DETECTION OF MOVING OBJECT USING FOREGROUND EXTRACTION ALGORITHM BY PTZ CAMERA

Mrs.E.komagal[1] (AP/ECE), P.Anusuya Devi[2], M.Kumareshwari[3]M.Vijayalakshmi[4]

Department of Electronics and Communication Engineering
Velammal College of Engineering and Technology
Viraganoor, Madurai

Abstract

This paper proposes a way of recognition foreground of moving object by Foreground Extraction algorithm by Pan-Tilt-Zoom camera. It presents the combined process of Foreground Extraction and local histogram process. Background images are often modeled as multiple frames and their corresponding camera pan and tilt angles are determined. Initially have got to work out the foremost matchedbackground from sequence of input frames based on camera pose information. The method is more continued by compensating the matched background image with this image. Then Background Subtraction is completed between modeled background and current image. Finally before local histogram process is completed, noises are often removed by morphological operators. As a result correct foreground moving objects are successfully extracted by implementing these four steps.

Keywords

Foreground Extraction, local histogram, Morphological Operators, PTZ camera.

1. Introduction

The Detection and Foreground extraction of moving object could be a foremost step for several applications like video police work, traffic observation, and human following. Moving object detection provides a focus of attention for recognition, classification, and activity analysis, making these later steps more efficient, since only moving pixels need to be considered [1]. Most cameras used in surveillance are fixed, allowing one to only look at one specific view of the surveilled area. For scenes taken from this type of cameras the most common and efficient approach to moving object detection is background subtraction, that consists in maintaining an up-to-date model of the fixed background and detecting moving objects as those that deviate from such model. Due to its pervasiveness in various contexts, background subtraction has been afforded by several researchers, and a huge amount of literature has been published (see surveys in [2]–[6]).

DOI : 10.5121/ijist.2014.4307

There are 3 basic common approaches for detecting moving objects that are listed as follows optical flow, temporal distinction and background subtraction[5]. Technique that we tend to do for extracting moving object could be a quite totally different whereas employing a PTZ camera as compared to static camera. The PTZ camera has zoom and pan management and it will rotate 360 degrees on its axis. The background of each and every frame is totally different in term of position and placement, once employing a static camera, the background of every frame is found to be same.

Approach 1, will successfully extracts moving objects from a sequence of input pictures that are captured by static cameras and additionally moving cameras. High process value makes this methodology not appropriate for real time applications and issues arise once pictures aren't continuous however within the result it's found that it contains distinct foreground objects with crisp edges. Approach 2, which is predicated on temporal distinction, subtracts 2 consecutive frames and at last apply threshold to the output. These 2 ways are straightforward, however the results are found to be extremely obsessed with the objects visually and speeds. the foremost used common approach is predicated on background work option that is build up a background model and subtract current image frame from the modeled background to extract moving objects. Approach 3,which can subtract the pixel intensity values of the background image from the current image at same coordinate.

Even though there are lots of works on static camera segmentation but there is a lack on moving camera segmentation. From this our motivation to work on active camera like PTZ camera. Here the main issue is moving camera so the background is not fixed. To do the segmentation efficient the proposed approach in this paper is recognitionofforeground of moving object by Foreground Extractionalgorithm by Pan-Tilt-Zoom camera

The structure of this paper is as follows. Section II about PTZ camera that describe the previous analysis paper, and then section III about methodology of our proposed method. The experimental setup and results are then given in section IV, and then finally conclusion in Section V

2. PTZ Camera

Surveillance is the method of observation of the behavior, activities, or alternative dynamical data, typically of individuals for the aim of influencing, managing, directing, or protecting them.[2] This will embrace observation from a distance by suggesting equipment (such as CCTV cameras), or interception of electronically transmitted data (such as net traffic or phone calls); and it will embrace easily, comparatively no- or low-technology ways like human intelligence agents and interception. It’s terribly helpful to governments and enforcement to take care of group action, acknowledge and monitor threats, and prevent/investigate criminal activity. For the analysis of bicycle movement and interaction Extraction of direction data in road sign imaging obtained by mobile mapping system. Mutation detection for inventories of traffic signs from street-level broad pictures is used.

A pan–tilt–zoom camera (PTZ camera) could be a camera that's capable of remote directional and zoom management. Associate in nursing innovation to the PTZ camera could be a intrinsically microcode program that monitors the amendment of pixels generated by the video clip within the camera. Once the pixels amendment owing to movement among the cameras field of read, the camera will really target the element variation and move the camera in a shot to center the element fluctuation on the video chip. This method ends up in the camera following movement. The program permits the camera to estimate the dimensions of the item that is moving and distance of the movement from the camera.

With this estimate the camera will alter the cameras lens in and enter a shot to stabilize the dimensions of element fluctuation as a proportion of total viewing space. Once the movement exits the cameras field of read the camera mechanically returns to a pre-programmed or "parked" position till it senses element variation and therefore the method starts another time. It involves 3 operations like Panning, Tilting and Zooming. It’s capable of rotating concerning 360 degree.

.

3. METHODOLOGY

In this paper, Fig(1) describes PTZ video is taken as input, to fix the background of moving camera .The first step the sequence of frames are used for Euclidean distance with this the minimum distance is chosen as Matched background. Then the minimum Euclidean distance of Matched background is used for finding the most Matched background and to extract the Matched SURF key points. After the extracted SURF key points of homogenous points of Matched background which were used to compute homography matrix for background compensation.At last stage the compensated background and the current frame is used for foreground extraction. And finally is there any connectedcomponents are present in the foreground extraction to avoid the errors by using local histogram processing or morphology operators.The entire method is often outlaid as follows

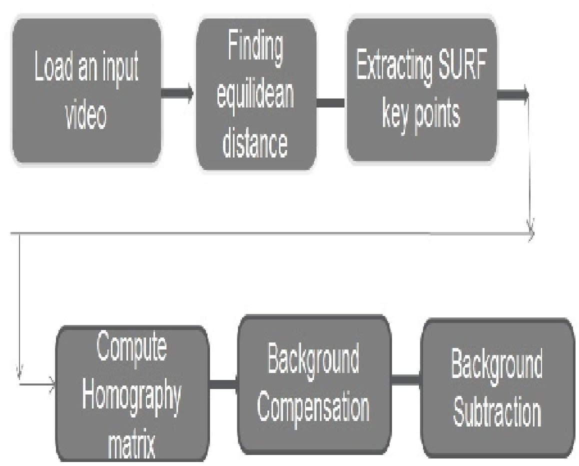


Fig.1.represents the block diagram of the whole process

A. To Find the most matched Background.

Given numbers of Background frames Bi=i (1, 2…,n),and ought to verify the corresponding pan and tilt angles (α_i, β_i) wherever i ought to ranges from (1,2,…..n)and the output of this step is to search out B_i that has the foremost overlapped areas with the present image frame. The camera pose information is used to realize the most matched background. Here Euclideandistance is often calculated between the present image frame and also the background image. If theEuclideandistance is minimum and it is often thought as the most matched background image.

$$\text{Dist}((\alpha_{t,}\beta_t),(\alpha_{i,}\beta_i))=\sqrt{(\alpha_t-\alpha_i)^2(\beta_t-\beta_i)^2}$$

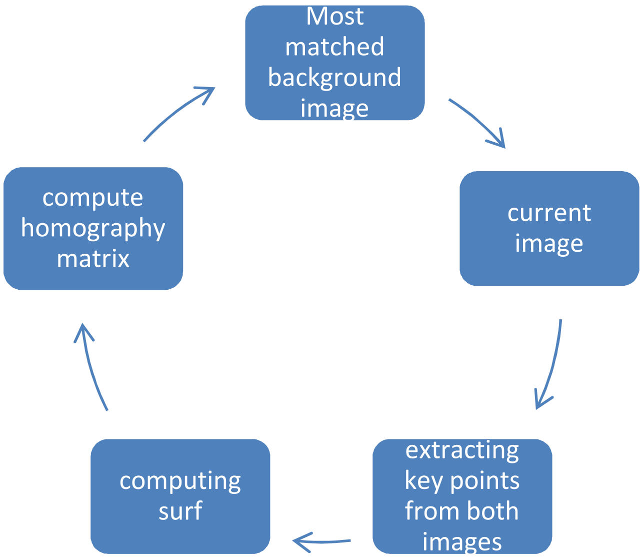
Here $\alpha_{t,}\beta_t$ represents the pan and tilt angles of the present image whereasα_i, β_i represents the pan and tilt angles of the background image. This formula will represents that corresponding output is that the most background image.

B. Surf Descriptor and Computing Homography Matrix

After checking out the foremost matched background now it is able to ascertain the foremost matched background that is the modeled background. The method will be further continued by extracting the SURF key points from the both frames So as to extract the key points to use SURF descriptor that is a lot of sturdy in comparison to SIFT descriptor.

SURF (Speeded up Robust Features) may be a local feature detector.. It is part galvanized by the SIFT descriptor. The quality version of SURF is many times quicker than SIFT and claimed by its authors to be a lot of sturdy against completely different image transformations than SIFT. SURF is predicated on sums of second Haar riffle responses Associate in Nursing makes an economical use of integral pictures. It uses associate in nursing whole number approximation to the determinant of Wellington boot blob detector, which may be computed extraordinarily quickly with Associate in nursing integral image (3 whole number operations). For options, it uses the total of the Haar riffle response round the purpose of interest. Again, these will be computed with the help of the integral image. It is a division that maps lines to lines, and so a collineation.

Scale-invariant feature Transform (or SIFT) is associate in Nursing rule in pc vision to notice and describe native options in pictures. The rule was printed by David Lowe in 1999.So in comparison to SIFT descriptor SURF is quick and higher therefore we tend to area unit exploitation here. The extracted key points within the background image will be matched with the key points within the current image. From the matched key points the homographymatrix will be computed.Inorder to work out the homographic matrix the input frame ought to be within the vary 3*3 matrix format. Homographies area unit outlined as specific collineations, so referred to as "projective collineations".The multidimensional language of this method will be drawn as follows.



C. Creating Aligned Background

After extracting the key points from each current and background image homography is computed with the matched key points. Then the method will be additional proceeded by compensating the background. The output of this step is to urge the aligned background with regard to this image so as to urge the background image for background subtraction method. It will be done by applying the homography matrix to the background image by using the formula.

$$B_{comp=}H_t * B_i$$

D. Extracting Moving Object by using Foreground Extraction

The final step of the method is to extract the moving object from the aligned background. Foreground Extraction are often done by subtracting the intensity constituent values of the present image from the aligned background image at a similar coordinate. The obtained result's compared to the threshold. If the distinction is over the threshold then it is thought of because the motion constituent otherwise. The output is found that it contain some noises owing to the motion estimation error. These noises are often removed by exploitation morphological operators like erosion and dilation. Dilation is that the method of adding pixels to the sting of the motion space, whereas erosion is that the method of removing pixels from the sting of the motion space. Even if noises are often removed by the morphological operations some quantity of connected noise is found within the image. So as to get rid of that try to implement local histogram approach.

Histogram equalization could be a methodology in image process of distinction adjustment exploitation the image's bar graph.. Adaptive bar graph equalization (AHE) could be a laptop image process technique used to improves distinction in frames. It differs from normal bar graph equalization within the respect that the adaptive methodology computes many histograms, every pixel of a definite section of the image, and uses them to distribute the lightness values of the image.

4. Results And Discussion

In this work, the PTZ video taken from MICC(Media Integration and Communication Center)dataset and that video is used for the detection of moving object using foreground extraction algorithm by the software MATLAB R2010a.First the method on the public MICC dataset [7],which contains 27 video clips captured by hand-held videocameras. Each clip has around 1000 frames and include scale changing, (i.e. the camera zooms in suddenly), heavy occlusion, and complex background clutter.

The foremost step in this paper is to determine the most matched background by using Euclidean distance formula .It can be obtained as

$$\text{Dist}((\alpha_{t,}\beta_t),(\alpha_{i,}\beta_i))=\sqrt{(\alpha_t-\alpha_i)^2(\beta_t-\beta_i)^2}$$

By obtaining the equation formula for consecutive frames The minimum value find out from the Euclidean distance for the consecutive frames is E_distance = 749.4932.and this value is used for matched background.

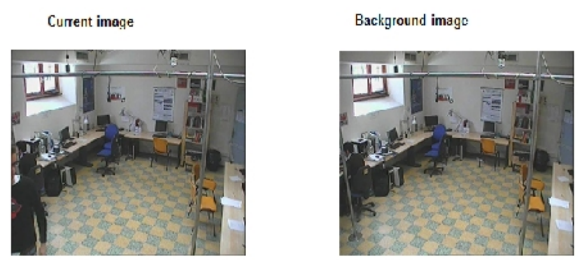


Fig2 Frame 0 and 11 shows the input frames taken which involves both current image and background image.

Fig.3Using Euclidean distance formula most matched background is determined from the corresponding input images.

After finding out the minimum distance between the current image and the background image by using Euclidean distance formula we can predict the most matched background, and this process is further continued by extracting the SURF key points from the image in order to compute homographymatrix . In this Fig 4 shows the extracted SURF key points to get modeled background.

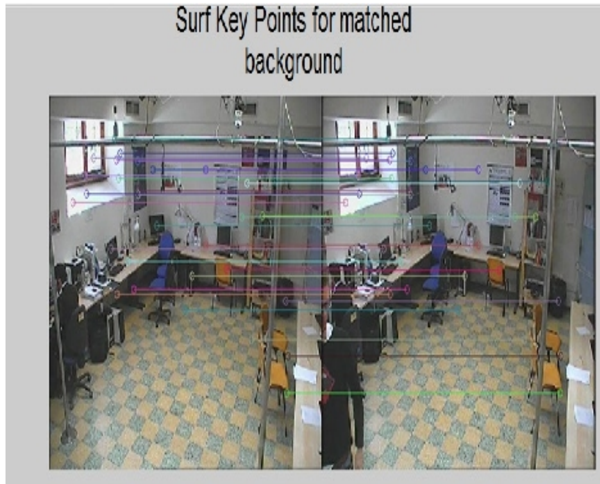


Fig 4.shows the extracted key points from the both current and background image by using SURF descriptor

After the extraction of SURF keypoints we should determine the aligned background by using wraping function Fig 5 & 6 shows the modeled background and the compensated background obtained by applying wraping function

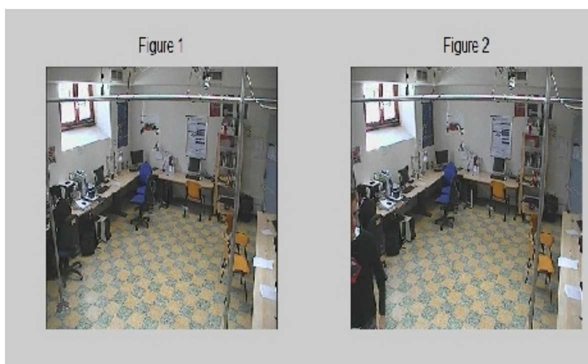


Fig 5 Frame 0 and 11 shows the input frames which can wraped in order to get a aligned Background

Fig 6. Represents the aligned Background obtained by convoluting homography matrix and Background image

The final step of the process is to obtain the extracted foreground from the moving object by applying foreground extraction algorithm .Fig 7 shows the extracted foreground output

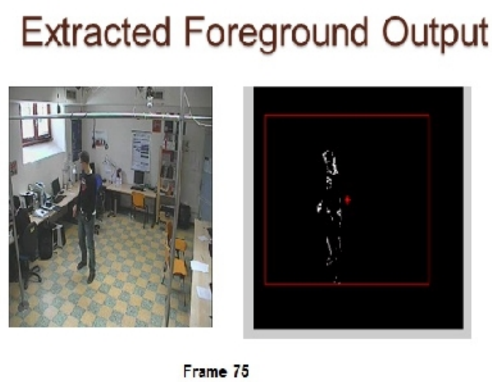


Fig 7.Frame the extracted foreground output that is obtained by applying foreground extraction algorithm

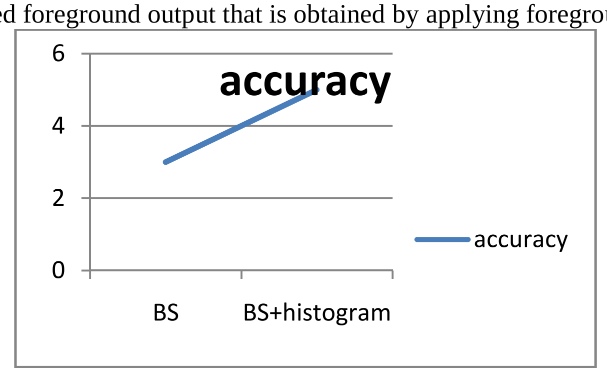


Fig 8.Shows the graphical representation of accuracy plot by using both background subtraction and local histogram processing

5. Conclusion

In this paper, propose an approach to the problem of moving object detection in image sequences taken from PTZ cameras based. The proposed approach is combining the foreground extraction between compensated background image and current image, and the result is further smoothed using a local histogram processing. By using this approach the accurate segmentation of foreground extraction of moving object which is useful for future processing like tracking, and behavior analysis. Finally the proposed method is compared with the background subtraction technique among these techniques the adaptability and accuracy is good for combining the foreground extraction and local histogram processing.

.

References

[1] R. T. Collins, A. J. Lipton, T.Kanade, H. FujiYoshi, D. Duggins,Y. Tsin, D. Tolliver, N.Enomoto, O. Hasegawa, P. Burt, and,“Asystem for video surveillance and monitoring,” The Robotics Inst.,Carnegie Mellon Univ.,Pittsburgh, PA, Tech. Rep. CMU-RI-TR-00-1212, 2000.G. Zhang, et al., “Moving object extraction with a hand-held camera,“IEEE 11th International Conference Computer Vision, ICCV, 2007, in press

[2] S.-C. S. Cheung and C. Kamath, “Robusttechniques for background subtraction in urban traffic video,” in Proc. EI-VCIP, 2004,pp. 881–892.

[3] M. Piccardi, “Background subtraction techniques: A review,” in Proc.IEEE Int. Conf. Syst., Man, Cybern., 2004, pp. 3099-3104

[4] R. J. Radke, S. Andra, O. Al-Kofahi, and B.Roysam, “Image change detection algorithms: A systematic survey,” IEEE Trans. Image Process.vol. 14, no. 3, pp. 294–307, May 2005.

[5] S. Elhabian, K. El Sayed, and S. Ahmed, “Moving object detection in spatial domain using background removal techniques: State of art,” Recent Patents Comput. Sci., vol.no.1, pp. 32–54, Jan.2008.

[6] S. Brutzer, B. Hoferlin, and G. Heidemann, “Evaluation of backgroundsubtraction techniques for video surveillance,” in Proc. CVPR, 2011, pp. 1937–1944.

[7] N. Thakoor, J. Gao, “Automatic extraction and localization of multiple moving objects with stereo camera in motion,“ IEEE International Conference on Systems, Man and Cybernetics (SMC), 2005, in press.

[8] Daniel D. Doyle, Alan L. Jennings and Jonathan T. Black”Optical Flow Background Subtraction for Real-Time PTZ Camera Object Tracking” :”IEEE International conference “

[9] Ptz Camera-based Adaptive Panoramic And Multi-layered Background Model 2011 18th IEEE International conference on Image Processing

[10] Xinghua Li, Qinglei Chen and HaiyangChen,“Detection and Tracking of Moving Object Based on PTZ Camera”, IEEE fifth International Conference on Advanced Computational Intelligence,pp:493-497, October 18-20, 2012 Nanjing, Jiangsu, China,

[11] AlessioFerone, Member, IEEE, and Lucia Maddalena, Member, IEEE,“Neural Background Subtraction forPan-Tilt-Zoom Cameras’, ieee transactions on systems, man, and cybernetics: systems, 2168-2216 _c 2013 ieee