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Survey on Crowd Escape

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Abstract: In computer vision and cognitive science field an automated scene analysis has been a topic of great attention. The techniques used for behavior analysis in computer vision, are mostly targeting individuals behavior. In recent times, crowd phenomena gained the popularity in the real world, thus crowded scene analysis has attracted much attention. Most of the people get panic when unexpected events occur in public as well as private places. The modeling and analysis of the crowd surveillance videos is an issue that exists due to the unconstrained behaviors observed. In the last few years, research on crowded scene analysis is going on, covering various aspects such as crowd motion pattern learning, crowd behavior and activity analysis, and anomaly detection in crowds. In various papers the problem of crowded scene analysis is addressed. To automatically identify crowd behaviors in surveillance videos, many computer vision methods have been applied to crowd behavior analysis.

Keywords: Crowded scene analysis, Video Surveillance, Crowd Behavior, Crowd Motion, escape and non-escape activity.

I. INTRODUCTION

Crowded scenes have been more frequent in the real world because of increase of population and variety of human activities. Due to increase in popularity a crowded scenes analysis is an area of interest to scientists in the recent times. It brings out massive challenges to public management, security or safety. In the last few years, automated scene understanding or analysis has already attracted much research attention in the computer vision community. In case of crowded scenes, the problems cannot be handled well due to the large number of individual participation. These individual not only cause the detection and tracking fail, but also greatly increases computational complexity. Under such circumstance, crowded scene analysis as a unique topic, is specifically addressed.

Commonly, video surveillance systems are fit in public as well as private places which cover large number of areas, where a great number of people populate cameras fields of view. Thus, the system's operator perceives his job getting more difficult for identifying an abnormal behavior but also it increases the interest for crowd behavior analysis.
The focus is on crowd escape detection, since people naturally escape from a place when unexpected events occur.

Research of crowded scene analysis could lead to a lot of critical applications. In case of Visual Surveillance, there are many places of security interests such as railway station and shopping mall. Traditional video surveillance system may fail for high density of objects, regarding both accuracy and computation. In case of Crowd Management, crowded scene analysis can be used to develop crowd management strategies in case of music festivals and sports events and support the movement of the crowd or individuals, to avoid the crowd disasters. In case of Entertainment, the establishment of mathematical models are developed based on crowd phenomena which can provide more accurate simulation, which may be used in computer games, film and television industries.

Crowd behavior analysis is thoroughly studied in the field of transportation and public safety where some well established models have been developed for describing the individual and group behaviors in crowded scenes.

II. RELATED WORK

In the recent years, several methods have been proposed to deal with the problem of crowd scene analysis, especially in public as well as private sectors for public safety.

R. Mehran, A. Oyama, and M. Shah, [2] author proposed a new method to detect and localize abnormal behaviors in crowd scenes on the basis of social force model. The proposed scheme for abnormal behavior detection in the crowd videos consists of four fold approach. The particles in grid are placed over the image and then they compute the social force between moving particles to extract interaction forces. After this, change of interaction forces in time determines the ongoing behavior of the crowd. Anomalies region are detected by interaction forces in the abnormal frames. Finally, classify frames as normal and abnormal by using a bag of words approach.
This method captures the dynamic behavior of crowd on the basis of interaction forces of individuals without the objects tracked individually. Abnormal behaviors in the crowd is effectively detected and localized by this method.
L. Kratz and K. Nishino [3], proposed a new model for detection of abnormal events called local spatio-temporal motion pattern. A novel framework is introduced for modeling the motion patterns of extremely crowded scenes and detecting abnormal events. They represent the rich, non-uniform, localized motions patterns through 3D Gaussian distributions of spatio-temporal gradients. To characterize the overall behavior of the scene author proposed the motion variation of local space time volumes and their spatial-temporal statistical behaviors.
This method offers good result in real world scenes with complex activities that are difficult to analyze for human observers.

E. Andrade, S. Blunsden, and R. Fisher [4], author presented an automatic detection technique for detection of abnormal events in crowd scheme. Crowd behavior is hard to predict and to encode normal crowd behavior author used unsupervised feature extraction. The spectral clustering applied on unsupervised feature extraction to discover the optimal number of models to represent normal motion patterns. Proposed approach is effective for detecting emergency in crowd scenarios.

Anomaly detection in crowded areas is shown with new approach by authors [5]. The study is mainly aimed at abnormal movements of crowd. Anomaly detection is done by using the new approach called optical flow of textures. The normal crowd behavior is detected on basis of mixtures of dynamic textures. 3D images of textures are considered instead of 2D images. A vector is extracted from 3D images to get information about motion and spatial and texture information. Optical flow algorithm is used for anomaly detection in crowd. The algorithm has enough accuracy on datasets taken. Images in low resolution are processed. The system is trained on large datasets for anomaly detection. This approach accurately detects anomalous objects like vehicles.

X. Liu, L. Lin, S. Yan, H. Jin, and W. Tao [6], author proposed three fold approaches. The first one is a multi-view object representation. Second is unified spatio-temporal context model, which incorporates Bayesian model based on two types of contextual information. Finally third is robust sampling-based inference procedure. Author combines the spatio-temporal contextual information with a novel deformable template matching procedure.
This scheme takes advantage from the spatio-temporal contextual information are quantitatively evaluated on several challenging datasets and the evaluation results clearly determines that proposed algorithm outperforms in comparison to other algorithms. Disadvantage of proposed algorithm is that it is not good enough for moving surveillance system.

Y. Cong, J. Yuan, and J. Liu [7] author proposed novel technique sparse reconstruction cost to detect abnormal event detection on normal bases. A testing sample is abnormal or not is determined by its sparse reconstruction cost, through a weighted linear reconstruction of the over-complete normal basis set.
The proposed method easily handles both local abnormal events and global abnormal events. It also supports detection of online events. The method is robust.

The paper [8] by Junior et al. in 2010 also presented a survey on a wide range of computer vision techniques for crowd analysis, covering people tracking, crowd density estimation, event detection, validation and simulation. They devoted large sections to reporting how related the areas of computer vision and computer graphics should be to deal with challenges in crowd analysis.
The tracking of people in crowd is done by using tracking algorithms. The technique of crowd analysis can be used for tracking and counting of people.

Antoni B. Chan, and Nuno Vasconcelos [9] proposed a solution to the problem of pedestrians traveling in different directions. In this method first crowd segmentation is done. The main aim is to count people those moving in different directions or in different speeds. The collection of spatiotemporal patches is used for representation of video. Scanning is done sequentially of video locations. Features are extracted to capture segment properties such as shape and size. Features are also extracted from the segment perimeter.
Systems based on the proposed approach could be used in real-world environments for long periods of time. Bayesian regression when used for crowd counting has disadvantage and that is it requires training for each particular viewpoint.

III. PROPOSED WORK

Considering that crowd escape behavior is a possible indication of an unexpected event occurring, following architecture has been proposed for crowd escape behavior detection. For a given video, frames are used for finding the optical flow fields. To analyze the crowd behavior, each optical field is represented as collection of patches. The patches which are foreground are considered to be moving objects.
The model is proposed to combine the information from different optical flow attributes to capture motion patterns for crowd escape detection. Optical flow is to compute pixel-wise instantaneous motion between consecutive frames. Optical flow is robust to multiple and simultaneous camera and object motions, and it is widely used in crowd motion detection and segmentation. Motion information representation is the basis for crowded scene analysis. Although other types of visual features such as scene structure, geometrical information and viewing direction could also be helpful. These features can be easily combined with flow-based models, which have priority in crowded scene analysis. Abnormal crowd events are detected when the crowd movement direction is not consistent.

Once motion features are detected and extracted, they are grouped into similar categories through some similarity measurements. The collective motion feature extraction and with k-means algorithm clusters are formed. These clusters are then separated as normal and abnormal. To classify the result the k-means classification is done. Thus result can be obtained as normal or abnormal behavior of crowd. For the above systeml ganesh festival procession scenario in Pune city can be considered as an example. The procession in festival is too big and takes very long time to end. To handle any type of abnormal events duing procession there is a need of system that helps in such situations. This model will help to identify such type of abnormal events by analysing crowd behavior. It will reduce risk of loosing lives during such events.
When at certain point an unusual event occurs then system can detect that event. The system will analyze the behavior of crowd and classify the behavior of crowd as abnormal or normal.

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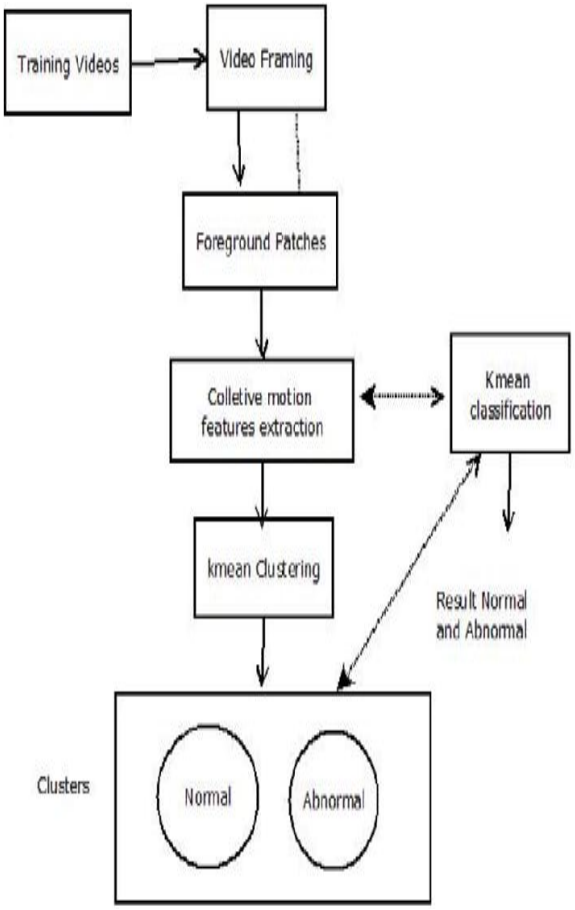

Figure 1: System Architecture

IV. CONCLUSION

Automatically crowd behavior is identified through surveillance videos. A few methods have been reported for characterizing human behavior in videos mainly based on analysis of optical flow. Also characterization of crowd motion using optical flow fields, and construction of associated class-conditionals of different field attributes and to detect the crowd escape behaviors involving changes in the position can be done.

REFERENCES

[1] Si Wu, Hau-San Wong, and Zhiwen Yu, "A Bayesian Model for Crowd Escape Behavior Detection ", IEEE Transactions on circuits and systems for video technology, VOL. 24, NO. 1, JAN 2014.

[2] R. Mehran, A. Oyama, and M. Shah, "Abnormal crowd behavior detection using social force model," in Proc. IEEE Conf. Comput. Vision Pattern Recognit., 2009, pp. 935–942.

[3] L. Kratz and K. Nishino, "Anomaly detection in extremely crowded scenes using spatio-temporal motion pattern models," in Proc. IEEE Conf. Comput. Vision Pattern Recognit., 2009, pp. 1446–1453.

[4] E. Andrade, S. Blunsden, and R. Fisher, "Modelling crowd scenes for event detection," in Proc. Int. Conf. Pattern Recognit., 2006, pp. 175–178..

[5] David Ryan, Simon Denman, Clinton Fookes, Sridha Sridharan, "Textures of Optical Flow for Real-Time Anomaly Detection in Crowds," 8th IEEE International Conference on Advanced Video and Signal-Based Surveillance, 2011

[6] X. Liu, L. Lin, S. Yan, H. Jin, and W. Tao, "Integrating spatio-temporal context with multiview representation for object recognition in visual surveillance," IEEE Trans. Circuits Syst. Video Technol., vol. 21, no. 4, pp. 393–407, Apr. 2011

[7] Y. Cong, J. Yuan, and J. Liu, "Sparse reconstruction cost for abnormal event detection," in Proc. IEEE Conf. Comput. Vision Pattern Recognit., 2011, pp. 3449–3456.

[8] J. Jacques Junior, S. Musse, and C. Jung, "Crowd analysis using computer vision techniques," IEEE Signal Process. Mag., vol. 27, no. 5, pp. 66–77, Sep. 2010..

[9] Antoni B. Chan,and Nuno Vasconcelos, "Counting People With Low-Level Features and Bayesian Regression," IEEE Transactions on image processing, VOL. 21, NO. 4, April 2012.

[10] D. Ryan, S. Denman, C. Fookes, and S. Sridharan, "Textures of optical flow for real-time anomaly detection in crowds," in Proc. IEEE Int. Conf. Adv. Video Signal-Based Surveill., 2011, pp. 230–235.