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Survey on Abandoned Object Detection using Image Processing

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ABSTRACT: A technique for detecting abandoned object in crowded spaces. The detection process is carried out using blob detection, and foreground and background isolation. We begin by studying, previously suggested techniques for image processing. We also survey various methods proposed for object detection and explore ways to improve surveillance methods. Various methods for improving image quality are also studied. Through this survey, we learn the need for better surveillance strategies. The necessity for elimination of human intervention is also discussed. The different definitions of suspicious activities is also discussed in this paper. The concept of trajectories is discussed in order to track the blob used for object detection. We also survey the various ways in which these suspicious activities can be tracked and identified using motion trajectories. A method for monitoring a active (or live) video feed is studied for further use. Different functions that can be conducted on videos, by analysis of motion trajectories are understood. Te concepts of null space and video sampling are also surveyed for better video processing. Exact meaning of the term abandoned is understood. As these terms are necessary for the implementation of our proposed approach. The algorithm for blob detection is discussed. The concept of foreground isolation also is studied. Along with that the use of background detection is studied. These methods are yo be used in the approach we have proposed in this paper. We study a possible system, which when implemented in real life scenario should show that it can successfully detect the abandoned object without any human intervention.

KEYWORDS: Abandoned object detection, Foreground Detection, Blob detection, Unmanned surveillance.

I. INTRODUCTION

Video surveillance is emerging as an efficient way to monitor high risk areas, such as, airports, malls, etc. Over the years terror threats have been rising, all over the world. But when a surveillance camera covers a large area, it is difficult as well as expensive, and often times inefficient to employ people to monitor the camera feed. For example, various areas like museums and theaters are always crowded with people who tend to linger. These people are more difficult to monitor as they are expected to spend longer period of time at the same place.

Take the famous museum in Paris for example, The Louvre, it happens to also be the largest museum in the world and is filled with priceless artifacts. It is also architecturally very vast, therefore manned video surveillance is near impossible feat considering it would require a great number of security personnel. Modern technology like metal detection and body
scanning, even heat signature tracking can be used to detect any threat, from theft to terror attacks. But this only works inside the museum. A large amount of tourists gather even on the outside. It would be extremely difficult for security personnel to monitor the exterior of the building. In this hypothetical situation, a video surveillance without human intervention could be useful, in order to track suspicious activities.

In recent times, there has been a great rise in terror activities all around the world. The United Nations Security Council is finding it difficult to monitor area and categorize them as high risk, as the target areas are not in any way connected.The attacks also happen simultaneously in some cases. Take for example the recent events in Manchester (UK), Bangkok (Thailand) and Marawi (Philippines) all happened within the space of a few hours. At least two of these attacks happened in crowded areas that were bombed. The attacks in Manchester and Bangkok , happened by a suicide bomber, one at a concert and another in a car. Attacks like these can be monitored using video surveillance.

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A contemporary approach is to provide previous definition of how the object will appear but this will result in the efficiency, of the detection system, to depend on human accuracy. The use of video surveillance is found to be so effective not only in monitoring an area, but also providing evidence [4]. As a result, most security teams, and law enforcement authorities depend heavily on surveillance cameras. But surveillance cameras can only be useful depending on the threat or the area. Monitoring heavily crowded spaces can prove difficult, if we depend solely on human intervention. In the long run, it could prove more useful to reduce the possibility of human error. Or at the very least reduce the impact of such errors. This can be done using various techniques to analyze video footage independently using computer algorithms [8][11].

II. RELATED WORK

Due to the rise in overall picture quality, as well as, the increase in targeted areas, the research in the field of video surveillance is vast. One such method proposes the use of both appearance(dimensions, color, shape, etc.) and trajectory to track objects [1]. Two different methods for video retrieval are explained, these are categorized as text-based or content-based. The content-based method is more effective on the other hand text-based input is easier to provide.

Various methods for recognizing and tracking trajectories have been previously proposed [5][6][9]. An overview of various methods for motion trajectory-based video contentmodeling, retrieval and classification. The techniques discussed form the foundation for content-based video indexing and retrieval (CBVIR) systems [5]. Anovel robust retrieval and classification system for video and motion events based on null space representation is studied [6]. A system that tracks moving objects in a video dataset so as to extract a representation of the objects' 3D trajectories. The system then finds hierarchical clusters of similar trajectories in the video dataset. Objects' motion trajectories are extracted via an EKF formulation that provides each object's 3D trajectory up to a constant factor [9].

In order to analyze the robustness of the system, the perturbed null operators have been derived with the first order perturbation theory. Research has been conducted to develop multiple approaches to conduct surveillance using tracking of people and objects [10][11]. An event detection algorithm based on trajectories designed for closed-circuit television (CCTV) surveillance systems. Following the foreground segmentation, blob and scene basic characteristics—blob position or speed and people density—are used to create low-level descriptions of predefined events. Comparing sequence parameters with the semantic description of the events associated with the current scenario, the system is able to detect them and raise an alert signal to the operator, the final decision-maker [10]. A novel method for detecting nonconforming trajectories of objects as they pass through a scene. The described method has the ability to distinguish between objects traversing spatially dissimilar paths, or objects traversing spatially proximal paths but having different spatio-temporal characteristics [11].

Another method is to conduct semantics-based behaviour recognition, that depends object tracking [2].Behaviour recognition and video understanding are core components of video surveillance and its real life applications. An approach that detects semantic behaviours based on object and inter-object motion features is introduced. While another approach proposes, finding the matching image in the collection given a probe image containing the same object. The different possible parameters of the bag of words (BoW) approach in terms of recognition performance and computational cost [3].Object Recognition in a large scale collection of images has become an important application of widespread use. Acomprehensive benchmark of the two leading methods for BoW is provided: inverted file and min-hash; and the effect of the different parameters on their recognition performance and run time, is explored using four diverse real world datasets.

Different methods for improving the image quality in surveillance footage and then isolating parts of the images have been previously discussed [4][8]. Modern visual surveillance systems deploy multicamera clusters operating in real time with embedded sophisticated and adaptive algorithms.Such advanced systems are needed for 24/7 operation: to robustly and reliably detect events of interest in adverse weather conditions while adapting to natural and artificial illumination changes and coping with hardware and software system failures [8].

III. PROPOSED APPROACH

In this paper, we propose a method to track suspicious objects and movements. This is done by conducting foreground detection in the captured video. For this each and every frame of the video is isolated and analyzed, pixel by pixel. We use the blob detection approach to identify abandoned objects.

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A] Foreground Detection

It is a technique of image processing, used to separate objects and people from overall background. In case of crowded pla-ces, the background is the infrastructure of the area. While, the foreground would be the people or independent structures (the objects that moved easily) as shown in Fig 1.

Fig. 1. Left: foreground detected. Right: original video.

The method proposed by Grabner et al. [7] is to divide a frame into many subregions and each subregion is used to train a cl-assifier by focusing only on a local region. The training samples are

$$S = \{(s_1, l_1), \ldots, (s_k, l_k) | s_i = [L_i, a_i, b_i, \delta_{xi}, \delta_{yi}, X_i, Y_i], \quad l_i \in \{+1, -1\}\} \quad \ldots (1)$$

where L, a, and b are the color values, X, Y the coordinates, and δ_x , δ_y the gradients along the x-direction and y-direction,

respectively, and they are collectively treated as the features for point (pixel) i.

If for a point, the difference with respect
to the background in terms of the corresponding color values
and optical flow intensity values are larger than a threshold,
then its label l_i is set to be +1 (foreground), otherwise it is −1 (background).

B] Blob Detection

Next, we track a single moving entity. This single entity is ass-umed to be a blob. A blob is a general patch with same density, which is different than that of the background and the disjoint patches that constitute the foreground.

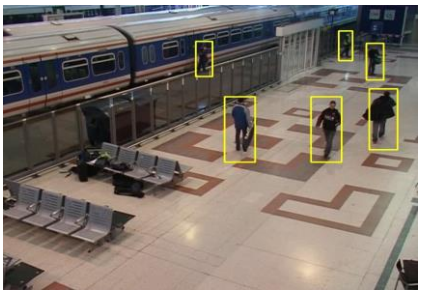

Fig. 2(b). Blobs after movement.

When a blob separates, the trajectories are tracked. The divisio-n of the blob that moves is usually a person, as opposed to the static divison that is usually the abandoned object.

IV. Conclusion and Future Work

Thus, we have studied previously proposed methods for image proccessing and video surveillance. We have also proposed a method for identifying abandoned objects in crowded areas. We do so using foreground isolation and blob detection. For future work, the system can extended to include other suspiciious activities and behaviours. The system can also be scaled to cover greater areas, using more cctv cameras.

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REFERENCES

1. Yuan-hao lai and chuan-kai yang, "Video object retrieval by trajectory and appearance," IEEE TRANSACTIONS ON CIRCUITS AND SYSTEMS FOR VIDEO TECHNOLO-GY, VOL. 25, NO. 6, JUNE 2015.
2. M. Elhamod and M. D. Levine, "A real time semantics-based detection of suspicious activities in public scenes," in Proc. 9th Conference on Computer and Robot Vision, Toronto, ON, Canada, 2012, pp. 268–275.
3. M. Aly, M. Munich, and P. Perona, "Bag of words for large scale object recognition: Properties and benchmark," in Proc. Int. Conf. Comput. Vis. Theory Appl. (VISAPP), Mar. 2011, pp. 299-306.
4. N. Firth, "Face recognition technology fails to ind U.K. rioters", New-Scientist, London, U.K. [Online]. Available: http://www.newscientist. com/article/mg21128266.000-face-recognition-technology-fails-to-nduk-rioters.html
5. X. Ma, X. Chen, A. Khokar, and D. Schonfeld, "Motion trajectory based video retrieval, classification, and summarization," Video Search and Mining (Studies in Computational Intelligence)", vol. 287. Berlin, Germany: Springer-Verlag, 2010, pp. 53-82.
6. X. Chen, D. Schonfeld, and A. Khokhar, "Robust null space represen-tation and sampling for view-invariant motion trajectory analysis," in Proc. IEEE Conf. Comput. Vis. Pattern Recognit. (CVPR), Jun. 2008, pp. 1-6.
7. H. Grabner, P. M. Roth, and H. Bischof, "Is pedestrian detection really a hard task?" in Proc. IEEE Int. Workshop Perform. Eval. Tracking Surveill., Aug. 2007, pp. 1-8.
8. Remagnino, and T. Ellis, "Active video-based surveillance system: The low-level image and video processing techniques needed for implemen-tation," IEEE Signal Process. Mag., vol. 22, no. 2, pp. 25-37, Mar. 2005.
9. Dan Buzan, Stan Sclaro and George Kollios, "Extraction and Clust-ering of Motion Trajectories in Video," Proceedings of the 17th Intern-ational Conference on Pattern Recognition (ICPR'04).
10. I. N. Junejo, O. Javed, and M. Shah, "Multi feature path modeling for video surveillance," in Proc. 17th Int. Conf. Pattern Recognit., vol. 2. Aug. 2004, pp. 716-719.
11. L. M. Fuentes and S. A. Velastin, "Tracking-based event detection for CCTV systems," Pattern Anal. Appl., vol. 7, no. 4, pp. 356-364, Dec. 2004.