平成19年度修士論文

題目：Tracking of Moving Person in Outdoor Environments
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In recent years, automatic detection and tracking of moving object is very important task for security system, monitoring activity and surveillance application. Many approaches have been developed to detect motion, namely, frame difference, background subtraction, optical flow and skin color extraction. However, those methods are essential to be further improved, as there are many obstacles such as brightness distribution of the emerging object, brightness change or shading occurs in the background and small movement in the background that will cause inaccurate detection.

In this paper, we propose a new method to detect and track the interested moving object based on low resolution image and tree algorithm employing block matching technique. Beside that, we propose also the object identification employing color and spatial information of moving object. In this paper, we categorize our study in three stages; object detection, object tracking and object identification. On each stage, we apply our new method and evaluate the effectiveness of our method.

The first stage is begun by reading the image on successive frames by using a camera. In this stage, we propose the low resolution image and tree algorithm to remove the image noise having salt and pepper noise and small movement in the background. Frame difference is performed after that on three successive frame images to detect the moving objects emerging in the background. Morphological operation such as dilation and erosion is used to fills small gaps inside the detected object and remove the noise around it. Then, connected component labeling is performed to label each moving object emerging in the background in different label.

The second stage is done to track only the interested moving object among the moving objects emerging in the background. On this stage, the block matching technique is performed to detect the interested moving object. The blocks are defined by dividing the image frame into non-overlapping square parts and made in the current and destination frame. The blocks are made based on the peripheral increment sign correlation image that considers the brightness change in all the pixels of the block relative to the considered pixel. The increment sign of each

block is calculated by comparing the pixel value of the neighborhood to the considered pixel. To determine the matching block, the correlation value between each block in the current and the destination frame is calculated. The interested moving object is determined when the numbers of matching block in the current and destination frame are more than the certain threshold value.

As a last stage, we identify the tracked moving object by extracting the color and spatial information of the tracked object. In this paper, we use mean and standard deviation value as image feature of the tracked object. To evaluate the identification process, we use similarity. This similarity is performed by comparing the image feature of the target and the reference object. The most similar feature is then compared certain threshold value to obtain similar object between target and reference object.

The proposed methods are implemented in the real time processing and applied on various image sequences captured by using a camera. And the satisfied results are achieved.

実験結果