Histogram Of Gradient (HOG) Based Crowd Activity Analysis Using Machine Learning

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ABSTRACT

Automated analysis of crowd activities using surveillance videos is an important issue for communal security, as it allows detection of dangerous crowds and where they are headed. Public places such as shopping centers and airports are monitored using closed circuit television (CCTV) in order to ensure normal operating conditions .Computer vision based crowd analysis algorithm can be divided into three groups; people counting, people tracking and crowd behavior analysis. In this paper the behavior understanding will be used for crowd behavior analysis. using machine learning with feature extraction method technique base crowd activity analysis and for feature extraction using Histogram Of Gradient and blob analysis method use for identify movement of human inside video frame and classify it using machine learning algorithm like SVM Classifier.

Keywords: Image pre-processing, SVM classification, Abnormal Activity Detection, feature extraction, identification/matching, Machine Learning.

1. INTRODUCTION

Crowd is a unique group of individual or something involves community or society [8].Crowd movement tracking is quite dissimilar from tracking individuals in the crowd. When individuals are being tracked, the information is compute at the level of each individual. With the increase of population and diversity of human activities, crowded scenes have been more frequent in the real world than ever. It brings enormous challenges to public management, security or safety. Humans have the ability to extract useful information of behavior patterns in the surveillance area, monitor the scene for abnormal situations in real time, and provide the potential for immediate response .However, psychophysical research indicates that there are severe limitations in their ability to monitor simultaneous signals. Extremely crowded scenes require monitoring an excessive number of individuals and their activities, which is a significant challenge even for a human observer[8] .

Automated scene understanding or analysis has already attracted much research attention in the computer vision community. One important application is intelligent surveillance in replace of the traditional passive video surveillance. Although many algorithms have been developed to track,

recognize and understand the behaviors of various objects in video ,they were mainly designed for common scenes with a low density of population. When it comes to crowded scenes, the problems cannot be handled well, because a large number of individuals involved not only cause the detection and tracking fail, but also greatly increase computational complexity. Under such circumstance, crowded scene analysis as a unique topic, is specifically addressed [8]. Abnormality detection is classified into two categories; trajectory analysis and motion analysis. Trajectory analysis is based on object tracking and typically requires an crowded environment to operate. Motion analysis is better suitable for crowded scenes by analyzing patterns of movement rather than attempting to distinguish object. The analysis of crowd movements and behaviour is of particular interest in surveillance domain. In scenarios where hundreds of cameras are monitored by a few operators behavioral analysis of crowds is useful as a tool for video pre-screening. Activity and event detection has gained much attention in automated video surveillance, content-understanding and content-ranking .Activity detection identifies the actions of a target based on a series of observations and interactions with the environment. To enrich the realistic characteristics, both contextual and social semantic effects should be considered in formulating the crowd behavior. Inspired by the social behavior modeling, people are driven by their own destination and emotion which is influenced by the interaction of other people.

2. Problem Definition:

Streets of our cities are day by days more crowded, impacting our well-being in comfortable environments, affecting our sense of safety and also creating serious problems of security. Studies on crowds and individuals in a crowd are critical for surveillance and real-time proactive control of safe and smart cities, since crowds could cause or be caused by violent events.

3. Objective

To Classify different types of videos with High Accuracy. This Paper covers the information regarding the nature of Human Behavior Detection using SVM classifier Technique and Noise reduction algorithm on the basis of histogram this can be detect. It reduces the noise and give better result of Detection of type of activity perfectly. That improves efficiency of activity detection .so major accidents can be prevented. In this paper it also covers all parameters regarding to the Video surveillance analysis techniques like efficiency, quality of picture, nice reduction, background process, foreground process.

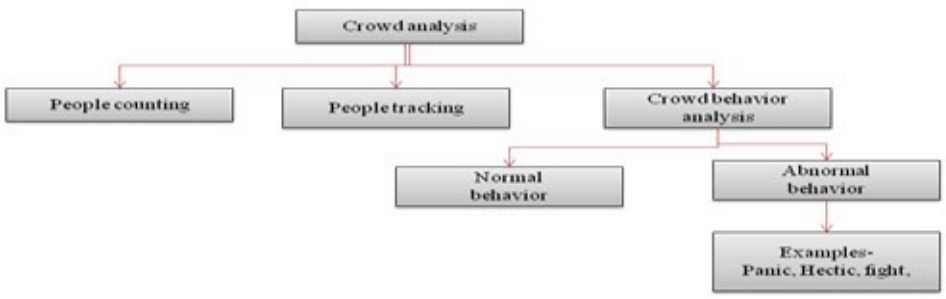
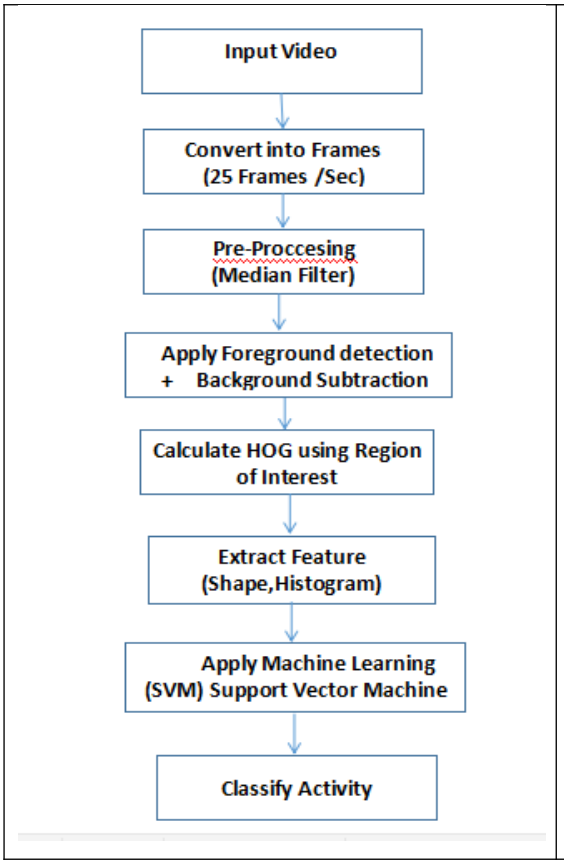


Figure.1 Crowd Analysis Chart

4. Proposed Model:



1. Input video from Data set .

2.Convert it into frames (25 Frames/Sec)

3.Pre-processing: Filter Noise with Median Filtering for getting High Accuracy

4. Apply Foreground Detection And Background Subtraction for focusing on only Blob's Movement.

5. HOG: is a feature descriptor that is often used to extract features from image data.

6. Extract Features Shape and Histogram .

7. Apply Machine Learning with SVM: classify Activities (abnormal and type of activities like Hectic, Panic, Fight, Fall etc .

Figure:1 Proposed Model

4.1 Prediction approaches

1. Obtain the activities type after Background Subtraction.
2. Use HOG for Region of Interest and Extract features.
3. Extracted feature is Shape .And that is done by SOBEL factor affects Edges as per X and Y axis .
4. After extracting feature ,Use SVM classifier for comparing Activity to stored data set
5. That will be given Matched Activity like Normal Or Panic,,Fight,,Fall,,Run etc having High Accuracy .

4.2 Feature Extraction

The support vector machines (SVM) are universal binary classifiers based on statistical and optimizing theories. The SVM is particularly attractive to biological analysis due to its ability to handle noise, large dataset and large input spaces and mapping of non-linear input data into a high dimensional feature space with minimum error on training set. During this binary classification process, it constructs a hyper plane in the feature space that separates optimally two different classes of feature vectors. These feature vectors are mapped into a feature space by using the kernel function. The hyper plane found by SVM is one that maximizes the separating margins between both binary classes.

5. Results After Implementation

Figure3.Normal Activity Detection

Figure4.Abnormal Activity –Run Detection

In above Figures 3 and 4 Normal and Abnormal Activities shown. DataSet: UMN ,Accuracy detected: 88.36

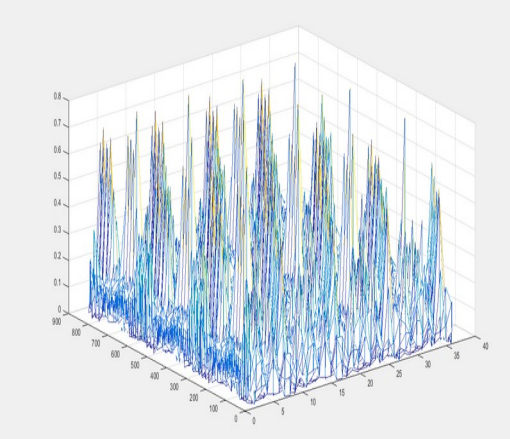


Figure 5. 3D Histogram

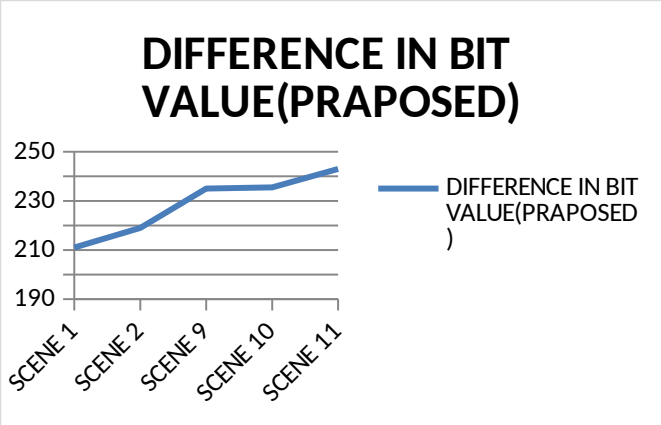


Figure 6. Bit Value As per Proposed Model

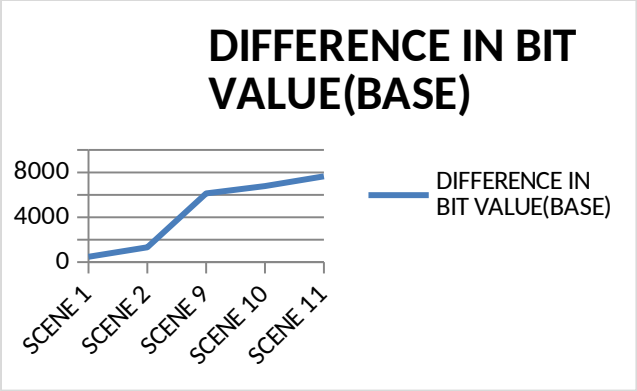


Figure 7. Bit Value As per Base Paper Model

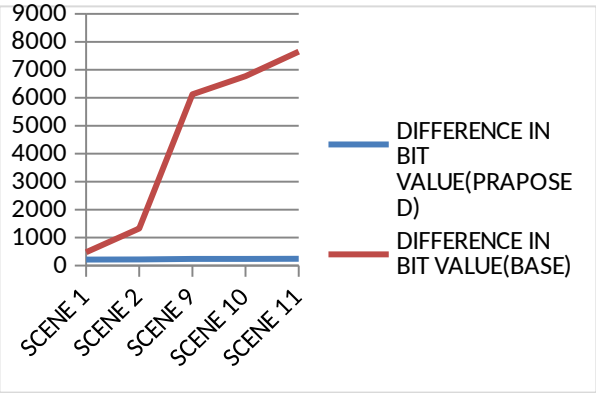


Figure 8. Bit Value Comparison

figure 5 shows 3D Histogram of Gradients as per activities detection in UMN dataset. Figure 6. Shows bit values in different scenes in video as per Proposed Model. The difference between data scenes is less as required. figure 7 shows bit values as per Base paper that is more compare to proposed model.

6 .RESULT ANALYSIS

UMN DATA	DIFFERENCE IN BIT VALUE(PRAPOSED)	DIFFERENCE IN BIT VALUE(BASE PAPER)
SCENE 1	211	475
SCENE 2	219	1325
SCENE 9	235	6125
SCENE 10	235.5	6775
SCENE 11	243	7650

Table 1 : Comparison Table

Types of Video	Accuracy	Precision	SSIM	PSNR	MSE
Normal	77.91%	100%	0.2754	70.1739	0.0062
Abnormal	82.99%	100%	0.2283	64.7191	0.0219
Panic	79.10%	100%	0.3298	66.31	0.0152
Fight	86.87%	100%	0.0706	61.8816	0.0422
hectic	88.36%	100%	0.2004	65.6792	0.0176

Table 2. Result Analysis

As per seen Table1.Comparison Table and Table2.Result Analysis Table ,Accuracy of Proposed model is very high in all types of Activities.

7. CONCLUSION

In the sector of crowd behaviour analysis It happens very first time that Abnormal Behaviours in surveillance videos are examined accurately in further Behaviour of Crowd. In this paper we worked on feature extraction and classification approach for detect and classify different type of crowd behaviour like panic, hectic, fight ,run and normal with Machine Learning of SVM algorithm and extracting Feature like shapes and optical Flow with HOG . Using proposed model we succeed to differentiate not only Normal and Abnormal behaviour of Crowd but also its Types .Proposed model got very good Results with high Accuracy

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