DETECTION AND CLASSIFICATION FOR GROUP MOVING HUMANS

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DEDICATION

"To My Beloved Father, Mother, Brothers and Sisters"

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ABSTRACT

In the case of moving group of humans the recognition algorithms more often misclassify it as vehicles or large moving object. It is there fore the aim of this project to detect and classify moving object as either Group of humans or something else. The background subtraction technique has been employed in this work as it is able to provide complete feature of the moving object. However, it is extremely sensitive to dynamic changes like change of illumination. The detected foreground pixels usually contain noise, small movements like tree leaves. These isolated pixels are filtered by some of preprocessing operations; such as median filter and sequence of morphological operations dilation and erosion. Then the object will be extracted using border extraction technique. The classification makes use the shape of the object. The performance of the proposed technique has achieved 75% accuracy based on 18 test samples. This result shows that if it possible to distinctly classify a group of humans moving in the video sequence from other large moving objects such as vehicles.

ABSTRAK

Dalam kebanyakan kes pengecaman manusia yang bergerak secara berkumpulan, algoritma pengecaman selalunya salah mengklasifikasikan kumpulan manusia tersebut dan mengklasifikasikannya sebagai kenderaan atau sebagai satu objek besar yang bergerak. Oleh yang demikian, adalah objektif utama projek ini untuk mengesan dan mengklasifikasikan objek bergerak tersebut sebagai satu kumpulan manusia bergerak atau sebaliknya. Teknik penolakan latar belakang digunakan supaya ciri-ciri objek bergerak yang sempurna dapat diperolehi. Namun demikian, teknik ini adalah amat sensitif terhadap perubahan dinamik seperti perubahan pada pencahayaan. Piksel-piksel yang telah diasingkan, biasanya mengandungi banyak hingar dan pergerakan-pergerakan kecil, seperti pergerakan daun-daun pokok. Piksel-piksel ini akan diproses dengan beberapa penapis seperti penapis median dan dituruti pula dengan beberapa operasi morfologi iaitu operasi pengembangan dan penghakisan. Kemudian, sempadan objek akan diekstrak menggunakan teknik pengekstrakkan sempadan. Proses klasifikasi pula mengunakan maklumat bentuk objek tersebut. Berdasarkan eksperimen terhadap 18 sampel ujian, didapati teknik yang telah dicadangkan mempunyai ketepatan sehingga 75%. Daripada keputusan ini, didapati bahawa algoritma ini berpotensi untuk mengklasifikasikan kumpulan manusia bergerak secara tepat berbanding dengan objek bergerak yang lain seperti kenderaan.

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B(j,i)	-	Background image
C(j,i)	-	Current image
g(j,i)	-	The output after the threshold process
TH	-	The threshold value
C_m	-	Center point
Y_{Cm}	-	Center point for y coordinates
X_{Cm}	-	Center point for x coordinates
Dist	-	The Euclidian distance
$\overline{DS}$	-	The normalized distance signal

CHAPTER 1

INTRODUCTION

1.1 Introduction

Video surveillance systems have long been in used to monitor security sensitive areas. The history of video surveillance consists of three generations of systems (generation surveillance systems) which are called 1GSS, 2GSS and 3GSS [11].

The first generation surveillance systems (1GSS, 1960-1980) were based on analog sub systems for image acquisition, transmission and processing. They extended human eye in spatial sense by transmitting the outputs of several cameras monitoring a set of sites to the displays in a central control room. They had the major drawbacks like requiring high bandwidth, difficult archiving and retrieval of events due to large number of video tape requirements and difficult online event detection which only depended on human operators with limited attention span.

The next generation surveillance systems (2GSS, 1980-2000) were hybrids in the sense that they used both analog and digital sub systems to resolve some drawbacks of its predecessors. They made use of the early advances in digital video processing methods that provide assistance to the human operators by filtering out spurious events. Most of the work during 2GSS is focused on real time event detection.

Third generation surveillance systems (3GSS, 2000-) provide end-to-end digital systems. Image acquisition and processing at the sensor level, communication through mobile and fixed heterogeneous broadband networks and image storage at the central servers benefit from low cost digital infrastructure.

Unlike previous generations, in 3GSS some parts of the image processing are distributed towards the sensor level by the use of intelligent cameras that are able to digitize and compress acquired analog image signals and perform image analysis algorithms like motion and face detection with the help of their attached digital computing components.

Moving object detection is the basic step for further analysis of video. It handles segmentation of moving objects from stationary background objects. This not only creates a focus of attention for higher level processing but also decreases computation time considerably. Commonly used techniques for object detection are background subtraction, statistical models, temporal differencing and optical flow. Due to the dynamic environmental conditions such as illumination changes, shadows and waving tree branches in the wind object segmentation is a difficult and significant problem that needs to be handled well for a robust visual surveillance system.

Object classification step categorizes detected objects into predefined classes such as human, vehicle, animal, clutter, etc. It is necessary to distinguish objects from each other in order to track and analyze their actions reliably. Currently, there are two major approaches towards moving object classification, which are shape-based and motion-based methods [15].

1.1 Overview

This project is to design group of humans recognition system that can be integrated into an ordinary visual surveillance system with moving object detection classification .The present system which operates on gray scale video imagery from

a video camera, the system is handled by the use of an adaptive background subtraction scheme[3] which works reliably in an out-door environments. After segmenting moving pixels from the static background, connected regions are classified into predetermined object categories: group of humans or vehicle or some thing else.

1.2 Overview system stages

The proposed system is capable of detecting moving objects .The system extracts features of these moving objects and then classifies them into two categories "Group of Humans or something else". The methods used can be summarized as follows:

1. Detection step:
    - Background model.
    - Foreground detection.
2. Object Preprocessing.
3. Feature Extraction.
4. Classification.

1.3 Objective of this study

The main objective of this project is to design a system that can detect and differentiate the group of humans moving from the moving objects. The object will be processed before classification using some image processing techniques to accommodate environmental change during the acquiring process. This work can be an important part for intelligent security surveillance purposes.

1.4 Scope of this study

To accomplish this objective, the scope of this study would be divided into several stages as follow:

1. The scene does not include night vision.
2. Method developed is meant only for outdoor environment.
3. This method makes use of the objects silhouette contour, length and area to classify the detected objects.
4. The camera is facing the front of the object.
5. The system classifies a group of 3 humans and above
6. The systems programmed using MATLAB.
7. The processing will be done is off line.

1.5 Projects Outline

The project is organized into five chapters. The outline is as following;

Chapter 1- Introduction

This chapter discuses the objective and scope of the project and gives general introduction on the history of video surveillance and classification of the moving objects that will be detected.

Chapter 2- Review of Literature Review

This chapter review previous approach for detection of multiple moving objects from binocular video sequences is reported. First an efficient motion estimation method is applied to sequences acquired from each camera.

Chapter 3- Project Methodology

This chapter presents the overall system methodology and discusses in details each step that has to be taken into consideration for classification purposes.

Chapter 4- Experimental Results

This chapter shows the results for each process done on the image for this system, and final results of the system.

Chapter 5- Conclusion

This chapter consists of conclusions and recommendation for future improvement.