

A survey on detecting human abnormal activity

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ABSTRACT-In the current era, Crowd behavior analysis is taken as an important topic due to the significance of video surveillance in the public area. There are many approaches for detecting abnormal behavior by monitoring moving objects such as human, non-living thing such as car, automobiles etc., The abnormal behavior occurs in the moving objects is deduced from the position of the moving object and the direction in which the moving object moves. Here, various techniques have been used to recognize the abnormal activity of human being. In this paper, review of various techniques are provided for recognize and to study the human abnormal activity in detail.

Keywords: Anomaly detection, Behavior modeling, Action detection, Video surveillance.

I. INTRODUCTION

Intelligent video surveillance has become one of the key research areas in computer vision due to its heightened security concerns. Even though many research topics are available in video surveillance, tracking and behavior analysis from the crowded video are the challenging problems as for the reason it has a number of applications including monitoring, behavior modeling, traffic control and security applications. Behavior is a generic term often referring to a observable actions of agents such as persons, or other moving objects in the scene. Behaviors become salient when they are different from the regular patterns in that context and do not conform either temporally or spatially; that is they 'stand- out' as different relative to the context of their surrounding in space and time.

In recent years, a number of security agencies which was specialized in dense crowd management have emerged in order to respond to the need. But the main intention of this problem was to drawn the attention of the research community for automatic detection of abnormal crowd behavior during public events.

Technically speaking, human behavior analysis could be divided into two tasks:

- (1) Human extraction
- (2) Abnormal behavior modeling.

Fig 1 shows the basic steps for the detection of human abnormal activity. First step is converting the video into image frame. This images is given as an input for object tracking.

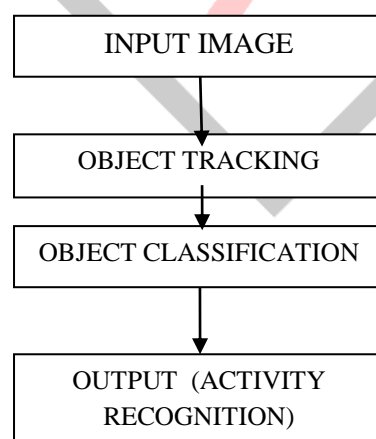


Fig 1: Basic steps for human abnormal activity detection.

After object tracking, Object classification takes place, using two important process like training and testing. The purpose of object tracking is tracking the direction of movement and activity of object.



Fig 2: Crowded scenes

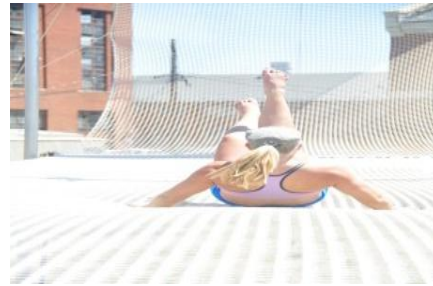


Fig 3: Falling



Fig 4: Running



Fig 5: Fighting

Figure 2,3,4,5 shows the abnormal activities of human in terms of crowded scenes, falling, running, fighting respectively. In this paper we discuss various techniques to detect these abnormal activity.

II. LITERATURE REVIEW

For the past few years, successful movement has been takes place towards the image processing techniques and methods. In this section different methodologies for detecting object detection are described.

Neil Robertson, et.al. a(2006)has proposed the technique action recognition that is achieved via probabilistic search of image feature databases representing previously seen actions.Encode scene rules of Hidden Markov Models (HMM) are used to smooth sequences of actions. In this technique, human actions and behavior are represented using hierarchy of abstractions from person-centered actions,actions with spatio-temporal context action sequences and finally general behaviors.While the upper levels all use Bayesian networks and belief propagation, the least level uses non-parametric sampling from a previously learned database of actions. The combined method represents a general framework for human behavior modeling.A future area of research may have beenyield significant results for intelligent surveillance is for extending the information which is extracted from video.

Oliver Brdiczka, et.al. (2008) have proposed learning and recognition of human behavior model. An Ambient sound detector detects the noises in the environment. The HMM models are used for the automatic offline analysis of human behavior recordings and the online detection of learnthuman behavior models. In this approach, the overall recognition rate is 88.78%.

Tsz-HoYu, et.al (2009)has proposed a technique which is used for the detection of human abnormality by using Novel method of utilizing observed history for detecting abnormal behaviors in surveillance applications.Motions of objects is estimated by Optical flow method.Abnormal behaviors can be detected by Principle Component Analysis(PCA) on the matrix. In this technique, Observed history is taken as reference data. The accuracy achieved by using this technique is about 90% at indoor, 94% at corridor,84% at laboratory and also some false recording occur.

Khalid rasheed, et.al. (2010) developed background subtraction technique to detect the small faces/heads in the surveillance system. Using this technique detection of human's head and the counthow many humans are entered in what type of movement, what type of movement performed by them and setting different level of alarm as required can be done. For example, In an Automatic Teller Machine(ATM) cabin if a person stays more than 15mins, it will detect some suspicious activity take place if any.

Teddy Ko (2011) hasproposed a technique to have a look at current developments and capabilities of visual surveillance systems, and to assess the feasibility and challenges of the usage of visual surveillance system to automatically detect abnormal behavior of human activity.Here, the temporal technique is used for segmentation. Temporal differencing makes use of the pixel-wise difference between two to three consecutive frames in an image sequence to extract moving regions. Temporal

differencing is very fast and adaptive to dynamic environments. Object classification depends on shape-based and motion based classification. Future scope of this technique uses the higher level artificial intelligence for lower level image processing.

Oluwatoyin, et.al. (2012) has proposed a novel behavior descriptor for the compact representation of crowd behavior towards abnormal behavior detection. It use an aggregation of features from optical flow, rotational and irrotational. Components of flow fields potentials exponent is used to capture both local and global characteristics for compact representation of crowd behavior. In future, the motion tracking could be done by Bio-inspired Ant-clustering algorithm.

Jian Ma, et.al. (2013) has proposed an interrelation between individual behavior and global pedestrian flow pattern. The main objective is to improve the evacuation efficiency by using the automatic clustering method. Meanwhile, shift tracking mode, Gaussian mixture tracking model, and artificial neural network model is used to increase high accuracy. A detailed analytic work on this topic only can be explored in future extension.

Prof. D. D. Dighe, et.al. (2014) has proposed the features of subset information in video streaming, and there is a tremendous processes with real time applications. In this paper, a new video surveillance system is introduced and developed. Using this technique human normal and exponential behaviors in realistic format is detect, and also data event generation of human tracking is categorised in real time applications. In this technique differencing, threshold segmentation, morphological operations and object tracking are applied. The experimental result shown efficient human tracking in video surveillance system. In this technique Edge location technique is used to categorise themoving object and thresholding and masking technique are used to detect moving object. If this technique is used, the rate of error will be low. For accuracy spatio-temporal filter can also be used.

P. Kamala, et.al. (2015) proposed to develop a completely automated, multiple camera surveillance and intelligent monitoring system. And that system should detect theft in shopping mall if anything by using human behavior analysis. The different polaroid observation and the observation of framework technologies identifies burglary in the shopping center. This method is used to identify the pernicious aim of persons. The intelligent monitoring system generates an alert and able to send message of observed activities through Wi-Fi to a human operator for immediate action and response decision. In future, this system can be used to detect the abnormal behaviors for a wide range of users.

Glen Debar, et.al. (2015) has proposed a technique for the detection of the fall of the older person who is in his/her old age if they are alone. Here background subtraction is based on an approximate median filter. By this method, sensitivity rate is about 88%. It has five features to detect a fall such as, aspect ratio, change in AR, fall angle, center speed and head speed. In future, for getting a 90% sensitivity of an image, it might be used.

Hemant Khobragade, et.al. (2015) has proposed a technique for detecting abnormal behavior by monitoring the moving objects and the direction. The chain codes which has been using represents a boundary by a connected sequence of straight line segment of direction and specified length. The direction of each segments is coded by using numbering scheme. The proposed algorithm extracted the background and detected the foreground effectively.

Jian Liu, et.al. (2016) has presented optical flow method. This method is used to improve the real-time performance of monitoring the human abnormal behavior. Optical low of moving region is calculated by Lucas-Kanada method; Weighted energy histogram is used to describe the abnormal changes of human behavior. The foreground regions are extracted from the video sequence and through the weighted proportion of energy flow. The other objective is to determine whether it is abnormal or normal.

Pooja, et.al. (2016) have presented Structural Context Descriptor (SCD) for describing the crowd individual. Vigilance work seems slightly difficult for the crowd events of high density. SCD is used to depict every single person in the crowd and to exploit context clues between individuals. The pedestrian detection highlights each and every people present in the scenario. The SCD which is being explored discloses the individual in the crowded scene and depicts the relation among each of them. From the result of testing dataset, anomaly behavior could be detected.

Qian ying, et.al. (2016) have proposed a technique that is the usage of kinetic device as research platform. This paper shows the system will be of strong real-time performance and provide high detection rate. Here, Support Vector Machine (SVM) cross validation algorithm is used to detect human activity. Here, detection rate is 98.33%.

Manoj Kumar, et.al. (2016) have proposed a technique for detecting human abnormal behavior using hybrid model tracking system. The given crowd behavior detection system will estimate the direction of movement of objects as well their activity using proposed Genetic Levenberg-Marquardt (GLM) neural network. GLM-based neural network integrates the LM algorithm with genetic algorithm to improve the learning process of neural network. The overall process of behavior detection can be performed using three important steps they are, tracking of person from crowded video; extraction of feature point from tracking path; direction; and activity classification using GLM based algorithm.

III. OBSERVATION

From above literature survey, it is clearly noted that the following methods are used by different research persons for human abnormal activity detection:

1. Hidden Markov Models (HMM) which encode scene rules are used to smooth sequences of actions.
2. Temporal technique is used for segmentation.
3. The HMM models are used to automatic offline analysis of human behavior recordings and the online detection of learned human behavior models.
4. Motions of object is estimated by using optical flow method.
5. Human abnormal activity is detected by Principle Component Analysis technique.
6. Background subtraction technique is used to detect the small faces/heads in the surveillance system.
7. Structural Context Descriptor is for the detection of human abnormal activities.
8. Detecting human abnormality behavior using hybrid model tracking system.

IV. RESEARCH POSSIBILITIES

For future work the following research possibilities could be used to detect human abnormality with more accuracy.

1. For high accuracy detection rate, spatio-temporal filter could be used.
2. In future bio-inspired ant-clustering algorithm can be used to track the motion of the objects.
3. To process the lower level images, high level of artificial intelligence technique can also be used.

V. CONCLUSION

In this paper various techniques have been discussed for detecting human abnormal activity. In this study, different object detection and object classification were reviewed previously. Advantages of different techniques are combined to improve accuracy and provide low error rate in the detection of human abnormality action.

Work proposed by the researchers can be extended for the development of hybrid algorithms such as genetic algorithm & neural networks in order to increase the recognition rate of final classification process.

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