International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 08 Issue: 06 | June 2021 www.irjet.net p-ISSN: 2395-0072

Security Enhancing Using Motion Detection

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Abstract - *Video analytics is one of the quickest growing and vital domains of research. Video analytics is the process of analyzing the video and detecting various activities throughit. Video analysis can be used in many fields such as improving video quality, adding animations, and much more. But the most important use of video analysis is for security. Motion detection can be used with CCTV cameras to enhance security and make it more user-friendly. CCTV camera is the most basic instrument used for surveillance purposes at home, school, office, and many more places. Normal CCTV cameras record all the footage of the range which it captures and save it into a storage device. Recording and storing full-day footage is of no use. Many times, there are no activities, and still, it records the footage of blank background. This blank background takes a lot of space. Also, when a user wants to see the footage again, he or she has to go through the whole video to find a particular moment. This problem can be solved by using analyzing the video at run time through motion detection. Proposed is a system which can be used with CCTV cameras, to make it more efficient and user friendly. The video which is captured frame by frame will be analyzed using a motion detection algorithm. The algorithm uses the MobileNet SSD modelfor detecting the person in the frame and Centroid tracker and Non-Max Suppression algorithm for tracking and detecting the motion. The footage part in which the motionis detected will be saved in the used storage device and the rest will be ignored. The system also provides an alert system for those who want to know about the activity immediately. If any activity is detected at a given time range, a message will be sent to the owner or the person in charge.*

***Key Words*: Video analytics, MobileNet SSD, Centroid tracker, Non-Max suppression algorithm.**

1. INTRODUCTION

CCTV cameras are the most commonly used device for surveillance purposes. Many big companies, malls, and hotels have CCTV cameras installed at each corner. The person who is in charge of security needs to constantly sit and guard hundred different cameras continuously. It is hard for a single man to check so many cameras all day. So, the security person has to change the duties according to the shift. But the problem is that different guard has different perception towards suspicious activities. It may causea human error for correctly noticing the suspicious activities from so many screens. It is not the fault of the guard, humans are unable to supervise everything continuously, and in this case, monitoring multiple screens for a long time is very tiring and hectic. Even if a person monitors a single screen for 30 minutes, the human eye detects 20 percent of the activities.

It is not a smart and reliable approach, especially at places where security is of utmost need. Carelessness in security can also increase wrong activities performed by the people. Therefore, the traditional CCTV cameras are replaced with the smart security system that has inbuilt video analysis. The system which we are providing takes a live feed from the camera and analysis it using an algorithm. The algorithm detects the motion in the video, and only that part of the video is saved. It saves a lot of memory by not saving blank background videos that are of no use. It also makes later monitoring of the footage user-friendly as the person does not have to check for all the activities from a video that is filled with a blank screen instead, he can go through only the video which has some activity.

Banks, malls, and other corporate places are usually closed at night, and no activity or human presence is expected at that time. All the robberies and malpractices are performed at night when no one guards the place. Our system has a feature of alert messages. If a motion is detected at a given particular time, let's say at night, an alert message is sent to the owner of the place or the person in charge to maintain security. It makes easy to keep your place safe at night from thief and robbers.

2. LITERATURE SURVEY

According to the author **Yu-Chen Chiu et al.** In the field of computer vision, Object detection plays a crucial role. In the past, countless object detection algorithms has been proposed in the literature although they all have one negative point in common; submitted algorithms ignore the fact to reduce computational complexity rather than it mainly focuses to improve the detection accuracy. So, in order to achieve real-time performance, these excellent object detectors need to operate with a high-end GPU.

Thus, theauthors introduce a real-time lightweight object detector that can be applied in embedded systems with restricted computational resources. This model is basedon Mobilenet-v2 and is one of the key features in the design of modern Autonomous Driving Assistance Systems (ADAS). Moreover, the proposed model isintegrated with FPN (Feature Pyramid Network) to enhance accuracy, and just like other excellent object detectors, the model will efficiently improve detection stability and detection accuracy [1].

According to the author **Jan Hosang et al.** Object detectors have immensely benefitted from moving towards an end-to-end learning paradigm: features, proposals, and the classifier turning out to be one neural network enhanced outcomes two-fold on general object detection. Therefore, the proposed algorithm is a post-processing algorithm i.e. Non-maximum suppression an essential component. The working of the proposed algorithm is quite basic—after the detection of the object, some noise/overlapping can be seen in the bounding boxes of the object, therefore in order to remove the noise and overlapping of the bounding boxes the proposed algorithm mergesall the overlapping bounding boxes in such a way that the output image contains 0 noise and is 100 percent accurate. The defector standard Non-maximum algorithm is incredulously trouble-free, completely hand-crafted that is based on greedy clustering with a fixed distance threshold as well as powers a trade-off among review and precision [2].

According to the author **M. Singh et al.** the determination of the tracking algorithm is a crucial perspective identified with the performance of video tracker. With the advancement in reconfigurableinnovations like FPGAs, it is feasible to analyze algorithms on a hardware platform for real-time execution. From both IR and CCD cameras, utilizing standard CCIR-B video, a centroid-based tracker has been designed. In the current work conspire for the execution of centroid tracker and VLSI engineering for differentkinds of centroid-based tracking algorithms has been analyzed. Xilinx FPGA has been utilized as a target gadget for performance assessment of different centroid tracking algorithms and examination of resource and timing necessities related to these algorithms have been finished [3].

According to the author **Fengpeng Guo et al**. The semantic analysis of computer vision is to allow the machine to automatically understand, examine and produce sensible semantic ideas for the content contained in visual signals like pictures or videos. As of now, numerous specialists and researchers have completed in-depth and broad research on image recognition, and with the rise of neural networks, the utilization of deep learning should turn into the current research trend. In this paper, the authors utilize the industry-wide deep learning framework Caffe training informational collection, and the outcomes are sent to Huawei's latest product, hilens, to acquire the end-product through the startup document and show the picture and accuracy[4].

According to the author **Agus Mulyanto et al.** Real-time human detecting and tracking is a significant task in the Advanced Driver Assistance System (ADAS) especially in giving data about the circumstance in front of the vehicle. Deep Convolutional Neural Networks (CNN) is one algorithm that is generally applied to arrange and detect objects. CNN has shown an amazing execution. Nonetheless, the high computation of Deep CNN makes the algorithm hard to be applied to the real ADAS framework. Since 2014, the One-stage Detector approach, for example, SSD and YOLO started to be applied on gadgets with low computation. In this test, the authors present a real-time framework for the detection and tracking of people for the ADAS framework executed in Raspberry Pi 3 Model B Plus. The object detection approach in this examination applies the SSD structure, and the tracking human movements approach is finished by ascertaining the movement of midpoint coordinates from bounding box objects from two sequenced frames [5].

According to the author **Aras Dargazany et al.** This paper proposed a methodology for human body part tracking which depends on torso track. The fundamental objective of this paper is to trackprinciple human bodies like torso, head, and hands. In the proposed strategy for human body part tracking, the authors are utilizing associated segments to improve the distinguished outline to recognize the body leaves behind regard to torso area and size. The authors are additionally utilizing a mass tracking module which is made out of frontal area identification, mass discovery, and mass tracking to track down the surmised area size of the torso in each casing. By tracking the torso, the authors will want to follow other body parts dependent on their area as for the torso. Having discovered torso size and area, the district of certain body parts on the outline will be displayed by a Gaussian circle utilizing Gaussian mass demonstrating in each edge with various tones to show its area, size and posture. The proposed HBPT approach assists us with

recognizing and track human body parts progressively for additional utilization in Human Activity Recognition in vision-based HCI [6].

According to the author **Suguna Satyavolu et al.** with ever-expanding interest for uses of Deep Learning (DL) in different fields, specifically, industry and scholarly regions, the interest for a success rate of application of Deep Learning frameworks are likewise expanding at a quick rate. There is a wide range of DL structures accessible, each having its capacities and qualities. The mix of systems and algorithms together gives the ideal output. For this reason, analyzing systems alongside different algorithms in the various applications should be known to choose the best structure for a particular application. In this paper, two systems, for example, TensorFlow and Caffe are carried out in explicit applications and results are examined to pick the best structure dependent on application [7].

3. CONCLUSIONS

Motion detection is for both indoor and outdoor surveillance systems as well as for both single and multiple object detection. We are developing a motion detection system that will help detect moving objects specifically persons. Various methods for motion detection such as centroid tracking, non-max suppression, background subtraction, adaptive background subtraction, optical flow method, and frame differencing are used. From these entire methods, centroid tracking is one of the easiest and simple methods to detect the motion of the object. Bounding Boxes i.e. rectangle boxes around the object are formed on the resulted frame when motion is detected. We are developing a motion detection system better than the existing one that will help detect the moving person without detecting any other object, for example, car and buses, etc. By using the Human Motion Detection system bank's safe will be more secured as it will send alerts regarding burglary happening. Furthermore, memory wastage would be avoided and it will save memory. This method works well for long videos, which overcomes the drawback of fixed background analysis. The time required to trace the motion in a given video is optimal compared to other methods.

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