IJCTA, 10(01), 2017, pp. 73-77

Motion Tracking and Segmentation in the Compressed Doman using Spatio Temporal Markov Random Fields

R. Karthikeyan* and Celine Kavida. A**

Abstract : The moving object in H.264/AVC compressed video sequences are tracked here using Spatio-Temporal Markov random fields. The ST-MRF model integrates spatial and temporal aspects of the object's motion. The motion vectors (MVs) and the block coding modes from the compressed bit stream are only used to perform tracking. Compressed domain takes fairly low pressing time but provides high accuracy. At each frame, the decision of whether a particular block belongs to the object being tracked is made by ST-MRF model. Using this model, an estimate of labeling of the current frame is formed based on the previous frame labeling and current frame's motion information. It is then updated from frame to frame in the order to follow the changes in the object's motion. The Spatio-Temporal Markov Random Field model is used to detect and track a moving target. Then a threshold segmentation algorithm is applied. Advanced in the field of global motion estimation of the foreground area, and precise definition of the foreground is achieved.

1. INTRODUCTION

Though recently there are process in both pixel-domain video object tracking ,the need for a tracking frame work with both reasonable accuracy and reasonable complexity still exists. The pixel domain is highly accurate but has computational complexity. So a method to track the moving objects in H.264/AVC compressed video sequence using Spatio-Temporal Markov Random Fields can make it simpler and effective. As the compressed domain is reusable it is helpful for real time application. It is fast and fairly accurate. Tracking of objects in a video necessary for uniquely identifying the set of activities carried out by the object in the complete video. This can be used in the areas like surveillance, traffic control, areas of computer vision, video processing or in any kind of object tracking domain.

The recently increasing terrorist activities, theft, traffic rule violations, instructions at banks and other non social activities can easily be identified and tracked using the tracking methods. Unlike other tracking methods where background Subtraction technique is used to track objects makes it less interesting and clear. Hence, a threshold value calculated based on the size, color and orientation of the object is used which makes the tracked object prominent.

In case of analyzing the non-uniform motion, if uniform motion can be assumed by dividing between a small frame, it is possible to estimate even the complex motions of multiple objects. Under the assumption of uniform motion, it is possible to perform efficient compression coding, because three-dimensional spectrum space can be approximated at a plane.

However, improvement in coding efficiency cannot be expected for a motion wherein the speed changes rapidly. In addition, NHA is more accurate frequency analysis technique than FFT. However, the

* Computer Science Engineering Veltech Multitech DR.RR DR.SR.engg college, TN, Chennai. *rkarthikeyan@veltechmultitech.org*

** Dept of Physics Veltech multitech DR.RR DR.SR.engg college TN, Chennai. *celinekavida@veltechmultitech.org*

computation time taken by NHA is high. Therefore, when a large-sized video is analyzed by 3D NHA, real time processing becomes difficult. An automatic motion-based object segmentation algorithm for video sequences with moving camera by employing short-term motion information solely is used. For every frame, two error frames are generated using motion compensation. They are combined and a threshold segmentation algorithm is applied. Recent advances in the field of global motion estimation enable outlier elimination in the background area, and thus a more precise definition of the foreground is achieved. We propose a simple and effective error frame generation and consider spatial error localization. Thus, we achieve improved performance compared with a previously proposed short-term motion-based method and provide subjective as well as objective evaluation.

2. EXISTING SYSTEM

Object tracking in video processing follows the segmentation step and is more or less equivalent to the 'recognition' step in the image processing. Detection of moving objects in video streams is the first relevant step of information extraction in many computer vision applications, including traffic monitoring, automated remote video surveillance, and people tracking. There are basically three approaches in object tracking. Feature-based methods aim at extracting characteristics such as points, line segments from image sequences, tracking stage is then ensured by a matching procedure at every time instant. Differential methods are based on the optical flow computation, *i.e*. on the apparent motion in mage sequences, under some regularization assumptions. The third class uses the correlation to measure the inter image displacements. Selection of a particular approach largely depends on the domain of the problem.

The existing system is useful only in robotics and computer vision fields. The approaches depend largely on the problem domain. There exists a cost/performance trade off. Real time application cost is high. The diverse nature of the techniques used in the field has a lot of room for improvement. The SNR (Sound To Noise ratio) is high. Tracking of object in the existing system is done using Background Subtraction technique where the tracked object is in white color and the background in black color. This does not produce a clear image of the tracked object.

3. PROPOSED SYSTEM

The proposed system is used to track objects from a compressed video. The only data from the compressed stream used in the proposed method are the motion vectors and block coding modes. Compressed domain takes fairly low processing time and also provided high accuracy. The system uses Spatio-Temporal Markov Random Field model to detect and track a moving target. Using this model, and estimate of the labeling of the current frame is formed based on the previous frame labeling and current motion information. The decision of whether a particular block belongs to the object being tracked is made by STMRF model. The Spatio-Temporal Markov Random Field model is used to detect and track a moving target. The results of experimental Evaluations on ground truth video demonstrate superior functionality and accuracy of our approach against other state-of the-art compressed domain segmentation/tracking approaches. Although our algorithm works well even with fixed parameter values, possibly better performance may be obtained by adaptive tuning, although this would in general increase the complexity.

The Proposed system takes fairly low processing time but provides high accuracy. It uses Spatio-Temporal Markov Random Field model to detect and track a moving target. The accuracy compared to Iterated Conditional

Modes(ICM) Employs both spatial and temporal information at the same time through the ST-MRF model. The Use of compressed domain methods in practical applications are generally of lower computational cost.

Iterated Conditional Modes(ICM) Employs both spatial and temporal information at the same time through the ST-MRF model . The Use of compressed domain methods in practical applications are generally of lower computational cost.

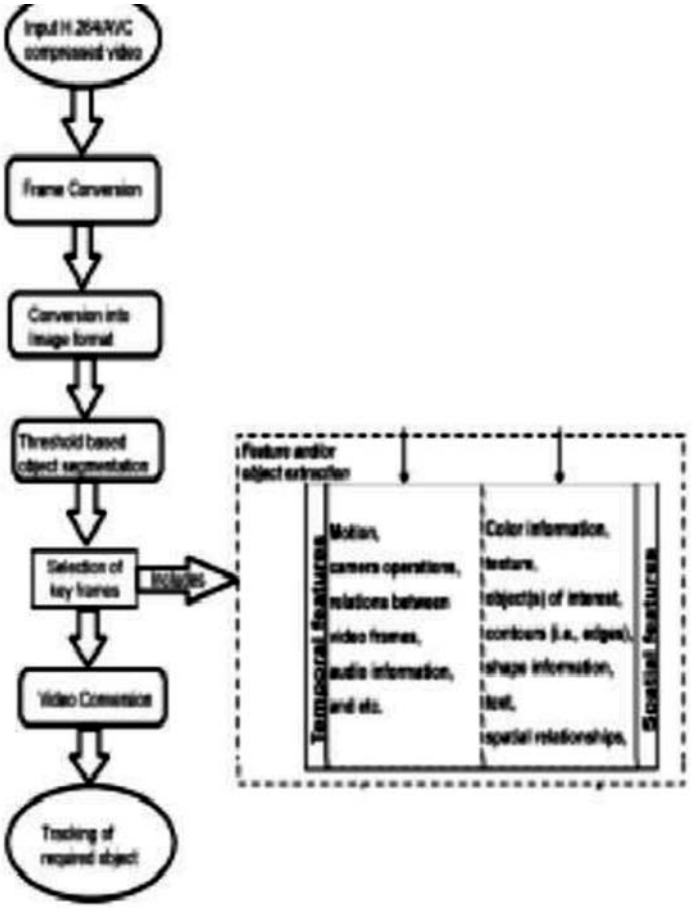

Figure 1: Flow diagram of Proposed System

1. Frame Conversion

Figure 2: Frames generated from video

The tracking process requires conversion of video into frames. Frames are static and produced based on time feature of any video. The picture elements in a line are transmitted as sine signals where a pair of dots, one dark and one light can be represented by a single sine. The product of the number of lines and the number of maximum sine signals per line is known as the total resolution of the frame. Higher the resolution the more faithful the displayed image to the original image.

2. Object Segmentation

Segmentation refers to the selection of interesting features in an image. Very much related to this is labeling, grouping together into a single entity or object pixels that have something in common. Typically, that they are adjacent in space.

In the proposed system object threshold value on the frames that are converted to images.

3. Object Recognition

After Segmentation the output is compared with the original frame to check for the required object. This is known as object recognition. Object recognition in computer vision is the task of finding and identifying objects in an image or video sequence. Humans recognize a multitude of objects in images with little effort, despite the fact that the image of the objects may vary somewhat in different viewpoints, in many different sizes/scale or even when they are translated or rotated. Objects can even be recognized form view. There are two different methods of object recognition namely the Appearance based method and the Feature based method.

4. Object Tracking

Figure 3: Tracking of object

Video object tracking is the process of locating a moving object or multiple objects over time using a camera. The objective of video tracking is to associate target objects in consecutive video frames. The association can be especially difficult when the objects are moving fast relative to the frame rate. Another situation that increases the complexity of the problem is when the tracked object changes orientation over

time. For these situations video tracking systems usually employ a motion model which describes how the image of the target might change for different possible motions of the object. To perform video tracking an algorithm analyzes sequential video frames and outputs the movement of targets between the frames. There are a variety of algorithms, each having strengths and weaknesses. Considering the intended use is important when choosing which algorithm to use. There are two major components of a visual tracking system: target representation and localization, as well as filtering and data association.

4. CONCLUSION

This project presents a novel approach to track a moving object in a H.264/AVC-compressed video. The only data from the compressed stream used in the proposed method are the motion vectors and block coding modes. As a result, the proposed method has a fairly low processing time, yet provides high accuracy. The results of experimental evaluations on ground truth video demonstrate superior functionality and accuracy of our approach against other compressed-domain segmentation/tracking approaches. Although our algorithm works well we still work on the future enhancement of the project considering only the object and not its extra details like shadow.

5. REFERENCES

1. Video Object Tracking in the Compressed Domain Using Spatio-Temporal Markov Random Fields-Sayed Hossein Khatoonabadi and Ivan V.Baji'c,Senior Member,IEEE.
2. M.G.Aravanitidou,M.Tok,A.Krutz,and T.Sikora,"Short-term motion based object segmentation",in Proc.IEEE Int. Conf.Multimedia Expo,Barcelona,Spain,Jul 2011,PP.1-6
3. C.Aeschliman,J.Park,and A.C.Kak,"A Probablistic frame work for joint segmentation and tracking",in Proc.IEEE Comput.Vis. Pttern Recognit.,San Francisco,CA,Jun 2010,PP.1371-1378.
4. D.Comaniciu,V.Ramesh,and P.Meer,"Kernel-based object tracking",IEEE Trans.Pattern Anal.Mach Intell., vol.25,no.5, pp.564-575, May 2003.
5. T.Drummond and R.Cipolla,"Ral-time visual tracking of complex structures",IEEE Trans.Pattern Anal.Mach Intell.,,Vol 24,no,7,pp.932-946,jul.2002.
6. Vector Sparse Representation of Color Image Using Quaternion Matrix Analysis ",IEEE Transactions on (Volume:24 , Issue: 4), Page(s):1315 - 1329 , ISSN :1057-7149 , INSPEC Accession Number: 14929059 , Date of Publication :27 January 2015 .
7. Y.Wang,K-F Loe, T.Tan, and J-K Wu,"Spatiotemporal video segmentation based on graphical models", IEEE Trans. Image Process.,vol.14, no.7, pp.937-947, Jul.2005.
8. R. Huang,V. Pavlovic, abd D.N Metaxas,"A new spatio –temporal MRF framework for video based object segmentation", in proc.MLVMA Conjunct.Eur.Conf.Comput.Vis.,2008,pp1-12
9. Y.Wang,"A dynamic conditionalrandom field model for object segmentation in image sequences,"in Proc. IEEE Comput.Vis.Pattern Recognit.,,vol.1.Jun.2005,pp.264-270.
10. A.Cherian, J.Andersh,V.Morellas,N.Papanikolopoulos,and B.Mettler,"Autonomous altitude estimation of a UAV using a single onboardcamera,"in Proc. IEEE Int.Conf.Intell. Rodots Syst.,Oct 2009, pp.3900-3905.