

Development Methods for Hybrid Motion Detection (Frame Difference-Automatic Threshold)

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Abstract—In general the motion detection method look for differences between some sequentially ordered frame followed by threshold process to detect whether occurred any movement or not. Process of deciding threshold to show any movement in dynamic environment has high enough difficulty related with many "fake" movement which appears as the result of illumination change factor, sunshine or light source, color differences as the effect of automatic color correction inside the device, shadow movement, etc.

Temporal mechanism using standard deviation is a mechanism that proposed in Video Surveillance and Monitoring (VSAM) research project at Carniagie Mellon University. In this research we proposed one hybrid scheme to determine initial value of motion thresholding to create an adaptive moving detection system. We proposed the using of local standard deviation in 3 x 3 pixel area as initial value for mechanism that was defined by Robert et al. This hybrid scheme used moving standard deviation value in each pixel to create adaptive threshold value for motion/movement detection.

The experiment showed that by using local standard deviation as initial value we could achieve balance accuracy for movement and non-movement detection with accuracy propostion 80.00% for video with movement and 90.91% for video without movement.

Keywords—*motion detection; adaptive threshold; three frame differencing*

I. INTRODUCTION

Motion detection usually applied for surveillance cameras which observe certain area scope that has specific constant view. Aside from surveillance system, some technology of surveillance camera were able to monitor traffic in certain location and object recognition.[13]

Three frame differencing is one of the methods to detect any changes inside the video data as a basis to perform motion detection. This method has advantage in simplicity process that might result in short time processing time. Disadvantages of this method are the existence of threshold parameter which has to be defined by the user to perform motion detection. Determination of the threshold value by the user manually might cause this method cannot perform adaptively. That means when observing in different environment might result different threshold value. By assuming the threshold value is equivalent to temporal standard deviation, this mechanism can eliminate fake movement caused by the dynamic environment. Therefore, this research proposed an alternatif initial value for thresholding based on standard deviation to create an adaptive moving detection system, by combining three frame differencing and temporal standard deviation that proposed in Video Surveillance and Monitoring (VSAM) research project at Carniagie Mellon University [13].

II. BASIC THEORY

A. Digital Image

Digital image is a continuous image that transforms into the discrete forms, both space coordinate and light intensity. Digital image forms as matrix with $m \times n$ size, which m represent height and n represent width of the image. Some devices which could transform image into digital image are scanner, digital camera, and camcorder.

Digital image divided into two types, still image and moving image. Still image is a singular image which is static. Moving image is union of still image which shown sequentially that give eyes perception as a moving image. Digital image used in this research is moving image which next called as video.

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