Design and Analysis of Crowd Sized Estimation Techniques

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ABSTRACT
This paper considers the different technique of estimation of crowd densities, an important part of the problem of automatic crowd monitoring and control. A new technique based on texture description of the images of the area under surveillance is proposed.

Keywords
crowd, image and surveillance etc.

1. INTRODUCTION
Security at venues, in particular cricket stadiums or other large scale area, where a large number of crowd tend to appear can be a critical business consideration. This is fitted to surveillance systems using Closed Circuit Television (CCTV) where specific objects and their behaviour can be supervised through a long period of time. However, a human mind might be miss some essential data because supervising crowds through CCTV is very difficult and require more labour and cannot be operated for all the cameras simultaneously [10]. So, the need of automated techniques for supervising crowds such as approximation of crowds strength, location, movement of crowd and observing crowd’s behaviour, is required.

2. SURVEY
A technique to estimate crowd densities have been proposed by Daviesetal[3], which has based on two measures removed from the input image of the area under surveillance. The first measure is the number of front picture elements calculated by deducting the input image from a position image containing no people. The second measure is the number of advantage picture elements of the image computed by an edge recognition followed by a diminishing operation.

Davies etal proved that there existence of a linear relationship between the number of people present in the area under observation and the two measures, which were combined by a linear Kalman filter [3] into an “optimal” estimation of crowd density. Inspite of the success of this technique for approximating crowd density in areas containing reasonable amounts of people, it cannot be applied successfully in areas with high density crowds because the linear relationship does not hold when there are many covered people in the image. With the growth of economic development and increasing people's social interaction, the culture of large malls, stadium and places such as subway station is increasing more and more serious issue due to crowd congestion. As per the news agency reports: On February 27, 2013, LaoHeKou of Hubei province occurred a stampede caused by crowd of local elementary school, 12 students were injured, 5 students died. Therefore, if we would analyze the events in advance and predict the likelihood of the risk, then timely and effective measures could be taken to rescue the crowd [5]. It can effectively avoid the social security problem that caused by the high crowd solidarity. According to the different feature extraction methods, crowd density estimation techniques can be divided into three categories: 1) estimation based on pixels statistical categories; 2) estimation based on texture analysis technique; 3) estimation based on individual characteristics. For the first category, Davies, Chow et al proposed a approach of using foreground-pixels, which is based on the relationship between number of people and crowd density using a linear methods for estimating the density. The Hong Kong Chow et al proposed a neural network method by using a mix of global learning algorithm for the crowded density. The method is mainly based on the extraction of the three characteristics of the crowd: population object edge length, a proportion of object pixels in the image and the background of the object pixels in the image. Paragios [1] proposed a method based on Markov Random Field (MRF) real-time crowd density estimation. The method is divided into two steps: The first step is to distinguish the image’s foreground and background by Markov Random Field; The second step is to get the image by changing detection combined with a geometric module to perspective correction, and then estimate the population density of the monitored area. Chow et al. joined the body template matching module and match for human body for the people who are clearer individual characteristics and near camera. [5]. Jia Hong Yin et al. proposed two technique to enhance crowd density measurement using reference image. A reference image with only backgroundus used to classify image pixels as belonging to eitherpedestrians or background so that a functional relationship between number of pedestrian-classified pixels and number of people can be established for crowd density measurement. The automatic background generator proposed exploits an intensity region related to the average pixel intensity of each image to segmentbackground pixels and puts background pixels from a sequence of crowd images together to obtain an artificial background image. The calibration approach, with which previously-established function for one site can be used to estimate crowd density at various other sites, involves calibration of the image as opposed to calibration of the camera. The results from two investigated sites using the background generator and the calibration have been shown to be compatible with those from the site where the function between number of pedestrian-classified pixels and number of people was established with a reference image taken from site. The techniques increase the general applicability of the crowd-density estimation method developed by the authors. Both background generation and calibration may be used in othersurveillance systems such as vehicle monitoring.
3. CROWD DENSITY

Prof Dr. G. Keith the meaning of crowd density, In spaces of public assembly how it is important to differentiate that spaces are used. There are two types fundamentals - static and dynamic (places where the crowds particularly stand and spaces where the crowds are classically moving). The static and dynamic space will have different utilisation factors. So we do experience different densities and different crowd management requirements. For example a higher crowd densities nearby to the front of stage will be experienced by a concert. Routes to and from entry/exit points, bars, concession etc. it should be differentiated in the site plan and showed so that operators know where the crowds are moving and where crowds are particularly static. One key element to this is evaluating the use (utilisation factor) of the site.

3.1 Static Crowd Density

The static crowd density and the impact of crowd density (the number of people per square metre) was still pursued by Prof Dr. G Keith for a standing crowd and a moving crowd, and it is important to understand for crowd security. For example, to evaluate the efficiency of crowd movement, amount and rates of fill for places of public get-together and the relative risks of both standing crowd density and the moving crowd density need to be understood by you. The diagrams below show the standing density in people per square metre.

3.2 Visualising Crowd Density

A 3D crowd visualiser for control room applications was developed by us. The 3D crowd visualiser allows us to both train staff to finding density from CCTV angles and to provide control room pictures for crowd build up during an event. Each grid is 5m by 5m.

![Figure 3 person per square metre](image)

4. WHY WE NEED CALCULATION OF REAL CROWD DENSITIES?

We have two reasons to tell about why we need figure out to crowd densities. Firstly, In Germany Government require a calculation of the maximum attendance limit in any government event. Secondly, At major events, the actual crowd densities are needed in order to be able to give information on crowd numbers and associated ordinary flows, as well as on how many first aid services will be required. Yet the Rather than implementing individual communication of people, this work make use of information at a large global level prepared by the crowd solidity and place geometry. We show that automatically acquired person solidity estimates can be applied to improve location of person and tracking performance in crowded scenes [4].

The approach of these government event regulations is not to ask: “how many people can a particular area hold?” rather: “how many people can be contained without risk?”, thus restricting the number of people to a completely harmless mass in terms of safety regulations. This is how the figure of 2 p/m2 was established in Germany. Projections in other countries are, to varying degrees, considerably higher or lower (5). If we examine crowd density values that present a clear risk, e.g. at bottlenecks or during evacuations, then a value of 6 p/m2 is often estimated in Germany. Measurements in Japan, however, show up to 8 p/m2.

How realistic or how useful is the designation of the number of people per m2? Can the number of people be used without taking into account the characteristics of the people themselves?

4.1 Mickel Theory

Locating and detecting people in crowded area is a vital component for a large range of applications that including surveillance, group behavior personation and crowd distress prevention. The dependable person detect and track in crowds, nevertheless, that is a highly challenging task cause of heavy occlusions, different viewpoint and varying solidity of people and the confusing appearance of body parts as well, e.g. the shoulder of one person could be similar to a head of a nearby person. High-solidity crowds present particular defiance due to the difficulty of secluded individual people with low-level standard methods of background subtraction and motion segmentation typically applied in low-solidity surveillance scenes [4].
4.2 Methodology
Flow chart of the estimation of crowd density with video.

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5. CONCLUSION
In this survey, we have discussed different techniques of crowd density estimation. Techniques, which were discussed, are based on two measures extracted from the input image of the area under surveillance, “optimal” estimation of crowd density through a linear Kalman filter, estimation based on pixels statistical categories, estimation based on texture analysis technique, estimation based on individual characteristics.

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6. REFERENCE


