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Suspicious Event Detection in Examination Hall

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Abstract: ***Suspicious human activity recognition from surveillance video is an active research area of image processing and computer vision. Through the visual surveillance, human activities can be monitored in sensitive and public areas such as bus stations, railway stations, airports, banks, shopping malls, school and colleges, parking lots, roads, etc. to prevent terrorism, theft, accidents and illegal parking, vandalism, fighting, chain snatching, crime and other suspicious activities. It is very difficult to watch public places continuously, therefore an intelligent video surveillance is required that can monitor the human activities in real-time and categorize them as usual and unusual activities; and can generate an alert. Recent decade witnessed a good number of publications in the field of visual surveillance to recognize the abnormal activities. Furthermore, a few surveys can be seen in the literature for the different suspicious activities recognition; but none of them have addressed different suspicious activities in a review. In this paper, we present the state-of-the-art which demonstrates the overall progress of suspicious activity recognition from the surveillance videos in the exam hall. We include a brief introduction of the suspicious human activity recognition with its issues and challenges. This system consists of suspicious activities such as cheating in the exam hall, speaking with other candidates, change in the position. In general, we have discussed all the steps those have been followed to recognize the human activity from the surveillance videos in the literature; such as foreground object extraction, object detection based on tracking or non-tracking methods, feature extraction, classification, activity analysis and recognition.***

Keywords: Suspicious Activity, Face Detection, Face Recognition, Surveillance video, CNN (Convolution Neural Network)

1. Introduction

Examination environment consists of large number of candidates and number of exam conductors and guards. Lot of human efforts are needed to continuously watch over the candidates for prevention of any mishap or cheating. A human cannot always pay attention and concentration of this much to the exam. Hence, in order to address the problem of cheating in exam and for reduction in human efforts, this suspicious activity detection system is designed.

In existing system[1], the detection of abnormal activity is done in a examination environment. That system uses 3D Convolution Neural Network(CNN) for detection which comprises of two convolution layers instead of five. System is able to detect only the basic gestures of the candidates in an examination environment. Existing system is not able to detect the facial features. Also, it is not able to recognize or identify the particular candidate based on his/her suspicious activity.

The system[2] is able to detect the human faces and recognize them based on the movements of eyes, lips. etc. System uses 2D characteristics to extract the facial features. It uses unsupervised approach for face detection and facial features extraction. It is able to detect only in case of an upright face.

2. Literature Survey

“Toward Abnormal Trajectory and Event Detection in Video Surveillance” Serhan et.al. 2017 IEEE Transaction[8]. In this papers authors described about fused approach of trajectory-based and pixel-based approach for anamolous event detection. In this paper abnormal behaviors are detected by considering speed and direction of object so only able to detect wrong direction, Loitering, and No Payment events only. Also in this category not all events are identified, there are many false alarm and missing events. So there is scope to use advanced technique which will minimize the false alarm. Also by using other advanced algorithms we can detect other types of events also.

“Suspicious behavior detection based on DECOC classifier” by Mossaad Ben Ayed and Mohamed Abid[9]. In this paper videos images are converted into gray sale using binarization technique.

“Feng Want et.al[10]. Have employed ERMH-BOW for vide event detection, BOW i.e. Bag of Visual word features are employed to capture what aspect of an event. Using Difference Gaussian key-points and visual vocabulary and visual vocabulary s constructed. Also Hessian Laplacian detectors and SIFI are used. By using k-means clusters of visual words are created and each cluster is named as visual word. Then motion histogram for each visual word its weights indicating the presence or absence of the visual words. The relative motion vectors are employed between different visual words. Finally to alliciate the mismatch problem existing BOW is extended c-relation between visual words.

3. Proposed System

The proposed system, in this paper combines the two approaches for suspicious event detection. First approach [1] consists of abnormal event detection using a convolution neural network and second approach[2] consists of face detection and face recognition. This system is able to overcome the disadvantages of the first approach by identifying and detecting the candidate’s movements more accurately and efficiently. It uses CNN for detecting

and tracking the candidates movements in an examination environment. Moreover, it is able to identify correctly the candidate which is doing a suspicious activity based on face recognition. Facial features are extracted in a file and when an input video is playing, those extracted features are compared with the facial features of the candidates currently giving exam, if it finds someone suspicious that candidate's details along with his/her name is displayed in that frame. It is represented on the frame using red box. Also, the candidate's details get stored in a file which can be retrieved as per need and for further evaluation.

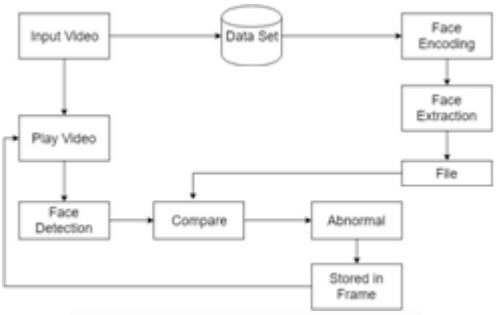


Figure 1: Architecture Diagram

Initially, System's architecture consists of registration of candidates with their facial image, names and personal information. That information is stored in a dataset. Also, dataset contains input video of examination hall on which suspicious activity detection is going to be performed. Input video is played at user side and in backend, while video is still playing, the facial features and facial encodings are extracted from dataset.

When a candidate is found to be doing suspicious activity like cheating then candidate's face is compared with the facial features contained by dataset and it is classified into suspicious activity by CNN algorithm. The report is generated afterwards which contains information of that particular suspicious candidate.

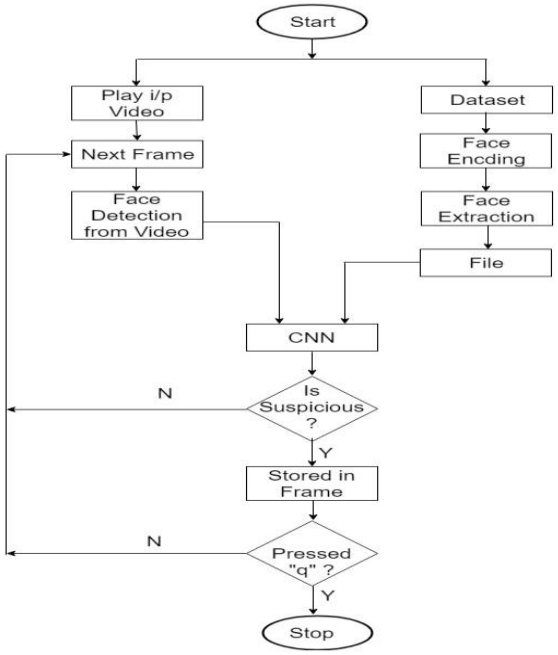
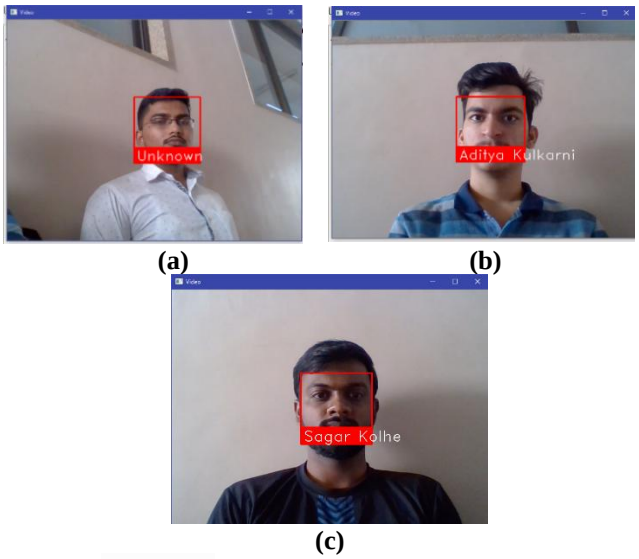


Figure 2: Flow Diagram

4. Experiment Results



(a) **(b)**

(c)

Figure 3: Face Detection and Recognition

The images shown above are the experiment results which showcases two scenarios. First scenario is the one in which a candidate is not registered with the dataset. First scenario is shown in Fig 3 a), "Unknown" is displayed for the candidates not registered with the dataset. Second scenario is the one in which a candidate is registered with the system's dataset. Second scenario is shown in Fig 3 b) and c).

5. Conclusion

In this system, initially a preprocessed video is used. Background estimation and foreground extraction is done and Convolutional Neural Network is used to detect human faces. The result is then used to identify head motion. Further a combination of Motion Detection, Edge Detection and Skin Color Detection is performed to identify the hands of students. The major form of contact between students during examinations is through gestures through eyes gestures through hands and hand contact for object exchange. Identifying the hands of students helps to detect contact between students. The faces and the hands identified are boxed out in green color by the system. When the faces or hands cross a certain threshold, the system changes the box color from green to red which indicates that a suspicious activity is being carried out.

6. Future Work

This system could be improved by using more robust algorithm. The robust algorithm would allow us to detect the faces of the persons from far distances. Also, Object detection and its activity recognition could be done from far distances. In Examination Environment, Object type could also be recognized using such algorithms. Further improvement in this system would be to detect and recognize the objects and human faces using low resolution camera also. Moreover, different camera angles could be used to improve the detection capability of the system.

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