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Detection of Abnormal Events

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Abstract—The detection of abnormal events has an essential role in video content analysis and achieving in realtime video streams is a very important and challenging task in order to monitor surveillance fields. The objective of this paper is to provide surveyed information of some research papers related to the abnormal event detection. The survey provided insight into various potential feature extraction and classification techniques.
Keywords—anomaly detection, video surveillance, object detection, pattern analysis

I. INTRODUCTION

Video surveillance systems are important field monitoring systems for security and law enforcement.Smart video surveillance is a very popular research topic in computer vision applications. These systems produce a large amount of data that cannot be monitored all time by human security personnel. This requires a solution that detects anomalous or abnormal events in real time. Behavior analysis in a crowd scene, motion detection in restricted access areas required automation of video analysis.

II. LITERATURESURVEY

The authors of Detecting Abnormal Events in University Areas propose a simple algorithm to classify events from video surveillance based on optical flow calculations [1]. The algorithm divides each frame in the video into zones, estimates optical flow in each of the zones and creating a histogram of magnitudes of flow vectors. The events are classified based on a threshold value as an abnormal or normal event.

Optical flow calculation involves tracking of points in each frame of the video, after which estimating the histograms of the magnitudes of each zone to find out the zone of high activity and analyzing magnitudes to compare with the threshold determined by optical flow calculations in a normal event and an abnormal event. The advantage of the algorithm is its computational simplicity, but the disadvantage is normal optical flow is noisy, better optical flow versions are required.

In Abnormal Behavior Detection in Crowded Scenes Using Density Heatmaps and Optical Flow [2], the Crowd behavior analysis is very difficult to ask due to scale, light and crowd density variations [2]. A new two-stream network is proposed that uses crowd density heat maps and optical flow information to classify abnormal events. Dense crowd images usually include a big variety of person's head sizes due to perspective distortion. A simple neural network will capture characteristics of the crowd at various scale So, they create inception like network, with filters of different sizes in order to produce density heat maps.

Optical flow algorithms calculate the displacement of motion of objects, surface and edges in a video from one frame to other. The method used is Flownet 2.0 to obtain optical flow estimation.

We won’t get many training data for the abnormal event detection Therefore, they solve that problem by using the GTA V engine to create the datasets required.

In Global Abnormal Event Detection in Video via Motion Information Entropy [3], The Calculation of the frame level motion entropy which is used to describe the confusion of a scene based on that motion entropy, the second component calculates the Gaussian distribution of normal scene. And then it uses the truncated probability to detect whether the frame is abnormal or not.

Both the direction and magnitude of information can be integrated to represent the scene. Next, the value of entropy is used to measure the chaos of the scene.

When the scene is confused with larger entropy value, usually imply that the scene is normal. The small value means abnormal.

One of the main problems of abnormal event detection is to distinguish between normal and abnormal events in surveillance videos. As we know there will a lot of similarities between abnormal and normal events.

In Rapid Abnormal Event Detection Method For Surveillance Video Based On A Novel Feature In Compressed Domain Of HEVC [4], The process measures the motion intensity within a video region and a motion intensity transmission method to predict MICs for subsequent frames. And by identifying unexpected changes of MIC, Accidents are detected using the difference between the predicted and actual MICs for each frame.

In High Efficient Video Coding (HEVC), Each frame is divided into squares of equal size called largest coding units (LCUs). Each LCU can be divided into the smaller unit until a proper partition reached. Each smallest unit is referred to as a prediction unit (PU). For each inter-coded PU, there will be a motion vector (MV) indicating the best match position in the reference frame. LCU with intense motion have longer MVs and finer partitions.
A brighter LCU indicates a larger
MIC because there is more intensive motion there than other LCUs in this frame. When predicted MIC and Actual MIC are nearly the same then Normal Event. If they are not even i.e. if predicted MIC are larger than real MIC then accident has happened.
The authors of Abnormal Event Detection based on Analysis of Movement Information of Video Sequence propose event detection based on moment feature descriptor and classification. The feature descriptor extracts the optical flow and computes the histogram of optical flow orientations (HOFO) [5]. The hidden Markov model (HMM) is proposed to classify the events due to the probabilistic property. HOFO feature descriptor is based on the movement and if the index of the HOFO is at a low level. Thus, these frames contribute to the false negative and then lead to the lower performance of the classifier. The accuracy of the HMM with the optical flow is slightly better than other algorithms

III. CONCLUSION

This paper surveyed research papers on abnormal event detection. Various feature extraction and classification techniques like optical flow were proposed in research papers. This provided information about important stages in the abnormal event detection.

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