International Journal of Applied Research 2015; 1(4): 43-46

ISSN Print: 2394-7500
ISSN Online: 2394-5869
Impact Factor: 3.4
IJAR 2015; 1(4): 43-46
www.allresearchjournal.com
Received: 18-02-2015
Accepted: 03-03-2015

Gokilavani Chinnasamy
PG Scholar, SNS College of Technology, Coimbatore-641035, India.

Gowtham. M
PG Scholar, SNS College of Technology, Coimbatore-641035, India.

Correspondence:
Gokilavani Chinnasamy
PG Scholar, SNS College of Technology, Coimbatore-641035, India.

Segmentation of Pedestrian Video Using Thresholding Algorithm and its Parameter Analysis

Gokilavani Chinnasamy, Gowtham. M

Abstract
Video segmentation is the field of video processing that deals with dividing a video into useful segments. Video segmentation plays an important role in real-time encoding systems. This paper deals with analyzing and segmenting a pedestrian video using the thresholding algorithm. By using the k-means algorithm, which uses clustering technique, the parameters of the pedestrian video such as direction of movement of the pedestrian and the distance of the pedestrian from the capturing device is calculated and the result is displayed. Furthermore, this can be implemented in real-time systems, which is used for various applications.

Keywords: Video segmentation, video processing, encoding systems, thresholding algorithm, k-means algorithm, clustering.

1. Introduction
Information retrieval from video images has become an important factor in research areas from the past to till date Zhang Yu-Jin *et al.* [6]. Segmentation of objects in the motion is a critical task. The rapid growth of digitized video collections is due to the widespread use of digital cameras and video recorders combined with inexpensive disk storage technology. Furthermore, the video background is generally much more complex than that of document images. A combination of this complex background cause thresholding algorithm designed for image processing to perform weakly on video images.
Video processing is the particular case of signal processing, which often employs video filters where the input and output signals are video files or video streams. Video processing techniques are used in television sets, VCR's, DVD's, video codec, video players, video scalars and video surveillance Elisa Drelie Gelasca *et al.* [1].

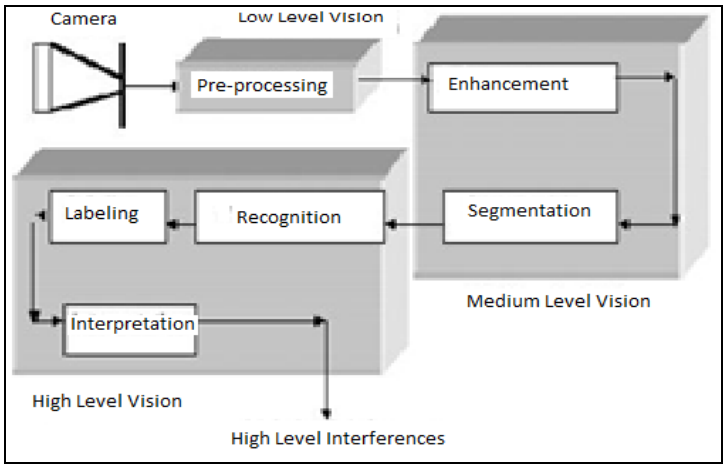


Fig. 1: Basic steps in video processing

Fig. 1 shows the basic steps in video processing, which contains low level vision, medium level vision and high level vision.

Video segmentation is the process of partitioning a video sequence into disjoint sets of consecutive frames that are homogenous according to some defined criteria. In most common types of segmentation, video is partitioned into shots, camera-takes or scenes. The application of video segmentation includes traffic monitoring systems and accident prevention systems.

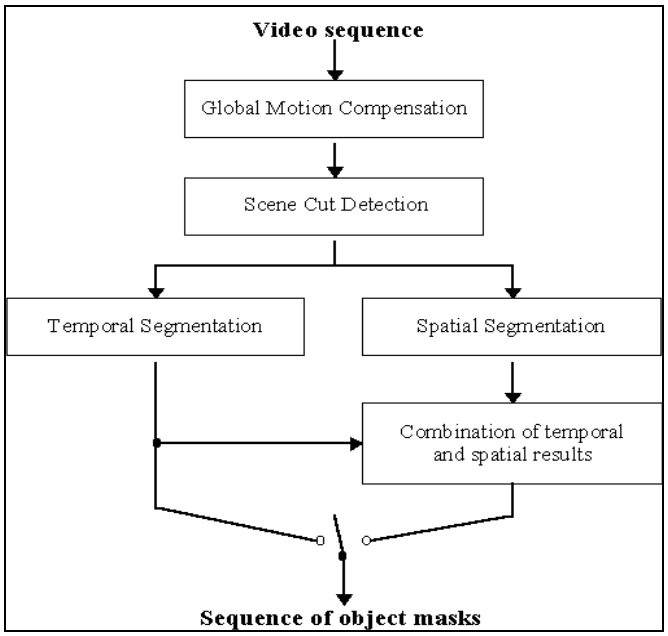


Fig 2: Basic steps in video segmentation

Fig. 2 show the basic steps in a general video segmentation in which the video sequence is cut into scenes and it is spatially and temporally segmented. The spatially segmented output and the temporally segmented output are combined to give the sequence of object masks.

Chapter two deals with various video segmentation techniques. In chapter three, a specific video segmentation technique called thresholding algorithm is explained. Chapter four deals with pedestrian video analysis. In chapter five, experimental results are displayed. Conclusion is given in chapter six.

2. Video Segmentation Techniques

There are several video segmentation techniques. In shot boundary detection Kien Hua A *et al.* [3], video is segmented into the basic units. This uses sequential search technique. This speeds up the histogram process with high accuracy. This algorithm is used in video data base management systems (VDBMs).The region based method Merin Antony AJ *et al.* [4] uses background subtraction and frame difference techniques. The boundary based method Merin Antony AJ *et al.* [4] is used to detect the boundaries of the moving objects. The shadow cancellation technique Shao-Yi Chien *et al.* [5] is used in real time applications. Using global motion compensation technique Shao-Yi Chien *et al.* [5], good segmentation results are achieved. In this paper, a simple segmentation technique called thresholding technique is used.

3. Thresholding Algorithm

Thresholding algorithm is used in segmentation process. Fixing proper threshold value is the main criterion in this algorithm. For fixing threshold, k-means clustering algorithm is used. This technique is an iterative algorithm. This algorithm has following steps:

1) Initially for the first frame, k-clusters are taken.
2) For each cluster, a cluster head is selected.
3) Assign each pixel in the image to the cluster, so that the distance between the pixel and the cluster head is minimized.
4) Re-compute the cluster centers by averaging all pixels in the cluster.
5) Repeat steps 3) and 4), such that no pixels change clusters.
6) When step 5) is achieved, square the distance between the pixel and the cluster center.
7) Repeat the above steps for all the available frames.

Thus the threshold is fixed for segmentation. The quality of this algorithm is based on the initial set of clusters and the value of k. Therefore k must be selected, such that the threshold value is optimum for segmentation.

4. Pedestrian Video Analysis

The input pedestrian video is analyzed using the module which contains four main blocks namely, input video, frame conversion, segmentation and background subtraction.

A. Module

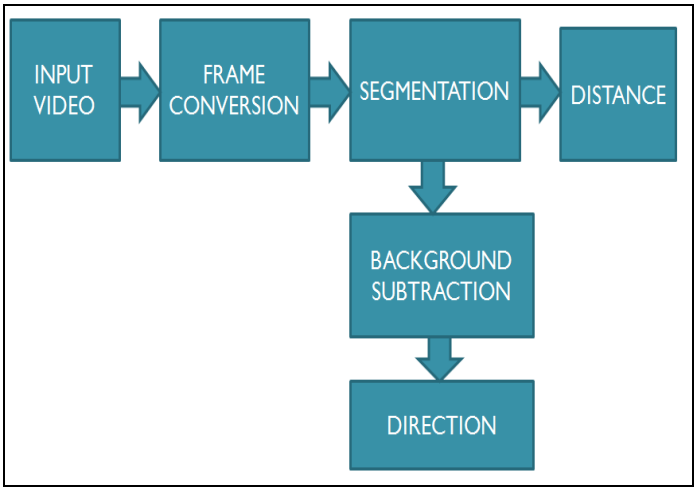


Fig 3: Block diagram for pedestrian video analysis

Figure 3 shows the various steps in analyzing a pedestrian video, which finally yields two parameters namely distance and direction relevant to the input video. The various steps are explained in the following sections.

B. Input video and Frame conversion

The input video is taken by using a camera or any other capturing device. In this paper the video format used is avi. The video can be of any length and accordingly the video segmentation is carried out.

The recognized input video is converted into frames using the technique similar to sampling a signal in time domain. The Frame Conversion block does not make any changes to the input signal other than the sampling mode. According to the length of the input video, the number of frames generated will be varying. In this paper the length of the input video is 5 seconds and therefore the number of frames generated corresponding to the video is 80.Thus the frame rate is 16 frames per second.

C. Segmentation and background subtraction

Segmentation is the process of partitioning a digital image into multiple segments (sets of pixels, also known as super pixels). The goal of segmentation is to simplify and/or change the representation of an image into something that is more meaningful and easier to analyze. Image segmentation is typically used to locate objects and boundaries (lines, curves, etc.) in images. Moreover, image segmentation is the process of assigning a label to every pixel in an image such that pixels with the same label share some visual characteristics.

Thresholding is the simplest method for any kind of segmentation. Here the threshold is fixed based on the thresholding algorithm named k-means clustering, which is discussed in the third chapter. Based on the threshold value, all the frames are segmented and from the segmented output the distance between the pedestrian and the capturing source is measured.

Generally, both in image and in video, the background objects tend to increase the redundancy, which in turn, does not provide any significant information. A foreground object can be described as an object of attention which helps in reducing the amount of data to be processed as well as provide important information to the task under consideration. Often, the foreground object can be thought of as a coherently moving object in a scene. A common approach is to perform background subtraction, which identifies moving objects from the portion of a video frame that differs significantly from a back ground model.

We must emphasize the word coherent here because if a person is walking in front of moving leaves, the person forms the foreground object while leaves though having motion associated with them are considered background due to its repetitive behavior. In some cases, distance of the moving object also forms a basis for it to be considered a background, e.g. if in a scene one person is close to the camera while there is a person far away in background, in this case the nearby person is considered as foreground while the person far away is ignored due to its small size and the lack of information that it provides. Identifying moving objects from a video sequence is a fundamental and critical task in many computer-vision applications.

Background subtraction is a class of techniques for segmenting out objects of interest in a scene for applications such as surveillance. There are many challenges in developing a good background subtraction algorithm. First, it must be robust against changes in illumination. Second, it should avoid detecting non-stationary background objects and shadows cast by moving objects. A good background model should also react quickly to changes in background and adapt itself to accommodate changes occurring in the background such as moving of a stationary chair from one place to another.

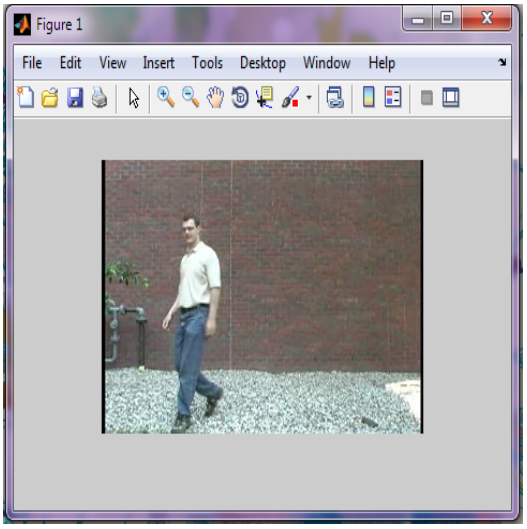
A simple method for background subtraction, which is used in this paper, is given below. It contains the following steps:

1) Compare the first two adjacent frames.
2) Subtract the two frames.
3) If there is no difference between the frames, then it is marked zero.
4) If there is any difference between the frames, then it is marked one.
5) Repeat the steps 1 to 4 for all the adjacent frames.
6) From this frame subtraction, the direction of movement of the object in the video is determined.

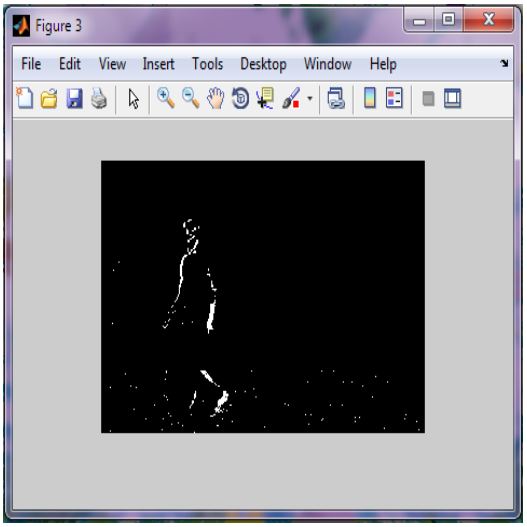
Thus distance is calculated from the segmentation and the direction is calculated from the background subtraction.

5. Experimental Results

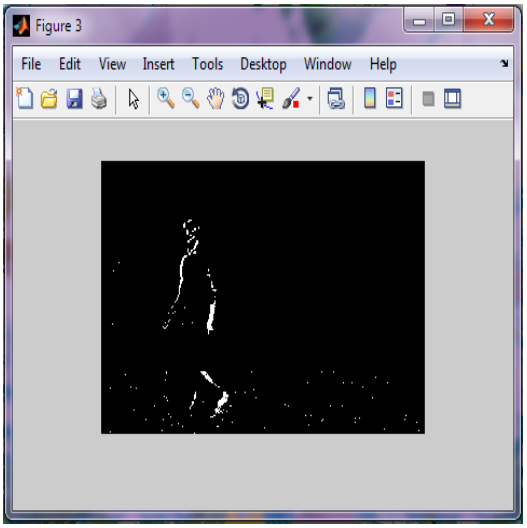
The video is simulated using MATLAB-R2013a and the results are shown below.



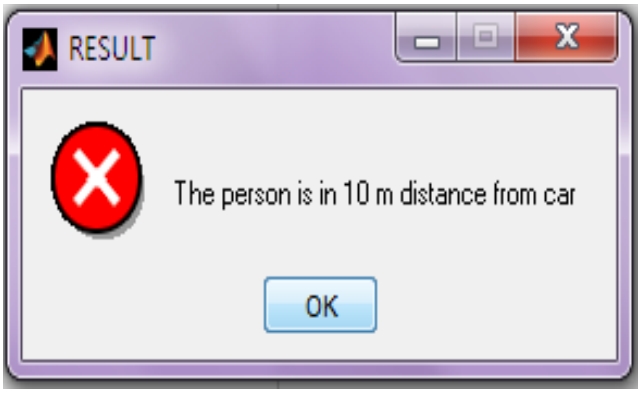
(a)



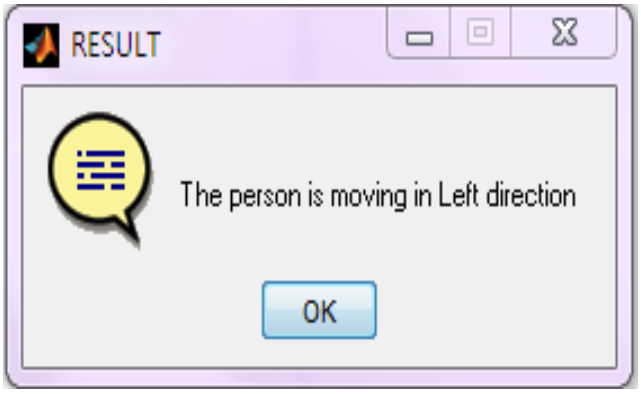
(b)



(c)



(d)



(e)

Fig 4: Simulation results.

The Fig.4 shows the experimental results. The Fig. 4(a) represents the video to frame converted output. Fig. 4(b) represents the segmented output. Fig. 4(c) represents the frame subtracted output. Fig. 4(d) shows the distance output and Fig. 4(e) shows the direction output.

6. Conclusion

By segmenting the pedestrian video, the two important parameters of the video namely distance and direction are found out. Though the segmentation algorithm is a simple one, good results are generated. The trick lies in selecting the optimum threshold value, which in turn is dependent on the value of k used in k-means clustering algorithm used to fix the optimal threshold value. Thus for accurate results, the foreground objects should not be still for a long time.

7. References

1. Elisa Drelie Gelasca, Touradj Ebrahimi, "Application Dependent Video Segmentation Evaluation a Case Study for Video Surveillance".
2. Hassani MEL, Jehan-Besson S, Brun L, Revenu M, Duranton M, Tschumperl´e D *et al.* "A Time-Consistent Video Segmentation Algorithm designed for Real-Time Implementation".
3. Kien Hua A, Jung Hwan Oh. "Very Efficient Video Segmentation Techniques", Computer Science Program, School of EECS, University of Central Florida, Orlando, FL 32816-2362.
4. Merin Antony AJ, Anitha. "A Survey of Moving Object Segmentation Methods", International Journal of Advanced Research in Electronics and Communication Engineering (IJARECE), 2012, 1(4).
5. Shao-Yi Chien, Yu-Wen Huang, Bing-Yu Hsieh, Shyh-Yih Ma, Liang-Gee Chen, Fellow, *et al.*, "Fast Video Segmentation Algorithm with Shadow cancellation, Global Motion Compensation, and Adaptive Threshold Techniques", Ieee Transactions On Multimedia, 2004, 6(5).
6. Zhang Yu-Jin. Tsinghua University, Beijing, China, "An Overview of Image and Video Segmentation in the Last 40 Years", Copyright © Idea Group Inc, 2006
7. Yasira Beevi C P, Dr. Natarajan S, "An Efficient Video Segmentation Algorithm with Real Time Adaptive Threshold Technique", International Journal of Signal Processing, Image Processing and Pattern Recognition, 2009, 2(4).

Author's Bibliography

Gokilavani Chinnasamy was born in Tami Nadu, India on 1991. She completed her B.E., degree in Electronics and Communication Engineering in Hindusthan College of Engineering and Technology, Coimbatore. And currently pursuing her M.E., degree Specialized in Electronics and Communication Engineering in SNS College of Technology, Coimbatore. Her area of interest includes Digital Image segmentation, Image enhancement and Image restoration. She has published papers in various international journals. She is a member of IETE and the IRED.

Gowtham M was born in Tami Nadu, India on 1989. He completed his B.E., degree in Electronics and Communication Engineering in SNS College of Technology, Coimbatore. And currently pursuing his M.E., degree Specialized in Electronics and Communication Engineering in SNS College of Technology, Coimbatore. His area of interest includes Image enhancement and Image compression. He has published papers in various international journals. He is the member of the IRED.