# Automatic estimation of crowd size and target detection using Image processing

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Abstract
Automatic estimation of crowed density and target detection using image processing is an application of surveillance using image processing. We can effortlessly monitor an area full of crowed which may lead to risk of stamping or riots. This automatic estimation of crowed involves snapshots of crowed in form of frames, any frame is picked and the density of crowed is calculated and if found the density rising upto a certain threshold level then an alarming signal is generated which may be in a form of an audio or an LED. This led to ease of controlling the crowd in highly crowded area without involving any manual effort of monitoring. In addition to this an added feature of target detection is used which involves close up picture view in image and the image can be used in detection of target by obtaining the pixel value of the target region. From the image a target can be detected by obtaining the pixel value of target in the inputted image.

***Keywords***: Automatic estimation of crowed, detection of target, Morphological Reconstruction.

## 1. Introduction

The management and control of crowed is a crucial problem for human safety, since when an accident happens where there is congestion of people many lives can be lost. With the development of rapid economic, large-scale human activities have become increasingly frequent, especially some massive entertainment events, sporting events, and large exhibitions. Crowed safety has become a critical issue, causing the attention of the security sector. As we know, the terrorist attacks in large groups can result in greater lethality and social impact, large-scale group activities are now important goals of terrorist attacks. So it is very meaningful to estimate crowed. In order to analysis group events better, we need to estimate the size of the crowed rather than the crowd density. If the technology takes off it could put an end to a longstanding problem that has dogged CCTV almost from the beginning. It is simple: there are too many cameras and too few pairs of eyes to keep track of them. With more than a million CCTV cameras in the UK alone, they are becoming increasingly difficult to manage. Surveillance cameras are cheap and ubiquitous, but the manpower required to supervise them is expensive. Consequently the video from these cameras is usually monitored sparingly or not at all; in fact it is often used merely as a record to examine an incident once it is known to have taken place. Surveillance cameras are a far more useful tool if instead of passively recording footage they can detect events requiring attention as they happen, and take action in real time. This is the goal of automatic visual surveillance: to obtain a description of what is happening in a monitored area, and then to take appropriate action based on video footage. The nature of this description may vary according to the sort of decisions and actions a surveillance system is to make. For instance, a recent survey indicated that high priorities for a public transport surveillance system are to detect congestion in restricted areas, and "individual delinquency" (e.g. violence against oneself or others). Detecting congestion requires only a simple description of each person in a scene, maybe just enough to count the number of people present, whereas the detection of delinquent behavior requires a much richer description of an individual, possibly including a history of their overall motion, limb movements and gaze direction. Although the exact requirements vary between surveillance systems, there are issues that are common to all.

## 2. Surveillance techniques

A completely automated system means a computer will perform the entire task from low level detection to higher level motion analysis. Since conventional system practically using human power to monitor and did not applicable for a long hour monitoring, thus automated system had been created to replace the conventional system. This thesis focuses on a method to detect and classify an object that pass through the surveillance area boundary using texture analysis of image i.e which involves binary characteristics of image and target detection. Technically, this method estimate the size of the crowd by taking the frame of image from the video and converting the input image into its gray resolution under defined parameters of gray resolution, then image is filtered using a two-dimensional filter, then multidimensional filtering is done using imfilter. After filtering the need is of detecting the individuals in the crowed, as the surveillance is done taking the top view , so the size of the head from the height of the camera is estimated from the image frame for detection of the number of individuals in the frame. Then edges of the crowed are find out by suitable conversions using suitable Matlab coding. The size of the head which is pre estimated is then detected in the image ( i.e. edge of the head ), size is pre estimated because in case of the overlapping the detection will not be accurate and size estimation would be difficult. The detection is then encircled using the suitable radii circles of definite color and are marked and counted, thereby displaying the result i.e. the number of people in the crowed. Along with crowed size calculation target detection is an additional feature that can be incorporated. Target detection has been a pop topic of extensive research for several decades. More and more methods have been proposed by academicians for target detection in literature, including based on geometrical feature method, based on model matching method, based on neural network method and also based on skin information method. Although many accomplishments have already been reached, due to the complicated environment such as background, illumination the extraction and detection of target is still a complex problem. Here target detection is done after obtaining the pixel value of the target from an image and then finding the same pixel value location in the input image.

## 3. Related work

We have studied the previous research work in order to technical research as-

[2.1]:- Estimation of crowd density uses image processing technology: - A.N. Maranal, S. A. Velastin2, L. F. Costa3 and R. A. Lotufo4.This paper [1] presents a new technique for the problem of automatic estimation of crowd density, a very important aspect of the problem of automatic crowd monitoring. This technique extracts crowd density features from digitized images of the area being monitored by using probabilities of grey-level transitions of such images. The crowd density features are used by a neural network to classify the crowd images according to five density classes. As all incorrectly classified images on this test were assigned to neighbors of the correct range of density, the committed error can be acceptable in some practical circumstances, the method presented in this paper is able to deal with high crowd density images, but its output is given in terms of ranges of crowd densities.

[2.2] Crowd Monitoring Using Image Processing: - by Anthony C. Davies, JiaHong Yin and Sergio A. Velastin This article [2] has shown that it is possible to use well-established image processing techniques for monitoring and collecting data on crowd behavior. A key factor in the solutions described is the use of global or semi global pixel intensity values to infer crowd behavior avoiding recognition and tracking of individual pedestrians. The methods discussed are amenable to real-time implementation.

[2.3] An Approach for Crowd Density and Crowd Size Estimation: - by Ming Jiang ,Jingcheng Huang , Xingqi Wang , Jingfan Tang, Chumming Wu This paper [3] proposes an approach for crowd density estimation, which combines the pixel statistical feature and texture feature. The proposed method removed background with Gaussian mixture model and gave a preliminary judgment for the crowd density through pixel feature, meanwhile reduced the impact of perspective distortion by dividing the region of interest. The texture features were extracted using GLCM, and selected Contrast 0 ° and Homogeneity 0 ° as texture feature. Experimental and comparative results show that the 5method is an effective, universal method which can be used in a real-time crowd density estimation system. And this paper estimated the crowd size for high density and extremely high density, which was more conducive to group events analysis.

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## 4. Research Methodology

The automatic crowed size estimation includes the processing including filtering noise through imfilter and morphological operations. Secondly, estimate the number of people. The specific method include detecting the individuals in the crowed, as the surveillance is done taking the top view , so the size of the head from the height of the camera is estimated from the image frame for detection of the number of individuals in the frame. Then edges of the crowed are find out by suitable conversions using suitable Maltab coding. The size of the head which is pre-estimated is then detected in the image (i.e. edge of the head ), size is pre estimated because in case of the overlapping the detection will not be accurate and size estimation would be difficult. The detection is then encircled using the suitable radii circles of definite color and are marked and counted, thereby displaying the result i.e. the number of people in the crowed. Along with crowed size calculation target detection is an additional feature that can be incorporated. Target detection has been a pop topic of extensive research for several decades. More and more methods have been proposed by academicians for face detection in literature, including based on geometrical feature method, based on model matching method, based on neural network method. Although many accomplishments have already been reached, due to the complicated environment such as background, illumination the extraction and detection of target is still a complex problem. Here target detection is done obtaining the pixel value of target image and then finding that pixel value in the input image.

## 5. Flow Chart

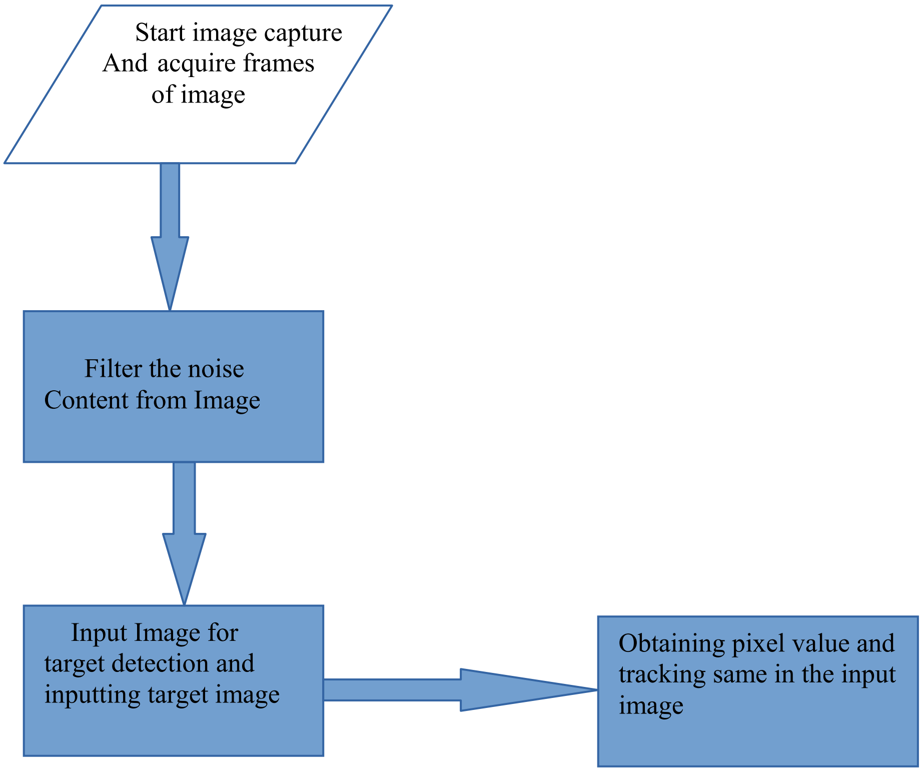


Figure 1: Flow Chart

## 6. Result And Its Innterpretion

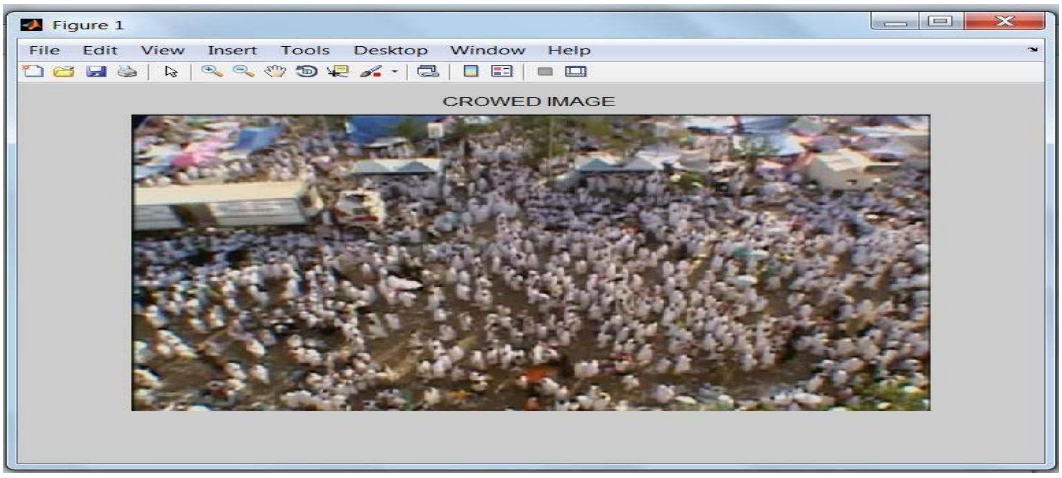


Figure 2: Crowed Image

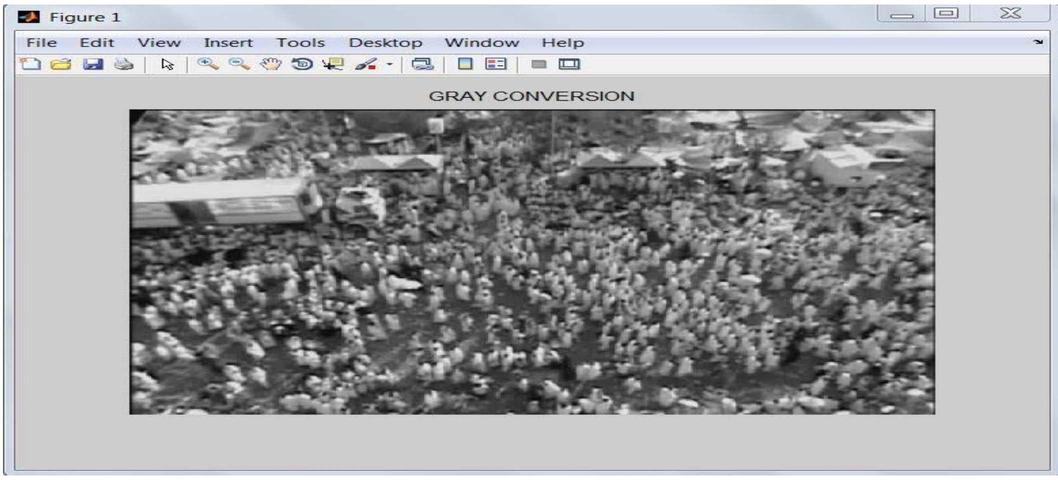


Figure 3 Gray scale Conversion of the Crowed Image

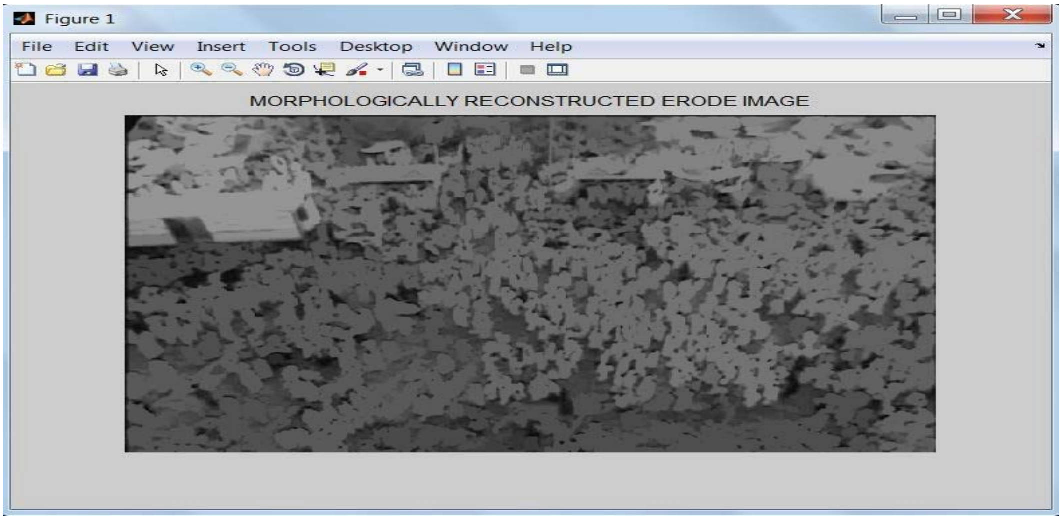


Figure 4: Morphological Reconstruction of the Crowed Eroded Image

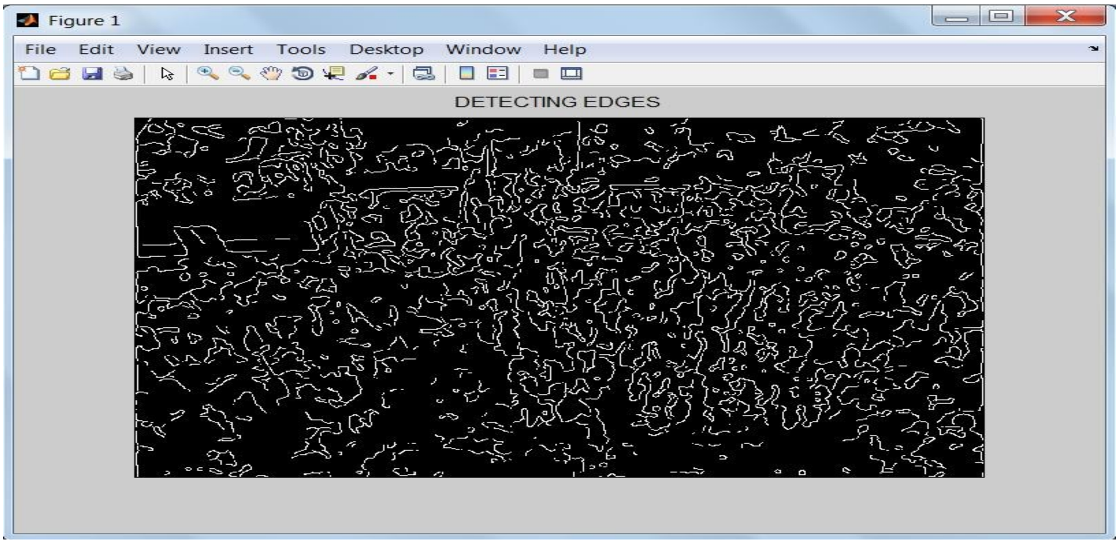


Figure 5 Detection Edges

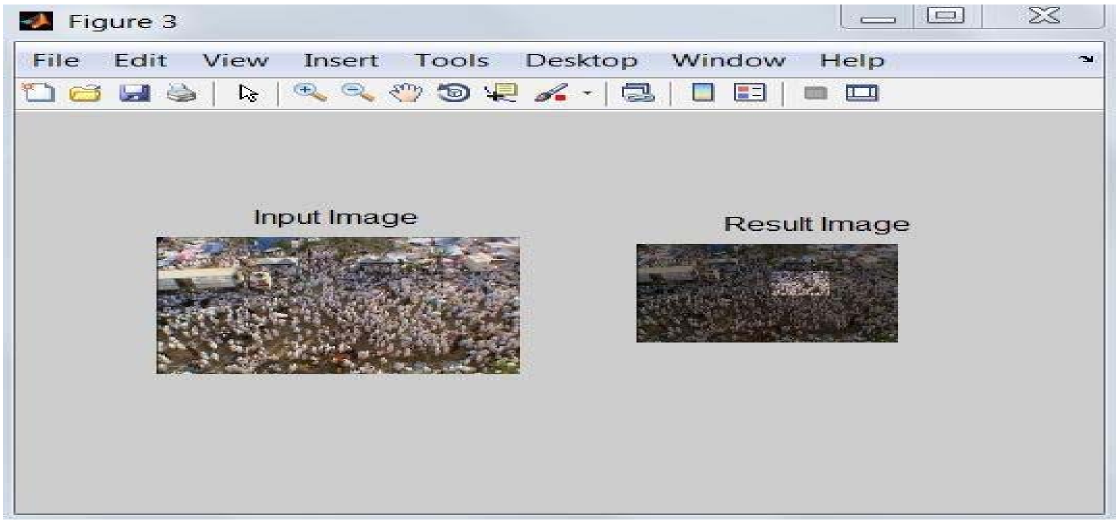


Figure 6 Result showing total number of individuals Detected Output of target image within input image

## 7. Conclusion

An Automated Surveillance addresses real-time observation of people, vehicles and other moving objects within a complicated environment, leading to a description of their actions and interactions. In this project, our main aim is the evolution of surveillance and how today technology is can be used to improve physical security as well as provide business information to enhance decision-making and increase productivity. Surveillance offers a wide range of applications and services appropriate to various client environments. The technical issues include estimation of crowed size and detection of target. Most commonly used sensors for surveillance are imaging sensors, e.g. video cameras. In future the system can be extended to a distributed wireless network system. Many terminals work together, reporting to a control centre and receiving commands from the centre. Thus, a low-cost wide-area intelligent video surveillance system can be built. Furthermore, with the development of embedded hardware, more complex digital image process algorithms can be used to give more kinds of application in the future. Furthermore as target detection id wrapped with crowed estimation feature, similarly face detection and also more applications can be wined together to enhance the system behavior and utility.

## References

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