System for Anomalous Crowd Behaviour Detection using KNN Algorithm

Asmita Patil[1], Pranali Shirke[2], Prachi Deshmukh[3]
Department of Computer Engineering
[1, 2, 3]Indira College Of Engineering And Management,Savitribai Phule, Pune University

Abstract*-In computer vision as well as in the field of cognitive science an automated scene analysis has been a theme of awesome interest. The behavior analysis methods utilized in computer area are for the most part focusing on people behavior. Lately, crowd phenomena picked up the ubiquity in this present reality, along these lines crowded scene analysis has pulled in much consideration. The vast majority of the general population get freeze when unexpected events happen out in the open and in addition private spots. The modeling as well as analysis of the crowd surveillance videos is an issue that exists because of the unconstrained behaviors observed. Over the most recent couple of years, research on crowded scene analysis is continuing, covering different angles, for example, crowd motion pattern learning, Crowd behavior and activity analysis, and anomaly detection in crowds. In view of this examination, researchers began to work at a system that will recognize the crowd escapes behavior in videos. The framework will auspicious identify startling conditions. In present framework method is given that discover the crowd motion from the event as well as nonexistence of escape techniques. The framework we proposed utilizes KNN classification system which gives the exact results to searching of the crowd motion from the nearness also in addition absence of unexpected happenings additionally to consequently recognize crowd behavior real time videos. As an info video is taken after that it is partitioned in various frames. The forefront patches are made relying upon frames. By making utilization of KNN classification collective movement also in addition retraction of elements is performed to recognize the typical as well as anomalous activity videos.*

Keywords-Crowd Behaviour, KNN, classification, behavior analysis.

I. INTRODUCTION

Crowded scenes have been more successive in this real world due to increment of populace as well as assortment of human activities. Because of increment in prominence a crowded scenes investigation is a area important to researchers in the current circumstances. It conveys out monstrous difficulties to public management, security or safety. Over the most recent couple of years, mechanized scene comprehension or investigation has as of now pulled in much research consideration in the computer vision community. If there should be an occurrence of swarmed scenes, the issues can't be taken care of well because of the vast number of individual participation. These individual cause the identification as well as tracking flop, as well as extraordinarily increments computational complexity. Under such condition, crowded scene analysis as a novel topic, is particularly tended to.

Extended people as well as extent of human activities are making crowded scenes as regularly as conceivable in the present reality. A crowded scenes examination is famous also in addition a fascinating region for analysts. Enormous challenges, for instance, public management, security or safety has pulled in researcher in the computer vision to make automated system. The broad number of individual support makes hard to deal with the crowded scenes and uncommonly augments the computational unpredictability by the identification as well as tracking come up short. Along these lines, crowd behavior analysis is a striking topic for examination.

Now a days the group scenes have been more irregular in view of increment in populace and also various activities of human. In view of extension in predominance a crowd scenes analysis is a area vital to analysts in the late circumstances. It passes on out expansive test to group association, security or insurance. In the latest couple of years, automated scene sympathetic or examination has viably concerned much research focus in the computer vision group. If there should be an occurrence of crowded sight, the issues can't be unraveled well due to the colossal numbers of individual contribution. These people cause the exposure as well as following flop also out computational complexity. In such situation, crowded scenes take a gander at as a sort of subject which is uniquely taken care of.

Anomalous action is the fundamental issue in broad crowd. Principally in college grounds if there is event of any action like misbehavior of students in any occasion or premises. It has progressed toward becoming need to identify this conduct at that particular time to keep away from the further conditions.

To conquer such circumstance we are building up another framework where we can distinguish the Anomalous behavior of group by motioning to the authority. So that appropriate move would be made on it.

In this paper we study about the related work done, in section II, the proposed approach modules description, mathematical modeling, algorithm and experimental setup in section III .and at final we provide a conclusion in section IV.

II. LITERATURE REVIEW

People naturally escape, from a place when unexpected events happen. Based on this observation, efficient detection of crowd escape behavior in surveillance videos is a promising way to perform timely detection of anomalous situations. In paper [1] they propose a Bayesian framework for escape detection by directly modeling crowd motion in both the presence and absence of escape events. Specifically, they introduce the concepts of potential destinations and divergent centers to characterize crowd motion in the above two cases respectively, and construct the corresponding class-conditional probability density functions of optical flow. Escape detection is finally performed based on proposed Bayesian framework.

Paper [2] presents an automatic technique for detection of abnormal events in crowds. Crowd behavior is difficult to predict and might not be easily semantically translated. Moreover it is difficult to track individuals in the crowd using state of the art tracking algorithms. Therefore in this paper they characterize crowd behavior by observing the crowd optical flow and use unsupervised feature extraction to encode normal crowd behavior.

In paper [3] authors have detect abnormal events via a sparse reconstruction over the normal bases. Given an over-complete normal basis set (e.g., an image sequence or a collection of local spatiotemporal patches), they introduce the sparse reconstruction cost (SRC) over the normal dictionary to measure the normalness of the testing sample. To condense the size of the dictionary, a novel dictionary selection method is designed with sparsity consistency constraint. By introducing the prior weight of each basis during sparse reconstruction, the proposed SRC is more robust compared to other outlier detection criteria. The method provides a unified solution to detect both local abnormal events (LAE) and global abnormal events (GAE).

Paper [4] describes a model for understanding people motion in video sequences using Voronoi diagrams, focusing on group detection and classification. They use the position of each individual as a site for the Voronoi diagram at each frame, and determine the temporal evolution of some sociological and psychological parameters, such as distance to neighbors and personal spaces. These parameters are used to compute individual characteristics (such as perceived personal space and comfort levels), that are analyzed to detect the formation of groups and their classification as voluntary or involuntary.

Paper [5] presents a survey on crowd analysis using computer vision techniques, covering different aspects such a people tracking, crowd density estimation, event detection, validation, and simulation. It also reports how related the areas of computer vision and computer graphics should be to deal with current challenges in crowd analysis.

Paper [6] present a novel statistical framework for modeling the local spatiotemporal motion pattern behaviour of extremely crowded scenes. The key insight is to ex- ploit the dense activity of the crowded scene by modeling the rich motion patterns in local areas, effectively capturing the underlying intrinsic structure they form in the video. In this paper it is demonstrated that by capturing the steady-state motion behavior with these spatio-temporal motion pattern models. The experiments show that local spatio-temporal motion pattern modeling offers promising results in real-world scenes with complex activities that are hard for even human observers to analyze.

In paper [7] refers that the most disastrous forms of collective human behavior is the kind of crowd stampede induced by panic, often leading to fatalities as people are crushed or trampled. Here they use a model of pedestrian behaviour to investigate the mechanisms of (and preconditions for) panic and jamming by uncoordinated motion in crowds. Their simulations suggest practical ways to prevent dangerous crowd pressures. Moreover, they find an optimal strategy for escape from a smoke-allied room, involving a mixture of individualistic behaviour and collective 'herding' instinct.

Object Video Virtual Video (OVVV) is a publicly available visual surveillance simulation test bed based on a commercial game engine. Paper [8] describe several realistic, controllable noise effects including pixel noise, video ghosting and radial distortion to improve the realism of synthetic video and provide additional dimensions for performance testing. Several indoor and outdoor virtual environments developed by the authors are described to illustrate the range of testing scenarios possible using OVVV.

In this section discuss the literature review in detail.

III. PROPOSED APPROACH

A. Proposed System Overview

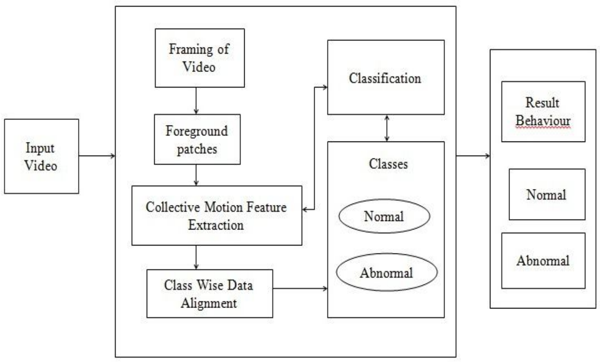

Figure 1.Proposed System Architecture

The following figure 1 shows the architectural view of the proposed system. The description is as follows:

At start system takes video as an input, the input video is segmented in number of frames. Then the foreground patches are generated based on frames. Using of Classification collective motion also retraction of features is conducted. At last K-means clustering is applied and the normal as well as abnormal events are searched. Information related to motion representation is the base for crowded sight study. Although several categories of visual features like scene structure, geometrical information also viewing direction will be helpful, motion features are overriding. In crowded sight analysis, it is extremely attractive to searching the patterns of motion and gets some high-level interpretation.

Histogram of Collective Motion: For effective searching of abnormal movements in crowd by utilizing collective motions in the different areas of frame. Histogram is created by making use of the following steps:

1. Frames of video are formed.
2. Optical flow is calculated in each frame. Foreground patches are found using flow in the frame.
3. Optical flow in foreground patches is consolidated to compute collective motion.
4. Frame is fragmented in multiple regions as well as motion value is computed in every region.
5. Value in every region is noted as well as assembled into vector as feature vector.
6. System is trained with this vector for abnormal as well as normal motions.
7. Input video frames are tested by making use of this trained system.

B. Algorithm

Algorithm 1: Parameter Estimation

1. sProcedure DETERMINE PARAMETER μ_2.
2. Input M_K
3. Generate equidistant samples $\eta_s, s = 1,2, \ldots, s$ in $[\mu_1, 5\mu_1]$
4. For i=1 to K do
5. Compute conditional density function $p(\eta_s | M_k, \omega_2) s = 1,2, \ldots, s$.
6. End for
7. $\mu_2 \Sigma_{s=1}^{S} \eta_s p(\eta_s | m_k, \omega_2)$
8. μ_2

Algorithm 2: Divergent Centers

1. Procedure GENERATE SAMPLE X.
2. Input $X_{(n)} = \left\{x_1^{(n)}, x_2^{(n)}, \ldots, x_L^{(n)}\right\}$
3. For i=1 to L do
4. Set $x_l' = x^{(n)} + \xi^{(n+1)}$
5. Take $\xi^{(n+1)} = x'$ with probability $p(x_l^n, x_l')$ and take $x_l^{(n+1)} = x_l^{(n)}$ otherwise.
6. Return $x^{(n+1)}$

Algorithm 3: Samples Generation

1. procedure GENERATE SAMPLE $(L, X)_L$ ( )
2. Input$\left(L^{(n)}, X_{L^{(n)}}\right)$
3. Perform algorithm 2 to update parameters of model $M_{L^{(n)}}$
4. Select model $M_{L'}$ with probability $P(L^{(n)} \rightarrow L')$
5. Set $\left(X_{L'}, u_{L'}, L^{(n)}\right) = T_{L^{(n)}}, L'(X\ L^{(n)}, U_{L^{(n)}}, L')$
6. Take $L^{n+1} = L'$ and $X_{L(n+1)}$ with probability$\varrho\left(\left(L^{(n)}, X_{L_{(n)}}\right), \left(L', X_{L'}'\right)\right)$, and take $L^{n+1} = L^{(n)}$ and $X_{L_{(n+1)}} = X_{L_{(n)}}$ otherwise.
7. Return $(L^{(n+1)}, X_{L(n+1)})$

C. Mathematical Model

This system can be represented in mathematical form by using set theory.

Let Si be the system Si= {Ur, Or, Fea, Fi, Ki}

Where,

Ur=set of users.

Ur={Ur1, Ur2, ...Urn}

Or=set of outputs.

Or={Or1, Or2, ...Orn}

Fea is set of features.

Fea={F EA1, F EA2, ...F EAn}

Fi=set of functions

Ki=set of centroid points.

Ki= {Ki1, Ki2, ...Kin}

Framing Fn = $\frac{V_\gamma}{t_p}$ ……………………… (1)

Fn = number of frames in video

Vγ = video length in second

T_P = time period between two consecutive frames in (second)

$t_p = \frac{F_{w*F_h}}{w*w}$ ....(2)

t_P= total patches in frames

F_w, F_h = width and height of frame respectively

W = size of each patch (width and height)

R = $\{r_i | r_i \in A = (r_{1 \ldots} r_{tp}), mr_i > \in\}$… (3)

R= set of foreground patches

A = set of all patches in frames

mr_i = magnitude of optical vector in for ground

∈ = threshold magnitude for patch.

H_F =m1, m2, ...,mn ……………………(4)

H_F = Histogram of collective motion of crowd

m1= magnitude of motion vector with angle Θ_1.

Hc = $H_F - H_F - 1$

Hc = Histogram change in consecutive frames

IV. RESULTS AND DISCUSSION

Crowd videos are used as an input dataset for the proposed system.

A. Results

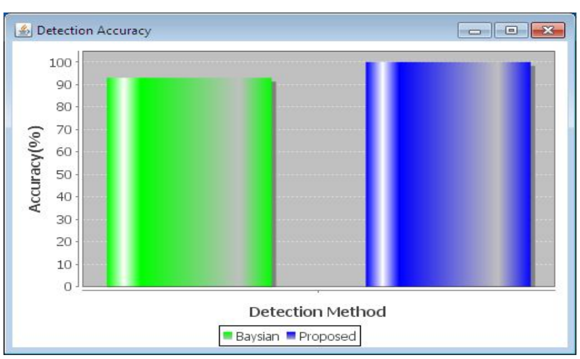

Fig. 2 Accuracy Comparison Graph

Figure 2 shows the accuracy comparison graph. This compares the accuracy provided while the operations in the Baysian system and in proposed system. From the figure we can clearly see that the proposed system generates more accurate results then the present Baysian system

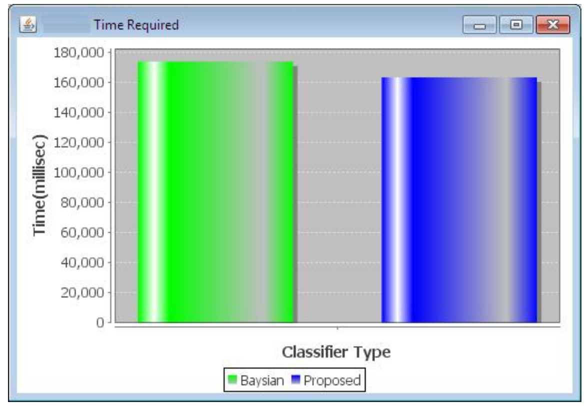

Fig. 3 Required time comparison graph

Figure 3 shows the comparison of time required for generating the output in the present system and in proposed system. Here we can see that the proposed system take less time compared to the present Baysian system.

V. CONCLUSION AND FUTURE SCOPE

Automatically crowd behavior is identified from surveillance videos. The available technique does not give the accurate outcomes for the identifying the crowd behavior from videos. That’s why proposed system by making use of the k-means classifier, by utilizing the classifier system gives the more accurate outcomes. In future there is need to conduct evaluations on different data sets which will cover various cases. Need to choose proper feature which will maximize performance of our proposed system.

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