International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Impact Factor (2012): 3.358

FPGA Implementation of Motion Feature Extraction Employing Pipelined Architecture

M. Nivethitha[1], B. Venkataramanaiah[2]

[1]P.G Scholar, Department of Electronics and Communication Engineering,
Sri Muthukumaran Institute of Technology, Chennai, Tamilnadu, India

[2]Assistant Professor, Department of Electronics and Communication Engineering,
Sri Muthukumaran Institute of Technology, Chennai, Tamilnadu, India

Abstract: ***A VLSI is capable of extracting motion features from moving images in real time has been developed by employing parallel architecture. Image processing is a method to convert an image into form and perform some operations in order to get an enhanced image to extract useful information from it.It is a type of signal dispensation in which input is image like video frame or photograph and output maybe image or characteristics associated with that image. Image processing includes treating images as two dimensional signals while applying already set of processing methods to them. Image segmentation is the division of image; The simplest method is thresholding technique. The proposed method is to achieve real time response of the system a pixel parallel architecture has been explored in binarization of filtered images of feature extraction. A Background subtraction method is a general method of motion detection. It is a technology that uses the differences of current image and background image to detect moving object. And we implement in FPGA by employing a pipelined architecture.***

Keywords: feature extraction, video surveillance, motion detection, background subtraction

1. Introduction

Real Time motion recognition is becoming increasingly important in various applications such as automotive vehicle control, efficient human computer interaction, video surveillance[5], remote gesture control, sign language interpretation, surgery report etc.it is important in surgery support for monitoring the heart beat and for monitoring the flow of microorganism. For counting objects rapidly on the line. Such application high speed image processing[2] employing high frame rate image sensors are needed for the detection of motion. Which is needed for improving the speed and precision of recognition? A number of very large scale integration (VLSI) with parallel architectures have been developed for performance enhancement in image processing algorithms.it includes image filtering which needs to be performed every pixel in the entire image processor improved the power efficiency by developing the parallel architecture.

The parallel architecture is important for improving the performance of image data processing. However, all these processors are primarily targeting the still image recognition and not dealing with motion or action recognition problems. So we use frame separation and background subtraction method[1] for detecting moving object. The purpose of frame separation is to prepare the modified video frames by removing the noise and unwanted objects in frame in order to increase the amount of information gained from frame. This method uses the difference between two consecutive images taken to determine the presence of moving object. The calculation is simple and easy but difficult to obtain a complete outline of moving object therefore the detection of moving object is not accurate, so in addition to it we use background subtraction method.

2. Background Modelling

Background subtraction method is mainly used for image segmentation; it allows to detect moving regions by subtracting the current image pixel by pixel from a reference background image that is created by averaging images over time in an initialization period. The pixels are classified as foreground where the difficult is above threshold after creating a foreground pixel map some morphological post operations such as erosion, dilation to reduce the effect of noise and enhanced detected region. For building such high speed system, MFE(motion feature extraction)[7]is important and computationally heavy process in motion recognition is required to be preserved less than 1ms.The motion features are extracted from the sequences, defined as the number of frames between the starting frame and end frame for extracting good motion features. If it is too short ,pixel motion cannot be detected, if it is too long the accuracy of local motion degrades so it should be of optimum length.

For accurate detection of region we use median filtering and morphological operations,this method combine the vertical with horizontal projection to detect the height of motion region. This can remove the impact of shadow to certain degree. Then we analyses the vertical projection value and set the threshold value to remove the pseudo maximum value and pseudo minimum value of the vertical projection to determine the number and width of body in motion region, we will get the moving human body with precise edge.

However we are implementing the VLSI architecture introduced in this work to be used for analyzing images having static background and FPGA(field programmable gate array) plays a great role in it moving object detection.

A self-speed adaptive motion feature extraction VLSI has been developed and implemented in FPGA. By employing the parallel architecture motion feature detection is implemented in FPGA, as a result ,a processing time for motion feature extraction after capturing an image has been achieved and the effectiveness of architecture is by building an object detecting system which can localize images only when they are in motion.

A. Processing Algorithm

They all follow a general pattern of processing which includes preprocessing, background subtraction, post processing.

a) **Preprocessing** - Firstly, video frames captured from a camera are input to the background subtractor Preprocessing stages are used for filtration and to change the raw input video to a processable format .
b) **Background subtraction**-The main problem of the background subtraction approach to moving object detection is its extreme sensitivity to dynamic scene changes due to lighting and extraneous events.
c) **Post processing**-Background modeling then uses the observed video frame to calculate and update the background model that is representative of the scene without any objects of interest. Foreground detection is where the pixels that show a significant difference to those in the background model are flagged as foreground

3. Block Diagram

Fig.1 shows the block diagram which has various modules the main aim isto detect moving object based on background subtraction. It is a technology that uses the difference of the current image and the background image to detect the motion region[7]. Image processing is a method to convert an image into form and perform some operations on it in order to get an enhanced image to extract useful information from it.The main aim is to extract a human recognition in real time monitoring. To achieve real time response of the system ,a pixel parallel architecture has been explored in binarization of filtered images of feature extraction. It uses the differences of current image and background image to detect moving object. And we implement in FPGA by employing a pipelined architecture.

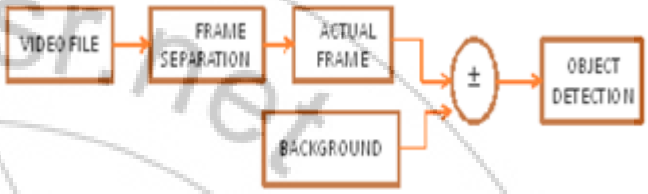

Figure 1: overview of the project

4. Background Subtraction

Background subtraction is the first step in the process of segmenting and tracking people[4]. Distinguishing between foreground and background in a very dynamic and unconstrained outdoor environment over several hours is a challenging task. The structure of the background subtraction is shown in figure 2. The background model is kept in the data storage and four individual modules do training of the model, updating of the model, foreground/background classification and post processing.

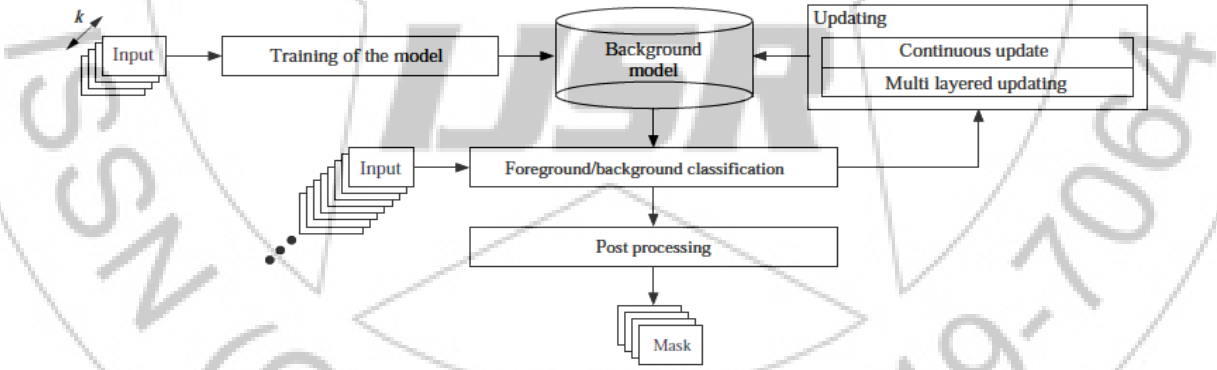

Figure 2: The structure of background subtraction model

The first k video frames are used to train the background model to achieve a model that represents the variation in the background during this period. The following frames (from k + 1 and onwards) are each processed by the background subtraction module to produce a mask that describes the foreground regions identified by comparing the incoming frame with the background model. Information from frames k + 1 and onwards are used to update the background model either by the continuous update mechanism, the layered Updating, or both. The mask obtained from the background subtraction is processed further in the post processing module, which minimizes the effect of noise in the mask.

5. Simulation Results

Simulations have been performed using MATLAB 2007 Simulation toolfor motion detection., The fig.3 shows the output of moving object detection in real time motion and in fig.4 showsthe accurate detection of region by using median filtering and morphological operations, this method combine the vertical with horizontal projection to detect the height of motion region.

Figure 3: Snapshots of object detection

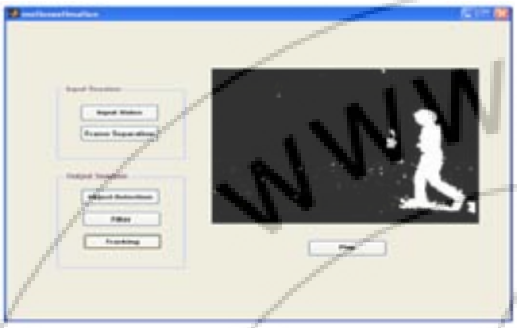

Figure 4: snapshot of object detection after filtering

6. Conclusion and Future Work

Motion detection method is inherently parallel, since computations for each pixel of each sequence frame can be done concurrently with no need for communications. This can help in lowering execution times for high-resolution sequences. Moreover, the approach is suitable to be adopted in a layered framework, where, operating at region-level, it can improve detection results allowing to more efficiently tackle the camouflage problem and to distinguish moving objects by those that, initially moving have stopped. This is a very desirable operative mode, considering that a very actual visual surveillance task is looking for suspect abandoned luggage.

The new method describes the object detection in real time motion based on employing a parallel architecture. Thus the blackout scheme provides a direct connection from the image sensor to the local feature extraction. he initialization and update of background image and detection of moving object is also accurate and we implement in FPGA in order to achieve the effectiveness of an object.

References

[1] K. Toyama, J. Krumm, B. Brumitt, and B. Meyers, "Wallflower: principles and practice of background maintenance," in *Proc. 7th IEEE Conf.Computer Vision*, 1999, vol. 1, pp. 255–261
[2] G. Backer, B. Mertsching, and M. Bollmann, "Data- and model-driven gaze control for an active-vision system," *IEEE Trans. Pattern Anal*
[3] G.L.Foresti,"A Real Time System for Video Surveillance of Unattended Outdoor Environments".
[4] J. M. Ferryman, Ed., in *Proc. 9th IEEE Int. Workshop on Performance Evaluation of Tracking and Surveillance*, 2006.
[5] R. T. Collins, A. J. Lipton, T. Kanade, H. Fujiyoshi, D. Duggins, Y. Tsin, D. Tolliver, N. Enomoto, O. Hasegawa, P. Burt, and L.
[6] Wixson, "A system for video surveillance and monitoring," Tech. Rep. CMU-RI-TR-00-12, The Robotics Inst., Carnegie Mellon Univ., Pittsburgh, PA, 2000.
[7] J. L. Barron, D. J. Fleet, and S. S. Beauchemin, "Performance of optical flow techniques," *Int. J. Comput. Vis.*, vol. 12, no. 1, pp. 42–77, 1994.
[8] L. Maddalena and A. Petrosino, "A self-organizing approach to detection of moving patterns for real-time applications," in *Proc. 2nd Int.*
[9] *Symp. Brain, Vision, and Artificial Intelligence*, 2007, pp. 181–190, Lecture Notes Comput. Sci. 4729.