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Motion Detector Using High Level Feature Extraction

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Abstract

Video surveillance always became a challenging area due to the execution time to detect abnormality movement and storage. Background subtraction is one of the way to detect motion due to high level feature extraction that can avoid tracking. These day, there no specific approaches that are suitable robustly to represent video motion. A method for finding the pattern is presented using background subtraction which is assumes that the apparent of the brightness pattern varies smoothly almost everywhere in the images. The proposed method is based on the morphological technique to handle image sequences that are quantized rather than coarsely in space and time. It is also an incentive to quantization of brightness levels and additive noise.

Keywords: High Level Feature Extraction, Background subtraction, Morphological Technique, Video Motion, Detect Motion.

INTRODUCTION

Close circuit television(CCTV) nowadays is a must to monitor the safety of a building or company. In order to get an efficient monitoring system, a good technique of feature extraction should be identified. In image processing, the essential step to detect an abnormally in the sequence of video can be refer to fig.1 below.

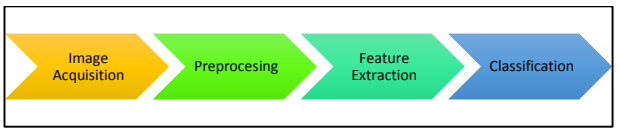


Figure 1: Sequence of video to detect an abnormally

The proposed process starts with the true input and the process that involving pre-filtering such as median, gaussian and more. The highlighted topic is the process of segmentation if we the high-level feature extraction based on the feature extraction towards normal. In this research, we focus on the high level feature extraction to identify the object, then a description of true object can be identified.

RELATED WORK

Computational vision based object detection has become important in the world as the number of surveillance cameras being installed in various fields increased[1]. Low level feature extraction will be based on motion directly while high level feature extraction will involve shape based[2]. Hence, high level feature extraction will need to have a good image segmentation. The surrounding intensity is the problem of image segmentation. Jiyan Pan, Quanfu Fan, and Sharath Pankanti propose to perform region-level analysis in both static foreground object detection and background mainte-nance [3].

Video-surveillance systems are becoming more autonomous in the detection and reporting of abnormal events. In this context, this study presents an approach to detect the motion aspect of a human in different situations. The proposed approach estimates sudden changes and abnormal motion variations in a set of points of interest (POI). The approach detects events where local motion variation is important compared to previous events. To demonstrate the interest of the approach, we present the results of a human detection experiment. The moving object detection is difficult to process reliably due to dynamic variation in natural scenes such as gradual illumination changes caused by day to night change and sudden illumination variation caused by weather changes[4].

There are steps in video analysis detection with are the interesting moving objects, tracking such objects from frame, and analysis of object tracks to recognize their behaviour[5].Feature extraction involves reducing the amount of resources required to describe a large set of data.

One very important area of application is image processing, in which algorithms are used to detect and isolate various desired portions or shapes (features) of a digitized image or video stream.

PROPOSED METHODOLOGY

Feature extraction is a step to get the characteristics of image used to identify each object. When background subtraction is used, the main thing that we need to improve is on how to get a good segmentation of subject. With a good segmentation, the good features can be extracted. Hence to get the good

segmentation in high level feature extraction, we need to ensure that the background subtraction is already done.

A. *Background Subtraction*

Figure 2: Example of Background Subtraction

In some cases, the intensity of lighting is not consistent. Since we use natural lighting that chance gradually, so the selection of background frame should be in averaging and not in single form.

B. *Morphological Technique*

Figure 3: Example of Morphological Technique

In morphological technique, the objective is to change grayscale image to- binary image format. The change will depends on the threshold chosen. Below is the step that have been used in morphological technique.

a) Threshold used for grayscale to binary is 0.07.
b) Used two step with are strel based on line and diamond.

C. *Segmentation*

In segmentation, the post processing is used to filter the noise. The good segmentation is obtained when there is no noise in the picture. Next, segmentation for the image is show in figure 4.

$$H(y) = \sum_{i=1}^{m} f(i,y) \quad (1)$$

$$H(x) = \sum_{j=1}^{n} f(x,j) \quad (2)$$

The segmentation consists of two steps, the first one is performing a thresholding on H(x) and H(y). So, it will computes the first derivative, defined by $\frac{d}{dr}$H, the pixels change from 1 to 0 or vice versa in order to get the values.

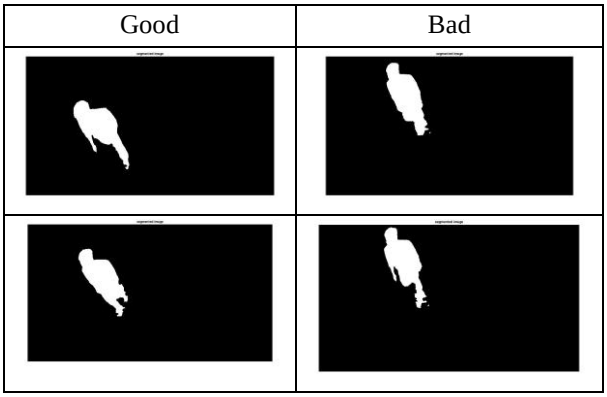


Figure 4: Good and Bad Segmentation in the picture

D. *Crop Image*

After the segmentation process, the interest area of image is cropped before the process of centroidize. The cropped area of the image for this study was the whole human body movement as show in figure 5.

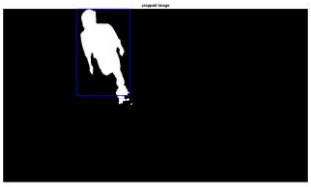


Figure 5: Crop picture for human body movement

E. *Feature Extraction*

The process started with the selection of video frame which has been cropped in previous step. Then the centroidal technique is used to determine the centroid of image. The centroid of image is determined by center of the image cropped. Each of value in the horizontal and vertical line is determined in 360 degree of image cropped with max value of each line is 10 degree, distance from centroid for each point is calculated and saved.

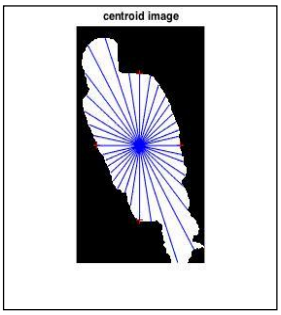


Figure 6: Centroid Image for Feature Extraction

F. Classification

Classification of the normal and abnormal motion is came after the feature extraction process is finished. Data of feature extraction process is saved in excel format. Next, the norm plot is performed using the covariance matrix. Then, the classifier is trained using the created training set. Using the classifier, the confusion matrix is deduced to calculate the percentage of diagonal confusion.

RESULT AND DISCUSSION

Fig.7 shows the result of grayscale from the input video with subtracted background and converted to rgb2gray used to detect the moving object. The result of detection is then converted to grayscale. The change of state from color to grayscale is necessary because of the difficulties to visualize color image as compare to grayscale image. Grayscale image is fairly easy to conceptualize using the watershed algorithm because the algorithm works on two spatial dimensions and one brightness dimension as a 3D image.

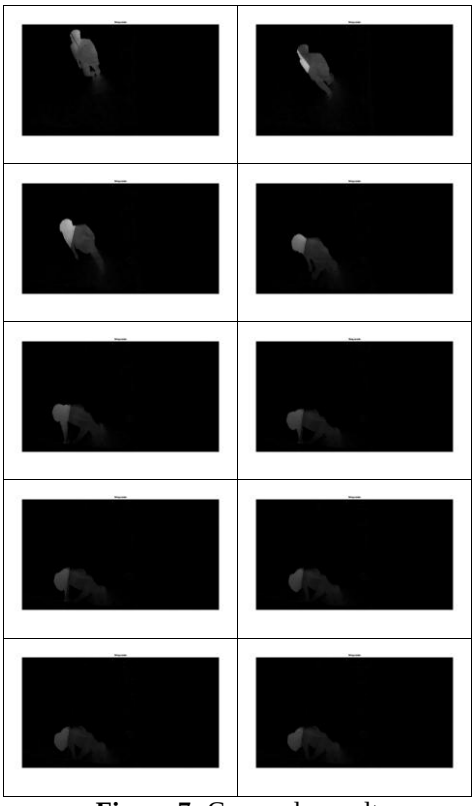


Figure 7: Grayscale result

Fig.8 shows the binary image with two possible values for each pixel (0 and 1). The output of binary image replaced all pixels in the input image with luminance greater than level with the value 1 (white) and other values with 0 (black). The binary image is obtained based on the threshold 0.07.

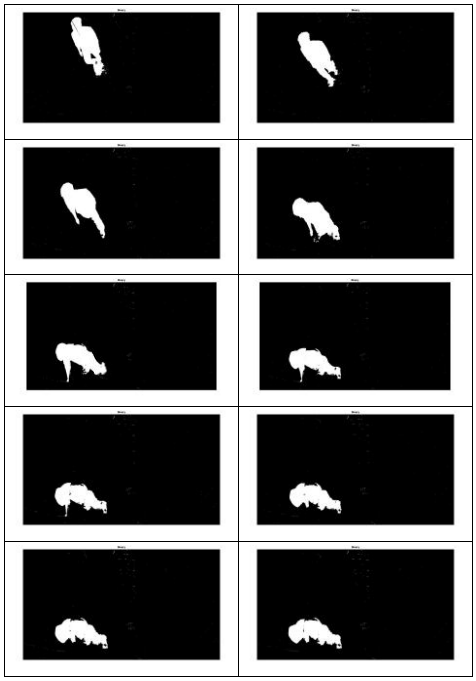


Figure 8: Binary result

To get a more sharpen image, median filter is used for segmentation as shown in fig.9. The used of median filter was to improve the sharpness of binary image. In segmentation of image, 2-D median filter is used by performing matrix A in two dimensions. Each output pixel contains the median value in a 3-by-3 neighborhood around the corresponding pixel of the input image.

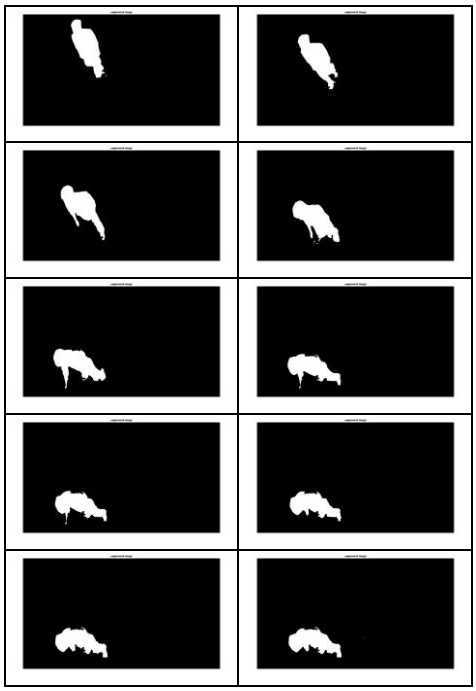


Figure 9: Segmentation result

Crop method (fig.10) is used to crop the human part of the image which is used for human's centroid calculation as in Fig.11. Cropped image is based on binary large object(BLOB) technique. From the cropped data, we determined the area of human's body using centrodized technique. The intensity of the light plays an important factor while using centrodized technique, the ROI of object depends on the intensity of the light. With the low light intensity, the technique cannot removes the background and this will make the BLOB area bigger and the shadow of the object will be considered as an object. Fig.11 shows the centroid technique used to calculate the center of the identified shape.

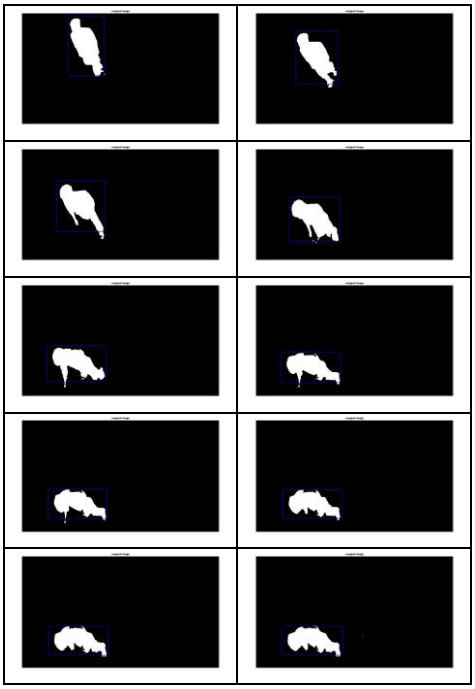
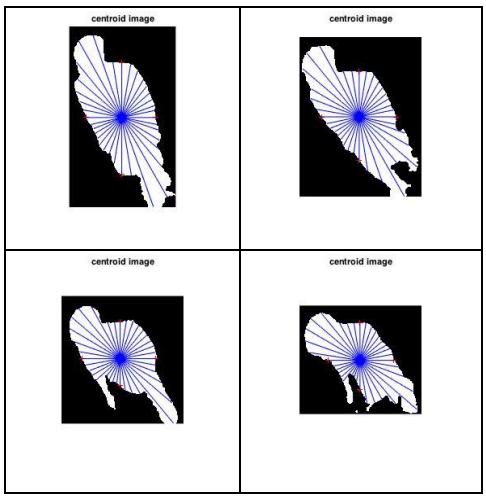


Figure 10: Cropped Image



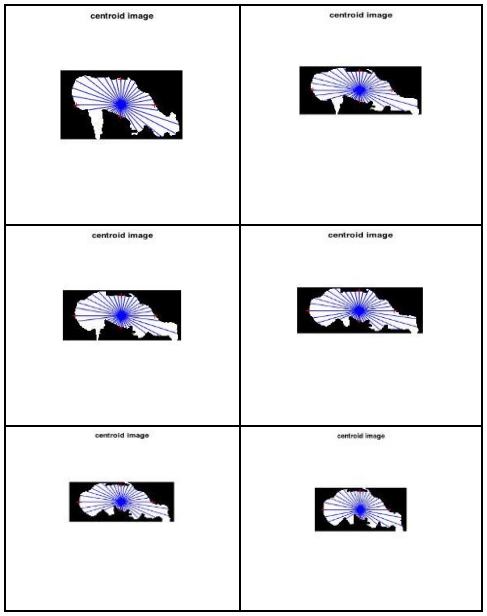


Figure 11: Centroid result

For classification purpose, data from image must be extracted into excel format then classify it using normal probability plot and covariant matrix. The Fig.12 shows the graph of data set was approximately normally distributed.

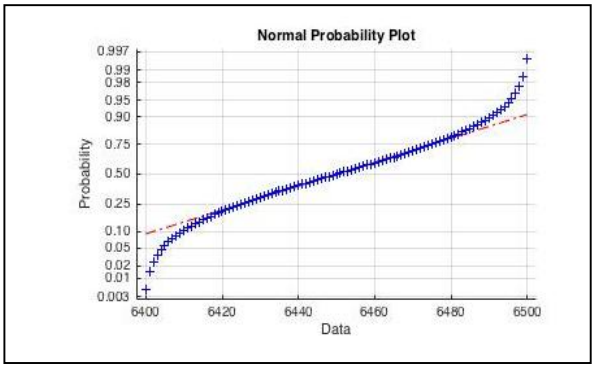


Figure 12: Normal Probability Plot Graft

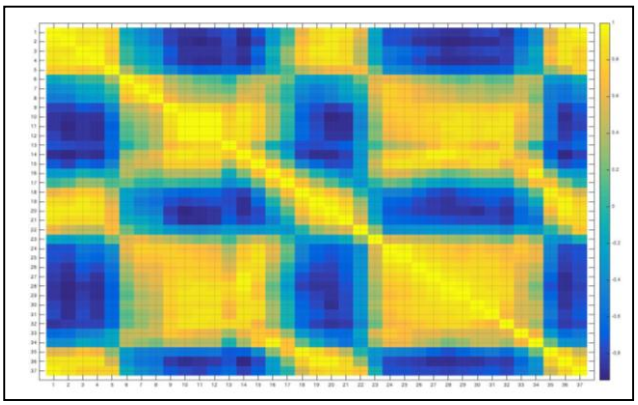


Figure 13: Covariant Matrix

Fig. 13 shows the data are well distributed by using "parula" as the colormap. The color scale is shown by color bar at the right. A colormap is a matrix of value between 0 and 1 that define the colors for graphics such as surface, image, and patch objects.

CONCLUSION

In this study, high level feature extraction is focus on shape based. To get a good centroid, we need to determine the Region of Interest (ROI) of project. In high-level feature extraction, we used two type of classification method . If it shows errors equal to 1 or closer to 1, it is good. If 0, it might be false or less accurate. Lastly, a good filming technique may affect the result. As we all know the quality camera only affect graphic not for the object detection.

REFERENCES

[1] N. Zainudin, S. Ramli, T. T. Zizi, M. M. Hanafi, N. A. Wahab, and N. Ibrahim, "Horn Schunck Algorithm for Facial Expression Change Detection Classification," vol. 5, no. 3, pp. 574–581, 2015.

[2] N. Ibrahim, S. Mokri, L. Siong, and M. Mustafa, "Snatch Theft Detection using Low Level Features," *Doaj.Org*, vol. II, 2010.

[3] I. B. M. T. J. Watson, "Robust Abandoned Object Detection Using Region-Level Analysis Jiyan Pan , Quanfu Fan , Sharath Pankanti," *Ieee Int. Conf. Image Process.*, pp. 3658–3661, 2011.

[4] R. K. Tripathi, A. S. Jalal, and S. C. Agrawal, "Suspicious human activity recognition: a review," *Artif. Intell. Rev.*, 2017.

[5] A. Yilmaz, O. Javed, and M. Shah, "Object tracking," *ACM Comput. Surv.*, vol. 38, no. 4, p. 13–es, 2006.