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A RELATIVE CRAM ON MEANS AND MEDIAN ALGORITHM FOR OBJECT TRACKING AND DETECTION

G.Simi Margarat, Dr.S.Siva Subramanium ,Dr.R.Robert Masilamani

[1]Reseach Scholar, Department of Computer science and Engineering, Bharath University, Chennai, Tamilnadu, India

[2]Principal, Mohamed Sathak College Of Engineering, Chennai, Tamilnadu, India

[3]Professor,Bharath University, Chennai, Tamilnadu, India

Email: gsimi166@gmail.com,drsivatbm@gmail.com

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Abstract: The increase in the digital video camera and the availability of video storage and high performance video processing hardware, paves up the possible outcomes for embark upon many video tribulations. In computer revelation, object representation and tracking is an important task. There are many techniques to tackle the video problems. Firstly, it is essential to develop real –time video understanding technique that can process large amount of data. The object tracking technique is used to detect the motion of the object from one frame to another. This paper focuses on various types of techniques subsist for object detection and tracking.

Keywords: *Object detection, Frame difference, Background subtraction, Object Tacking*

1 Introduction

A large amount visual surveillance systems start with motion detection. Motion detection methods attempt to locate connected regions of pixels that represent the moving objects within the scene; different approaches include frame-to-frame difference, background subtraction and motion analysis. Object motion detection technology concerns how to extract moving object from surveillance videos and eliminate the background and noise as much as possible. The capability of being able to analyze object movements from image sequences is crucial for visual surveillance.

Various methods have been proposed and reported both in academe and diligence for large number of real time applications. All the object tracking method can be broadly be categorized as template-based, probabilistic and pixel-wise. While the template-based method represents the object in a

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suitable way for tracking, the probabilistic method uses intelligent searching strategy for tracking the target object. Similarly, the similarity matching techniques are used for tracking the target object in pixel-based methods.
The PCA model [1] detects the motion and then separates the object from its background using background subtraction. Tracking approach is done in each frame of detected Object. Pixel label problem can be alleviated by the MAP (Maximum a Posteriori)[1] technique. The solution implemented in this framework utilizes spatial segmentation for detection of moving objects in video sequences, using background subtraction algorithm. This approach is based on modeling pixels as mixtures of Gaussians and using an on-line approximation to update the model.

A three dimensional representation of the HSV color space is a hexacone, with the central vertical axis representing intensity [2].The HSV[2]is used to extract features of objects present in video frames using the properties of the HSV color space and track the same object in subsequent video frames by considering human as target object.
Adaptive background subtraction[3] algorithm is used to detect and track moving objects. Object motion detection technology concerns how to extract moving object from surveillance videos and eliminate the background and noise as much as possible. The algorithm enables to update the background image on time.

An object detection and tracking systems are done in sequential way of processing and also it is implemented using hardware synthesize tools like verilog HDL with FPGA[4], achieves considerably lesser performance in speed and it does support lesser atomic transactions.

2 Object Detection And Tracking

Principal component analysis (PCA)[1] is a mathematical procedure that performs a dimensionality reduction by extracting the principal components of the multi-dimensional data. The main components are the linear combination of the original dimensions that has the highest inconsistency. The n-th principal component is the linear combination with the maximum variability, being orthogonal to the n – 1 first main component. These components are combination of optimally-weighted observed variables. A mathematical procedure uses an orthogonal transformation to convert a set of observations of possibly correlated variables into a set of values of uncorrelated variables called principal components. The number of principal components is less than or equal to the number of original variables. This transformation is defined in such a way that the first principal component

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has as high a variance as possible and each succeeding component in turn has the highest variance possible under the constraint that it be orthogonal to the preceding components.

FIG 1 Background subtraction.

The Hue,Saturation and value of intensity ,extract the features of an image .HSV[2] is implemented to further track the targeted object in the video. The K-means of algorithm starts with minimum K-value and adaptively increase till the error falls below the threshold value or the maximum number of clusters [depends on the resolution of human eye] is reached, in the first step of object tracking. Secondly, after clustering the current frame, the objects in the reference frame and target frames, are compared using the HSV methodology, which uses position, color and size of the objects for comparison.

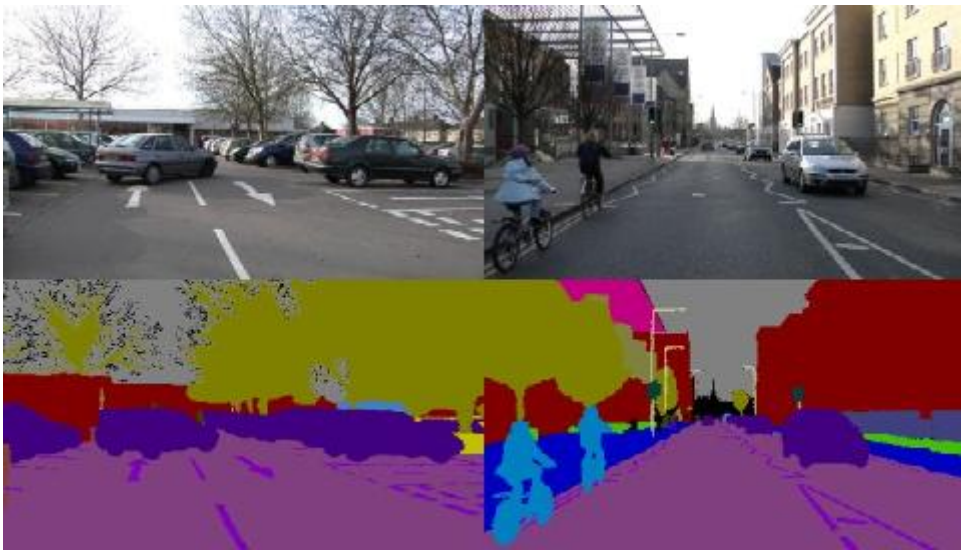

FIG 2:HSV based detection

3 Pixel Based Object Detection

The 5-stage [3] Adaptive background subtraction algorithm requires a continual updating of the background image, since we deal with a dynamic environment of video surveillance. Mathematical morphological [3] is used for filtering, thinning and pruning. It is a foundation of the mathematical set

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of tools underlying the development of techniques for images. For example, Morphological closing have a propensity to smooth the contours of objects. The secluded foreground image section would include interference of noise, because of the real time video frames. These can further lead to the incorrect tracking of object. The mathematical morphological joins narrow breaks, fills long thin gulfs, and fills holes smaller than the structuring element.

FPGA-Field Programmable Gate Array with Xilinx [4] for object detection is accomplished. This can be furthered used to reconfigure the system, to support the accurate object detection. Also the performance is improved with lesser time and lesser power consumption. The front end tool gives the input images and signal the bluespec simulator[5] to process and stop. The main role is of atomic transaction for the bluespec. This executes the splitting of image into many individual equal sized windows, background image pixel subtraction from foreground image pixel.

The processing elements are placed in systolic array or some form of computational arrays. This makes possibility of parallel execution of subtraction. And in turn, FIFO is needed to perform the parallel execution. This further can be used for window buffers, that in turn stimulates the use of pipelining easily.

4 Conclusion

The above are the various techniques and algorithms used in the object tracking and detection .The methods such as PCA[1] are best suitable for compressed or ordinary videos. We made a study on the techniques detect and track multiple objects in the video frames using front-end and backend tools. The hardware dependent detection methods requires pipelining and scheduling algorithm for sequential access of video frames.

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