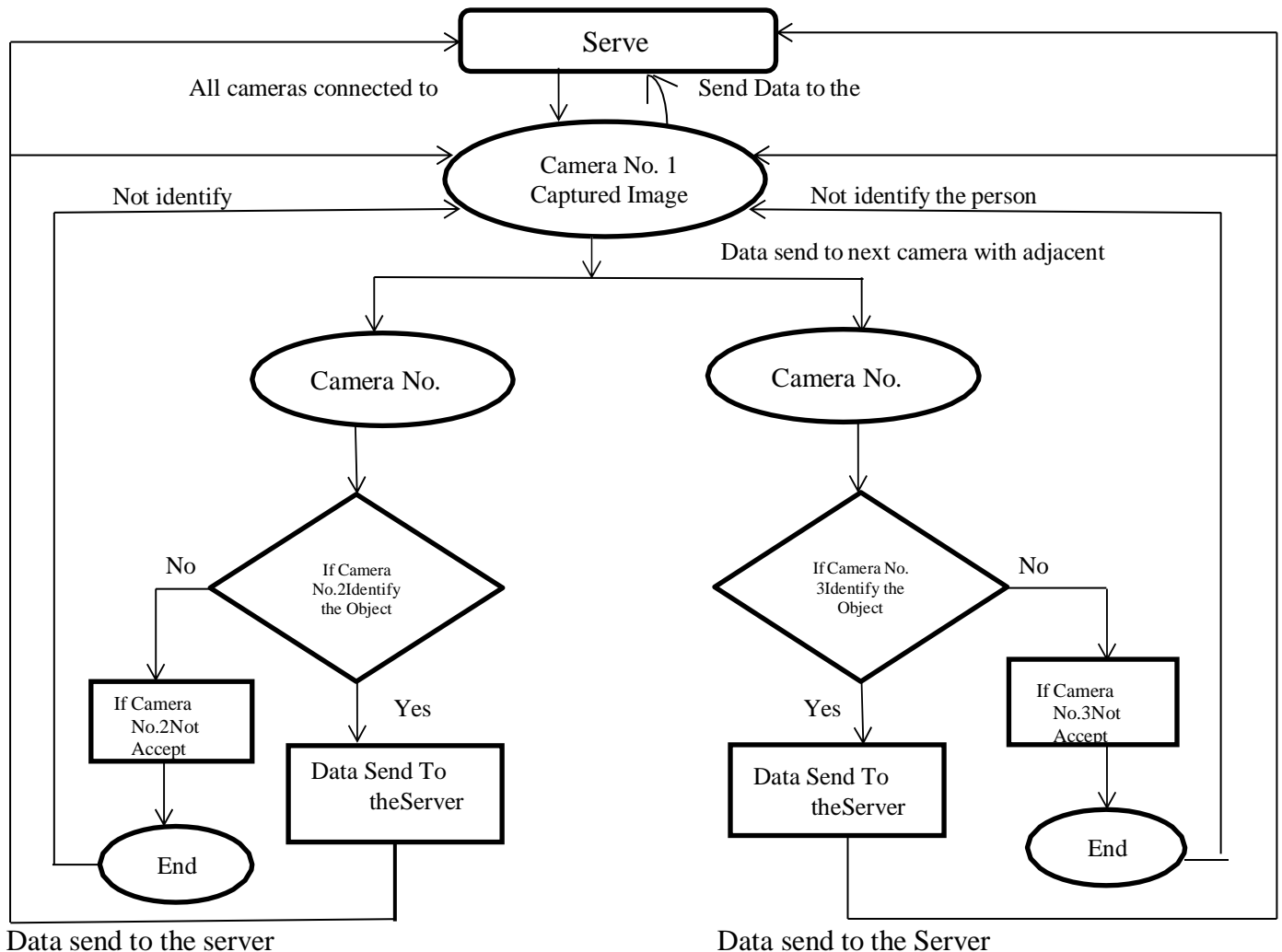


Fig: Flow Chart

Block Diagram Description:

In this project we have to setup both that main server. So the CCTV cameras should be in network, if any person done unnecessary movement under the range of camera no.1 get captured the image. After that capturing the image camera no.1 pass the data to server and neighborhood cameras. The server can store the data in a data base. We will then camera no. 1 send the message to camera no.2 he or she is come under range and detect he or she done unnecessary movement , after the camera no 2 we have two direction left side and right side. Suppose, camera no.3 is right side and camera no.4 left side direction then camera no.2 pass the data right and left side. If the person goes under the range of camera no.3 we will pass the message to camera no.2 and server I got them. Then camera no.4 is send message to server I denied and ready for next job. Similar, the job is continuous still the end of the network.

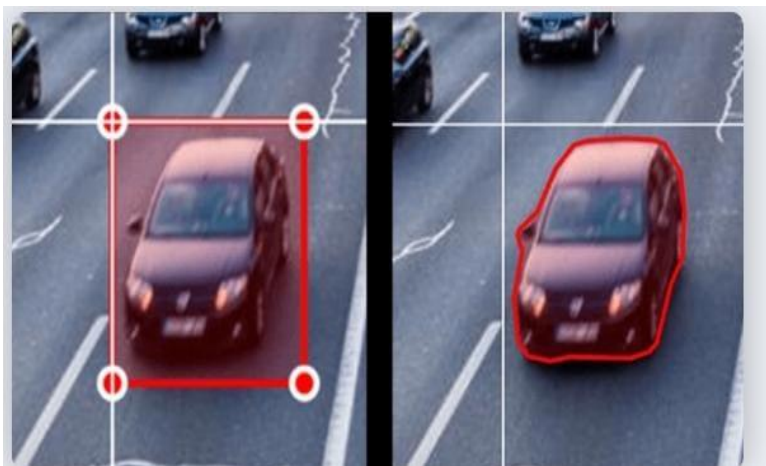
Technical Point: -

What is frame in video?

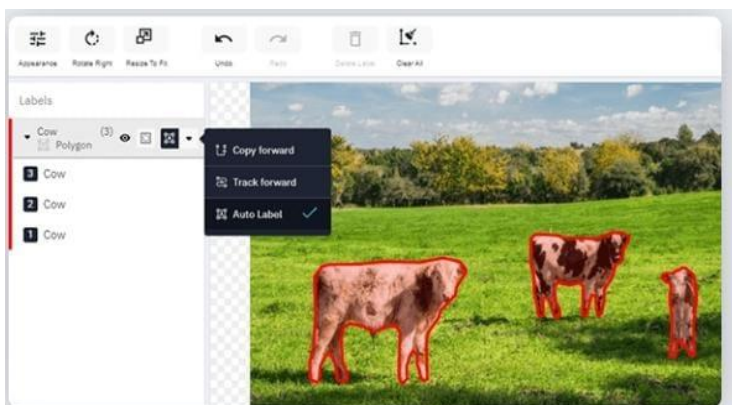
In filmmaking, video production, animation, and related fields, a frame is one of the many still images which compose the complete moving picture.

Line and Resolution: -

The frame is composed of picture elements just like a chess board. Each horizontal set of picture elements is known as a line. The picture elements in a line are transmitted as sine signals where a pair of dots, one dark and one light can be represented by a single sine. The product of the number of lines and the number of maximum sine signals per line is known as the total resolution of the frame. Smart poly objects selection save time labeling polygons for instance segmentation by drawing a simple rectangle that resolves to an object.



Track Forward Labeling Track a labeled objects from frame-to frame to automatically apply polygons or bounding boxes. Auto label common classes select common objects to recognize and plain sight will use pre-trained models to automatically apply labels.



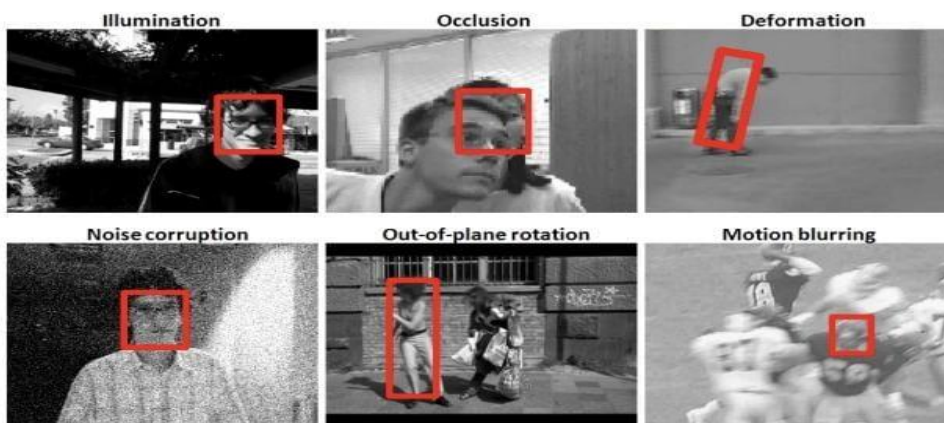
Four stages of the object tracking process now, let's discuss the object tracking process in more detail.

Target Initialization: -

The first step involves defining the object of interest or targets. It incorporates the process of drawing a bounding box around it in the initial frame of the video. The tracker must then estimate or predict the object's position in the remaining frames while simultaneously drawing the bounding box simultaneously.

Appearance Modeling: -

Deals with modeling the visual appearance of the object. When the targeted object passes through various scenes like the lighting condition, angle, speed, etc., they may change.



Appearance modeling consists of two components:

Visual representation: It focuses on constructing robust features and representation that can describe the object. Statistical modeling: It uses statistical learning techniques to build mathematical models for object identification effectively.

Motion Estimation: -

Motion estimation usually infers the predictive capability of the model to predict the object's future position accurately.

Target Positioning: -

Motion estimation approximates the possible region where the object could most likely be present. Once the location of the object is approximated, we can then use a visual model to lock down the exact location of the target.

Multiple Object Tracking: -

Multiple Object Tracking (MOT) refers to the approach where the tracking algorithm tracks every single object of interest in the video. Initially, the tracking algorithm determines the number of objects in each

frame, following that it keeps track of each object's identity from one frame to the next frame until they leave the frame.

Object detection is the process of finding and classifying objects in an image. One deep learning approach, regions with convolutional neural networks (R-CNN), combines rectangular region proposals with convolutional neural network features. R-CNN is a two-stage detection algorithm. The first stage identifies a subset of regions in an image that might contain an object. The second stage classifies the object in each region.

Single Object Tracking: -

Single Object Tracking (SOT) aims to track an object of a single class instead of multiple objects. It is also sometimes referred to as Visual Object Tracking. In SOT, the bounding box of the target object is defined in the first frame. The goal of the algorithm is then to locate the same object in the rest of the frames. SOT belongs to the category of detection-free tracking because one has to manually provide the first bounding box to the tracker. This means that Single Object Trackers.

IV. Conclusion

In this paper, human motion detection and tracking for real time security system was formulated. Video surveillance is focused on people counting and tracking mainly for real-time applications such as security system, traffic monitoring, etc. The object is detected from the live video and tracked using background subtraction, this system is proposed for real-time security purpose. In the live video 18 frames are processed at a unit time. Based on the camera's range the monitoring area may be increased. It is mainly applicable in banks, jewelry shops, military etc. Object detection is made efficiently using the background subtraction technique and the frames processed per second are improved.

Moving Object Detection is extremely significant and economic analysis field that's powerfully impelled by arrange of applications. Moving Object Detection is greatly noteworthy field that is intensely affected by mastermind of utilizations in terms of various applications. The main aim of this paper is to provide an outline of the existing methods for the detection of objects in motion along with the information of the importance this topic has grown globally.

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