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FOREGROUND OBJECT EXTRACTION FOR MPEG-4 STANDARD

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Abstract

Video segmentation plays an important role in the MPEG-4 standard for multimedia applications. In this paper the video segmentation is done by detecting the edge of the objects of the each frames and keep tracking it. Then morphology motion filter is used to find the edges of the foreground objects. Next, a filling technique is used to connect edge information to generate final object. Though there is no need for the moving camera situation in the surveillance system, it can deal with both still and moving camera situations. The object based or shape based retrieval is better than the other video on MPEG-4 standard. The main objective of selecting the edge based video segmentation is, the object can be easily stored, indexed and retrieved in the MPEG-4 standard for multimedia applications. The edge detection process serves to simplify the analysis of images by drastically reducing the amount of data to be processed, while at the same time preserving useful structural information about object boundaries.

Keywords:

MPEG-4, Video segmentation, Edge detection

1. INTRODUCTION

MPEG-4 standard is the standard used by many multimedia applications.MPEG-4 is a method of defining compression of audio and visual (AV) digital data. This is the standard designed for a group of audio and video coding format .MPEG-4 standard provides solution for coding of natural or synthetic video and audio or multimedia files.

This video coding standard MPEG-4 relies on a content based representation of multimedia files. In recent years, the paradigm of video coding has shifted from that of frame-based approach to a content-based approach, particularly with the finalization of the IOS multimedia coding standard MPEG-4. MPEG-4 defines syntax for a set of content based functionalities, namely, content–based interactivity, compression and universal access. However, it does not specify how the video content is to be generated. To generate the video content, video has to be segmented into video objects and tracked as that transverse across then video frames. so, the video segmentation is used to extract the content of the video .

Video segmentation has been a key technique for visual information extraction and plays an important role in digital video processing, pattern recognition, and computer vision .A wide range of video-based applications will benefit from advances in video conferencing, and personal entertainment .Video segmentation is the process of segmenting or partitioning the videos into meaningful shots. Shot is the collection of similar consecutive frames, where frame is the single still of the video .Though video segmentation the contents can be extracted easily where it makes the process of indexing and retrieval of video, video summarization, detection of objects that can serve as cues for event recognition; region based coding process efficient in the MPEG-4 standard.

Video segmentation can partition the videos in many ways where this proposed video segmentation process involves the extraction of foreground objects from the background of the video .Segmenting the videos can be in three ways: Image segmentation based video segmentation, Edge information based video segmentation and Change detection based video segmentation.

Image segmentation based video segmentation involves first apply image segmentation algorithms such as watershed transform and color segmentation each frame to separate a frame into many homogeneous regions. By combining motion information desired with motion estimation , optical flow or frame difference ,regions with motion vectors different from the global motion are merged as foreground regions algorithms ,often can give segmentation results with accurate boundaries , but the computation load for image segmentation and motion information.

Change detection based segmentation algorithms [1], threshold the frame difference to form change detection mask. Even though the processing speed is high, it is not robust. It suffered from shadow, noise, light changing.

Edge information based algorithm, implemented here first apply canny edge detector to find the edge information of the frame and keep tracking it for finding the edges for the video or the consecutive frames. Then secondly the morphological motion filter is used to find the edges of the foreground objects with the motion information. Next, a filling technique is used to fill the foreground moving objects to get the final object mask. Then finally the post processing is implemented to enhance the final object mask. Now the object is extracted successfully from the background without lose of the concerned edge of object. The works done related to this paper has been discussed in the section 2.

2. RELATED WORKS

Yasira Beevi and S.Natarajan [2] have proposed video segmentation algorithm for MPEG-4 camera system by means of change detection, background registration methods and real time adaptive threshold techniques. The proposed algorithm has given an acceptable segmentation results with low computation complexity. As well, it has a shadow cancellation mode, which can handle both light changing effect and shadow effect. Moreover, the algorithm has also applied real time adaptive threshold techniques through which the parameters can be determined automatically. The video segmentation procedures has been discussed in the section 3.

3. SEGMENTING THE VIDEO WITH THE EDGE OF AN OBJECT.

3.1 Detecting the edge of the object

Edge is a basic feature of image. The image edges include rich information that is very significant for obtaining the image characteristic by object recognition. Edge detection refers to the process of identifying and locating sharp discontinuities in an image [2]. So, edge detection is a vital step in image analysis and it is the key of solving object extraction. The canny edge detector is the most powerful edge detector provided by function edge. First the image is smoothed using a Gaussian filter with a specified standard deviation, σ, to reduce noise. Secondly the local gradient,

$$G(x, y) = [G^2_{x+} G^2_y]^{1/2},$$

And edge direction,

$$\alpha(x, y) = \tan^{-1}(G_{y+} G_x),$$

Are computed at each point. Sobel, prewitt, Robert detector can be used to compute G_x and G_y. An edge point is defined to be a point whose strength is locally maximum in the direction of the gradient. Then the edge points determined in second step give rise to ridges in the gradient magnitude image. The algorithm then tracks along the these ridges and sets to zero all pixels that are not actually on the ridges top so as to give a thin line in the output , a process known as *nonmaximal suppression.* The ridge pixels are then thresholded using two thresholds, T1 and T2, with T1<T2. Ridge pixels with values between T1 and T2 are said to be "weak" edge pixels. Finally, the algorithm performs edge linking by incorporating the weak pixel that is 8-connected to the strong pixels.

3.2 Detection of moving foreground object

A morphological motion filter **[**3, 4**]** is used to find the outlier parts of a frame with motion information. we are able to detect the boundaries of moving objects by selecting spatial edge pixels near moving connected components or occlusion regions. Further, the boundary accuracy is very high because spatial edges can be accurately detected using canny edge detector[5] The method in [6] is most effective for objects with fast motion. In some applications, however, the objects are moving only little like in head-and-shoulder or videophone sequences. For these sequences, the occlusion regions identified by the change detection mask are often too small to initialize the model. Also this approach involving a morphological motion filter has proven to be more effective than [6] in the case of slow object motion.

3.3 Still object detection using Hausdorff distance method

The object tracker establishes temporal correspondence and ensures that objects do not get lost when they stop C (z, **y)** = *(u - G) 2 + (v -* 6)2.moving. It matches the model of frame *n* against the next frame *n* + 1 using the Hausdorff distance as matching criterion [7] The Hausdorff distance is a simple but powerful measure to compare binary images or portions thereof and is illustrated in Fig. **1.** It can be efficiently implemented using the distance transformation and is very robust when dealing with objects that are partially occluded or rapidly changing their shape.

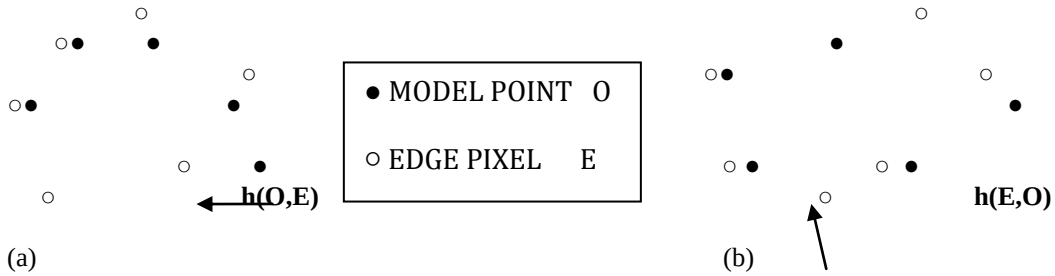

Figure **1:** Definition of Hausdorff distance. (a) *h(0, E)* measures the maximum distance of a model point to the nearest edge pixel, and (b) *h(E,O)* measures the maximum distance of an edge pixel to the nearest model point. In this example, *h(E,* 0) is larger than *h(0, E)* and therefore the Hausdorff distance is equal to *h(E,* 0). Let 0 = **(01,** . . . , *om}* be the set of binary model points of the object to track and *E* = {el,. . . , e,} the set of all edge pixels in the image detected by the Canny operator. The maximum distance of a model point to the nearest edge pixel *h(0, E)* and the maximum distance of an edge pixel to the nearest model point *h(E,* 0) can easily be computed using the distance transformation [8**]** The Hausdorff distance is then defined as the larger of these two maxima. A shortcoming of the Hausdorff distance is the large impact that outliers have, resulting in a large Hausdorff distance even when the match is otherwise very good. For that reason, it is preferable to use the generalized Hausdorff distance [7], which sorts the distances in ascending order and takes instead of the maxima the kth (1 *5* ***k*** *5 m)* and Zth (1 *5 1 5 n)* value for *h(0, E)* and *h(E,* 0), respectively.

3.4 Final object extraction

A Morphological filling technique is used to fill the background. So that the foreground object will be extracted easily. As an object is extracted with the help of edge pixel, no smoothing of image is needed.

4. EXPERIMENTAL RESULTS

This proposed work has been implemented practically . The resulting images are as follows:

(a) (b) (c) (d)

Figure.1 (Original frames captured from the video)

(a) (b) (c) (d)

Figure.2 (The gray scale images)

(a) (b) (c) (d)

Figure.3 (Edges of the objects in the frames)

(a) (b) (c) (d)

Figure.4 (The final object extracted)

Figure.1 shows the original frames captured from the video. For sample, four images has been taken. Figure.2 shows that the gray scale images which has been converted from the original images. To find the edge of an image, the image must be converted to the gray scale image . So the four sample frames are converted to the gray scale images. Figure.3 shows the edge of the objects in the frames are extracted. The edge of the object in the frames are detected through the canny edge detector, where it detects the edges clearly, when compared to the other edge detectors. Figure.4 shows the sample images of the frames, where the objects has been extracted clearly using the morphological filling technique. Final figure shows that the objects has been extracted clearly.

5. CONCLUSION

The video segmentation method is used for the object extraction which has been useful for the MPEG-4 standard content based coding for multimedia storage devices. This edge detection based video segmentation method is very accurate in detecting the edges of the objects very accurately when compared to the other detection method. The existing object extraction method has been suffering from the still object. That is when the object in the video has been not moving for a while the edge of the moving object cannot be found. It will be treated as the non moving object and the edge of the object will not be detected. So there is a chance of lose of edge of the object.

5.REFERENCES

[1] R.J.Radke, S.Andra, O.Al-Kofahi, and B.Roysam. “Image Change Detection Algorithm: ASystematic Survey”, IEEE Trans.Image Processing, Vol.14, No.3, pp.294-303, March.2005.

[2] A Hidden Markov Model Framework for Video Segmentation Using Audio and ImageFeatures”citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.20….rep).

[3] Garrison, L., Oliveras, A., & Salembier, P. (1997). Motion analysis of image sequences using connected operators. In *Proc. of visual communication and image processing* (pp. 546–557).

[4] Salembier, P., Oliveras, A., & Garrido, L. (1998). Antiextensive connected operators for image sequence processing. *IEEE Transactions on Image Processing, 7*(4), 555–570**).**

[5] J. Canny, “A computational approach *to* edge detection,” *IEEE Trans. Pattem Analysis and Machine Intelligence,* vol. PAMI-8, no. 6, pp. 679698, Nov. 1986.

[6] T. Meier and K.N. Ngan, “Automatic segmentation of moving objects for video object plane generation,” ***to*** *appear in IEEE Trans. Circuits Syst. for Video Technol.*, Sept. 1998.

[7] D.P. Huttenlocher, **G.A.** Klandennan, and W.J. Rucklidge, “Comparing images using the Hausdorff distance,” *IEEE Trans. Pattem Analysis and Machine Intelligence,* vol. 15, no. 9, pp. 850-863, Sept. 1993.

[8] ***G.***Borgefors, “Distance transformations in digital images,” *Computer Vision , Graphics, and Image Processing,* vol. 34, pp. 344-371, 1986.