iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 6 **Issue:** II **Month of publication:** February 2018

DOI:

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 6.887
Volume 6 Issue II, February 2018- Available at www.ijraset.com

A Review: Abnormal Crowd Behavior Detection Techniques

Vishwa Patel[1], Narendra Patel[2], Mahasweta Joshi[3]
[1]*P.G. Student, Department of Computer Engineering, BVM Engineering College, V.V. Nagar, India*
[2]*Associate Professor, Department of Computer Engineering, BVM Engineering College, V.V. Nagar, India*
[3]*Assistant Professor, Department of Computer Engineering, BVM Engineering College, V.V. Nagar, India*

Abstract: Abnormal crowd behavior detection is an important part in video surveillance system because of more concern with people safety in public places like sports stadium, shopping mall, train subway etc. Crowd congestion is not fixed in public places so due to heavy density and occlusion abnormal crowd behavior detection become challenging task. In crowd segmentation and tracking of every person is not possible and even it's become difficult task so we require method which does not require tracking of every person individually. This paper presents several techniques for abnormal behavior Detection such as crowd running suddenly, congestion detection, fighting etc.
Keyword: Abnormal Crowd Behavior, Video Surveillance, Optical Flow, Spatio Temporal Feature, crowd motion.

I. INTRODUCTION

Growing needs of protection of people and personal properties become important so video surveillance has become a big concern of everyday life. For the purpose of security cameras are deployed everywhere. At present machine understanding using video is a notable research topic. One of the most active areas is activity understanding and action recognition from video surveillance system. By understanding activities we are able to detect and classify targets of interest. Traditional video surveillance systems need security officers to monitor the video screen, which can cause decreased attention, false negatives, false positives and other issues. For the management and control of the crowd, motion of crowd is one of the basic properties of crowd detection[10].Abnormal crowd behavior detection is recent research topic in the Intelligent video surveillance system. It solves the problem of limited attention and false alarm from human. Analysis and understanding of human activity in crowd scene is most challenging task in computer vision. There are many researcher who have done abnormal crowd behavior detection using different approaches such as motion state, spatial feature, kinetic energy, interest point[1-4] have been presented in this paper. In section II, Literature review is given. In section III, we have given a brief introduction about various features used in abnormal crowd behavior detection. In section IV Summary is given.

II. LITERATURE REVIEW

The behavioral analysis of a crowd is an important topic of research in computer vision. In general, the temporal information is used to estimate the behavior of a crowd in a given environment.

There are two approaches for crowd behavior analysis: Object-based approach and Holistic approach. In object based approach crowd is treated as a collection of individuals. While the holistic approaches treat the crowd as a single entity, without the need of segmenting each individual. It is very difficult to track every person in denser crowd and hence the holistic approach is more suitable [12].

A.M. Cheriyadat and R. Radke [6], Yang Liu, Xiaofeng Li, Limin Jia [2] approach is object based which use motion intensity for abnormality detection.

X. Wang, X. Ma, and W. E. L. Grimson [7]used object based approach uisng unsupervised learning framework to model the activity in crowded and complicated scenes.

A. C. Davies, J. H. Yin, and S. A. Velastin proposed an approach based on discrete Fourier transform combined with a linear area transform algorithm to distinguish static from moving crowds and this is holistic approach[8].

L. Kratz and K. Nishino presents an approach for anomaly detection in extremely crowded scenes based on spatiotemporal information[9].

Jinhai Xiangl, Heng Fan, Jun Xu present the technique which is based on spatial temporal feature[1]that method extracts and tracks the moving objects effectively.

Hiba H. Alqaysi and Sreela Sasi presents the Dynamic Crowded Gatherings algorithm which is based on temporal feature[3].

Nan Li and Zhimin Zhangpresents the technique which based on critical point[4]. Yueguo Zhaang, Lili Dong, Shenghong Li ,Jianhua Li[10] use interest points to detect crowd behavior.
Mohammad Sabokrou, Mahmood Fathy, Mojtaba Hoseini, Reinhard Klette presents the technique which based on unsupervised Gaussian classifier[5].

III. VARIOUS FEATURES AND METHOD

A. Motion Feature

We can use motion feature to detect abnormal behavior of crowd. When motion of crowd will sharply change in a less time and crowd running is used as an indicator of emergency. By using Optical flow we can estimate the motion and velocity. If the value of the velocity above the threshold it will generate the alert. But if we used static threshold it can give false alarm because optical flow is sensitive to lighting condition. If we use dynamic threshold which can adopt slight light condition so we can reduce the false alarm and it will give batter performance. Abnormal behavior detection based on this feature does not require any training and learning process so it has less computation which can be used in real time detection[2].In another approach only corner are extracted as a feature to represent moving object and tracked by optical flow technique which will give motion vector which are used to describe motion. Then whole frame is divided into four blocks and motion patter nin each block is encoded by the distribution of motion vectors in it. Similar motion patterns are clustered into pattern modelin an unsupervised way, and we classify moion pattern into normal or abnormal group according to the deviation between motion pattern and trained model [11].

B. Spatio Temporal Feature

Local features of video have been used successfully for many recognition tasks such as object and human action recognition. Local space-time features extract the shape and motion in video and provide relatively independent representation of events. Abnormal behavior such as fight usually is accompanied with pushing, pulling and so on. There are tremendous changes occurred in orientation, velocity and overlapping area in fighting. Moving foreground is extracted by using background subtraction and symmetric differencing then each moving object is segmented and detect overlapping area. Once overlapping area is detected the spatial temporal feature is calculated and the clutter model [1] is built up and according to change of spatial temporal feature abnormal behavior is analyzed. Method describe in paper [1] assume that objects are not occluded in the scene**.**

C. Interest Point

Method which is used to detect abnormal behavior first calculate the optical flow field and Filter out the vectors whose velocity magnitude are below the threshold and estimate the interest points by the RANSAC [16] algorithm. After that estimation of interest point classify the interest point based on the eigenvalues of the Jacobean matrix. Thus the topological structure is build and it detects abnormal behavior by simply monitoring the change of topological structure[4].In another algorithm a complex network based algorithm[10] is used to detect interest point and extract the global texture feature in scenario. By using that that interest point moving object is detected. In the public scene, the people moving in irregular motion become the foreground. There are many method to detect fore ground such as single Gaussian model, non-parametric model, mixture model but this algorithm particularly use mixture Gaussian mode which return matrix of interest point which is presented as curve. This slope of curve is changes between negative and positive during the people normal walking, however it is always negative when crowd event happen. The slope of this curve is negative when pedestrian is gathered and positive when evacuated [10].Thus abnormal behavior is detected by the analysis of slope.

D. Unsupervised Method

Unsupervised learning is a type of machine learning algorithm which allows you to make a conclusion from datasets consisting of input data without labeled responses. The most common unsupervised learning method is cluster analysis, which is used for the data analysis to find hidden patterns in data.
Reference normal models are learned from training videos, which are then applied in the test phase for detecting the anomaly. Some feature descriptor is used to build these reference models. These extracted features represent either trajectories or spatio-temporal changes. Paper [13] and [14]focus on the trajectories of objects in videos,in which each object is to be labeled as an anomaly or not, based on how they follow the learned normal trajectory. These methods are computationally very expensive for denser crowd and could not handle the occlusion problem. To overcome these problem researchers proposed methods such as optical flow or gradients which gives low level features. They learn the shape and spatio-temporal relations using low-level features. In paper [5] each video

is converted into non-overlapping cubic patch. Local and global feature are used to capture the video property from different aspect.Local and global feature are learned in unsupervised way and Gaussian classifier is used to classify normal and abnormal behavior.

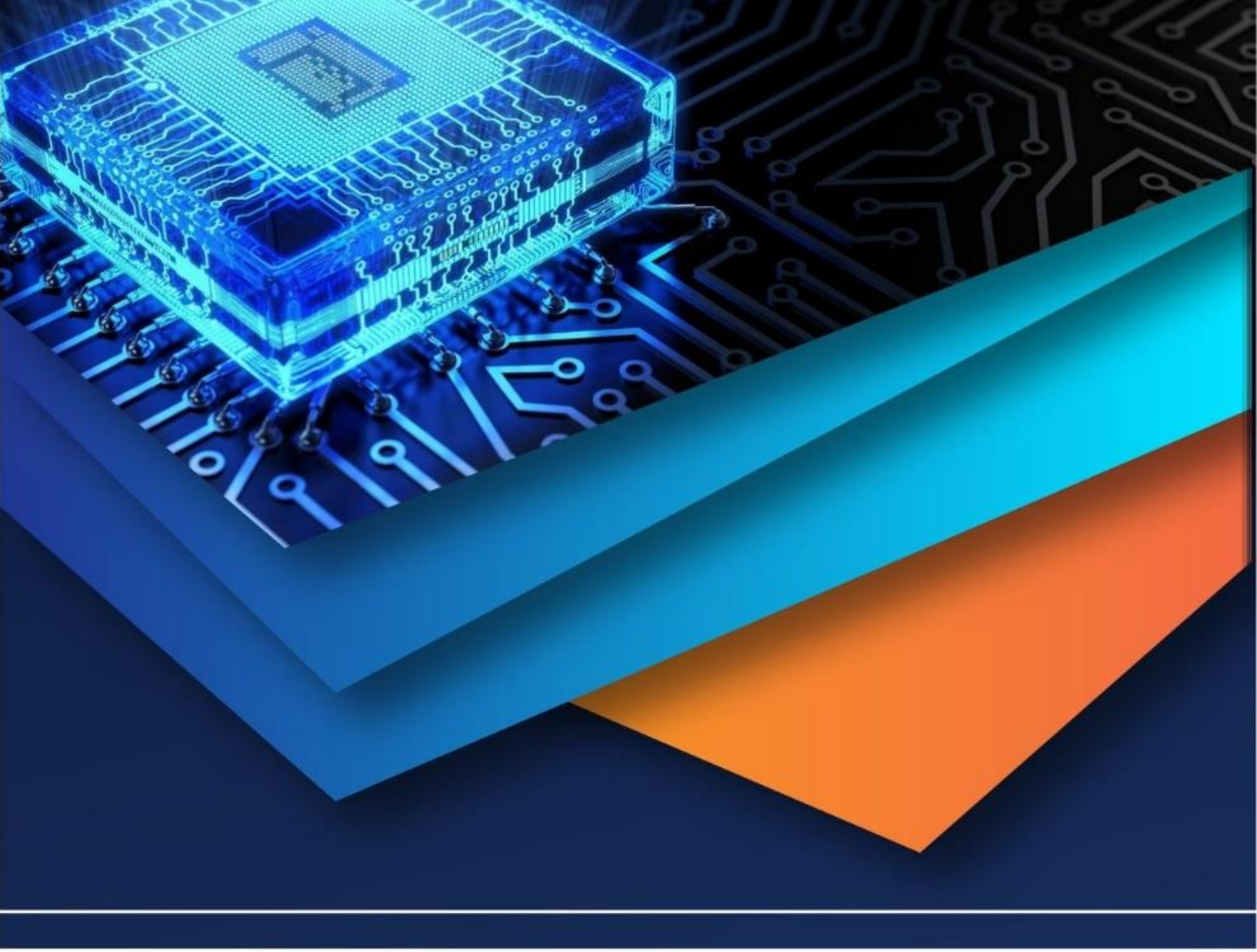
IV. CONCLUSION

In this paper, we presented a review on abnormal crowd behavior using various features. This work tackle some important problem such as crowd running suddenly, crowd density estimation, crowd formation/separation in crowded scene. Crowd behavior understanding in a higher-level analysis, like the main directions, velocity estimations, and detection of unusual situations. As we show there are two approach for crowd behavior analysis object based approach and holistic approach. Object based is relay on the knowledge of the individuals that form the crowd, what is challenging for denser scenarios. Hence, it is more suitable for low and moderately crowded scenes. The holistic approach treats the crowd as a single entity, so that the tracking issue is not a challenge. This second approach is more appropriate for denser scenes, but it cannot detect abnormal behavior effectively as object-based methods.

Algorithm which used motion feature with optical flow and threshold is sensitive to illumination of frame and Light condition but advantage of using this technique reduces processing speed, sensitivity to noise and improved accuracy. Algorithm which used interest point[4] does not require complex classifier to detect anomalies and is not sensitive to noise. We believe that algorithms that somehow learn normal activities from a set of observations (such as [5] and [7]) are promising.

REFERENCES

[1] Jinhai Xiangl, Heng Fan, Jun Xu ,“Abnormal Behavior Detection Based On Spatial Temporal Feature” in Proceedings of the International Conference on Machine Learning and Cybernetics, Tianjin July-2013
[2] Yang Liu,Xiaofeng Li, Limin Jia ,“Abnormal Crowd Behavior Detection Based On Optical Flow And Dynamic Threshold” Proceeding of the 11th World Congress on Intelligent Control and Automation Shenyang, China, June 29 - July 4 2014
[3] Hiba H. Alqaysi and Sreela Sasi,” Detection Of Abnormal Behavior in Dynamic Crowded Gathering”in Applied Imagery Pattern Recognition Workshop October-2013
[4] Nan Li and Zhimin Zhang,” Abnormal Crowd Behavior Detection using Topological Method” in 12th ACIS International Conference on Software Engineering, Artificial Intelligence, Networking and Parallel/Distributed Computing-2011
[5] Mohammad Sabokrou, Mahmood Fathy, Mojtaba Hoseini, Reinhard Klette,” Real-time Anomaly Detection and Localization in Crowded Scenes ”in 978-1-4673-6759-2/15/$31.00, 2015 IEEE
[6] A.M.Cheriyadat and R. Radke,” Detecting dominant motions in dense crowds ”in IEEE Journal Of Selected Topics In Signal Processing, Vol. 2, No. 4, August 2008
[7] X. Wang, X. Ma, and W. E. L. Grimson, “Unsupervised activity perception in crowded and complicated scenes using hierarchical Bayesian models” in IEEE Transactions On Pattern Analysis And Machine Intelligence, Vol. 31, No. 3, March 2009
[8] A. C. Davies, J. H. Yin, and S. A. Velastin,” Crowd monitoring using image processing” in IEE Electron. Commun. Eng. J., vol. 7, no. 1, pp. 37–47, 1995.
[9] L. Kratz and K. Nishino,” Anomaly detection in extremely crowded scenes using spatio- temporal motion pattern models” in 978-1-4244-3991-1/09/$25.00 ©2009 IEEE
[10] Yueguo Zhaang ,Lili Dong, Shenghong Li ,Jianhua Li,” Abnormal Crowd Behavior Detection Using Interest Point” in IEEE International Symposium On Broadband Multimedia System and Broadcasting @ 2014
[11] Shu Wang, Zhenjiang Miao,” Anomaly Detection in Crowd Scene” in 978-1-4244-5900-1/10/$26.00 ©2010 IEEE
[12] Julio Cezar Silveira Jacques Junior, Soraia Raupp Musse, and Cláudio Rosito Jung,” crowd analysis using computer vision technique” In IEEE Signal Processing Magazine, 1053-5888/10©2010
[13] F. Jianga, J. Yuan, S. A. Tsaftarisa, and A. K. Katsaggelosa” Anomalous video event detection using spatio temporal context. Computer Vision Image Understanding”, 115(3):323–333, 2011.
[14] S.Wu, B. Moore, and M. Shah,” Chaotic invariants of Lagrangian particle trajectories for anomaly detection in crowded scenes.” In CVPR, 2010.
[15] Olga Isupova, Danil Kuzin, Lyudmila Mihaylova,” Dynamic Hierarchical Dirichlet Process forAbnormal Behaviour Detection in Video” in 19th International Conference on Information Fusion Heidelberg, Germany - July 5-8, 2016
[16] M. A. Fischler and R. C. Bolles, “Random sample consensus: a paradigm for model fitting with applications to image analysis and automated cartography,” Commun. ACM, vol. 24, no. 6, pp. 381–395, 1981.



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY