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Survey on Video-Based Abnormal Human Behaviour Detection

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A B S T R A C T

To develop a true time video surveillance system for security functions, by detection abnormal and abnormal behavior of men and creating the safety system automatic and real time. Modeling human behaviors and activity patterns for recognition or detection of special event has attracted vital analysis interest in recent years. numerous strategies that are abound for building intelligent vision systems aimed at scene understanding and creating correct semantic reasoning from the served observed dynamics of moving targets. Most applications are in surveillance, video content retrieval, and human-computer interfaces. The main purpose of this survey is to extensively determine existing strategies and characterize the literature in a manner that brings key challenges to attention

Keywords: Human behaviour detection, suspicious activity, video surveillance, security

Introduction

Computerized abnormal event detection is a growing need due to its ability to be automated and replace human interference, hence innately inducing a sense of reliability and security The task of detecting abnormal events based on what cameras capture is critical and traditionally labour intensive and laborious as abnormal events happen with a very small chance. making over 99% of the effort to watch a video go in vain.

Surveillance cameras are quite common across numerous industries throughout the globe. The applications of those cameras will vary from felony deterrence to weather observation and more. Parks, and communities -all public spaces should be outfitted with video surveillance systems to assist deter crime and enhance public safety. Enforcement can even view the video directly from their smartphones, enabling faster response times. Video surveillance will facilitate staggeringly with crowd control as well as prevent crime by providing staff with real-time pictures from an event. Processed abnormal event detection is often applied in these situations as such events are time sensitive and detecting them with little or no delay and high accuracy is crucial.

Traditional image processing algorithms to detect abnormalities are heavy on computations and are thus slow and require very powerful systems to be run on. Sparsity-based techniques convert these heavy computations into smaller cost-less least square optimizations which speeds up the process and provides faster detection rates. The formal definition of the word "Abnormal is "deviating from what is normal or usual, typically in a way that is undesirable or worrying" "Abnormal" here, is confined to the boundaries of the environment where most surveillance is done or used, for instance -A man who suddenly begins to run in an environment where most people are standing still or are walking slowly, or a cyclist who suddenly enters the frame of a video which has only people walking or standing, or a case in which the camera's vision is obstructed and at a later point regained is also considered "Abnormal" in our case. This confinement is done as the definition of the word "Abnormal" is very bad and it would be a herculean task to try to cover and capture all of the scenarios that the word encompasses.

Related Work

S Akella et al. [1], discussed a model that can be used for object detection. The proposed model makes use of OpenCV DNN model with YOLOv3 architecture. The model uses COCO dataset for training the model. The dataset contains large-scale object detection, segmentation as well as captioning dataset. The entire framework consists of two components. First, the features are extracted from the image and then based on extracted features the classifier makes the prediction. Based on the detected object, it is classified as suspicious or normal. The given model can also detect the number of people in the frame as well as suspicious objects like isolated bags, knives, and guns.

Loganathan et al.[2], the author proposed a system that can be used for gun detection as well as abandoned luggage detection. For the gun-based detection crime, to train the model authors created a dataset of 3908 images from multiple sources like YouTube videos, Google images, etc. The proposed model uses TensorFlow implementation of Faster R-CNN and Inception v2 network for feature extraction. For Abandoned Luggage Detector, the authors have used a double subtraction technique that detect items that are left on the scene and not in motion and have defined them as stationary objects. If the object was in the scene from the beginning then they are considered as a part of the background. For the validation of detector, ResNet101 was used to avoid false positives.

K. Jhapate et al. [3], the proposed work uses OpenCV and motion influence map to identify unusual human behavior. Motion influence map is used to extract the motion features and then the extracted features are clustered with the help of the k-means algorithm. The model clusters those frames which have unusual activities that are defined in the motion influence map.

M. Kamthe et al [4], proposed a semantic approach to define and detect suspicious activities. The framework consists of defining suspicious activity, background subtraction, object detection, tracking and classification of activities. It also uses spatial relation and motion features between two objects. For the project work authors selected- abandoned luggage, and loitering. The objects are detected by using cross correlation between the template image and new image and for object tracking correlation-based tracking method is used. The authors have used datasets CAVIAR(PETS 2004) and PETS 2006 for testing the model.

Bordoloi et al [5], the proposed model is based on YOLOv3. It is used to train and test the dataset. The authors created their own dataset consisting of 3 anomalies performed by different people from different backgrounds. The videos were converted to frames at 30 fps. Then the images were annotated with the help of LabelImg tool in YOLO format. To train the models collected frames were annotated in 3 classes i.e. wallet_stealing, lock_breaking, and bag_snatching. But, due to small dataset, there was mismatch between test results and ground results. Hence authors have suggested expanding dataset to obtain better detection and make the model more practical.

Summary

The system proposed [1], counts the number of people per frame, isolated luggage, and weapon detected in the frame. The authors used various surveillance footage to test the proposed system and noticed the high confidence accuracy ranging between 92%-97%.

The gun detector model [2], was tested on the dataset of images of guns collected from surveillance videos. This model gave training accuracy of 91.3%, testing accuracy of 89.4%. The abandoned luggage detector is computationally efficient and has an extremely low false alarm rate.

The proposed work [3], was analyzed on 147 frames out of which 122 frames had unusual activity. The system detected all the 122 frames positively. The modal has the accuracy 96.49%, precision as 89.70% and recall value as 92.42%.

The proposed work [4], had accuracy of 57% in objects detection due to multiple blurred objects and 90% accuracy in object tracking. In activity detection stage, loitering at ATM was detected with 93% of the accuracy and the detection of abandoned bag had accuracy of 96%.

The proposed model [5], takes time to detect abnormal behaviour in range of 0.056-0.060 sec with average of 0.057 secs. The model has precision of 93.10%, FI score of 96.42% and accuracy of 95%.

4. Conclusion

In this paper, we addressed how the detection of abnormal human behaviour or suspicious activity, can help to create better security and also help in various scenarios if we are using a versatile dataset. Here the presented techniques and models are able to detect suspicious activity/ abnormal behaviour and abandoned objects by using feature extraction and classification. The presented works also stress the importance on models having better accuracy and less computation time.

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