FRUIT RECOGNITION SYSTEM

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Love of my life,

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ABSTRACT

Several fruit recognition techniques are developed based upon colour and shape attributes. However, different fruit images may have similar or identical colour and shape values. Hence using colour and shape features are not effective enough to distinguish and identify fruit images. A new fruit recognition system has been proposed which combines three features analysis methods; colour-based, shape-based, size-based in order to increase the accuracy of recognition. The proposed method will be based on obtained features values in order to classify and recognizes fruit images. To train and test the system, Neural Network Algorithm will be used. All the training and testing session will be done in MATLAB. This system also serve as useful tool in a variety fields such as educational, image retrieval and plantation science.

ABSTRAK

Sesetengah sistem kenalpasti buah-buahan dibangunkan berdasarkan ciri-ciri warna dan bentuk. Walau bagaimanapun, buah yang berlainan mungkin mempunyai persamaan dari segi bentuk mahupun warna. Maka, dengan hanya menggunakan ciri warna dan bentuk sahaja tidak cukup efektif dalam membezakan dan mengenalpasti gambar buah-buahan. Sebuah sistem kenalpasti buah-buahan yang baru telah diusulkan dimana sistem ini menggabungkan tiga cara analisis iaitu berdasarkan warna, saiz dan bentuk untuk meningkatkan lagi ketepatan sistem ini. Cara yang diusulkan akan berdasarkan nilai yang diperolehi unutuk mengenalpasti gambar buah. Sistem ini akan dilatih dan diuji dengan menggunakan Neural Network Algorithm. Semua sesi latihan dan ujian akan dijalankan menggunakan MATLAB. Sistem in turut boleh digunakan dalam pelbagai bidang seperti pendidikan, perolehan gambar dan sains perladangan.

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CHAPTER 1

INTRODUCTION

Nowadays, recognition system has become one of the most important fields in computer science concerned with recognizing patterns, particularly visual and sound patterns. It is central to optical character recognition, voice recognition, and handwriting recognition. It uses methods from statistics, machine learning and other areas. The typical applications of the previous recognition system are as text classification in order to recognize different type of texts such as spam and non spam emails [1]. Speech recantation is used on specified purposes such as translating different languages to English [2]. The other application from the previous system are hand written recognition for postal codes and the automatic face recognition which deals with digital images as input to the pattern recognition systems.[3]

Recognition and classification are essentially complementary functions that are lie at “high end” (required most complicated algorithm) in the field of image analysis (Duda and Hart, 1973). Classification is concerned with establishing criteria that can be used to identify or distinguish different populations of objects that may appear in images. These criteria can vary widely in form and sophistication, ranging from example images of representatives of each class to numeric parameters for measurement, to syntactical descriptions of key features. Recognition is the process by which these tools are subsequently used to find a particular feature within an image. It functions at very different level, including such different processes as finding a face in an image, or matching that face to a specific individual. [9]

Various recognition and classification techniques involve an extremely broad range of complexities. At low end, operations such as scanning UPC bar codes on supermarket packaging or automatic sorting and routing mail to the proper zip code, are based on careful design of the target to facilitate the reading function. [9]

Generally computers tend to be better than human at classification because they are not distracted by random variations in noncritical parameters and can extract useful statistical behavior to isolate groups. Sometimes these groups are meaningful. On the other hand, people are generally much better at recognition than are computers, because they can detect the few critical factors that provide identification of familiar object. But humans do not fare as well with unfamiliar objects or even with unfamiliar views of common ones. [9]

In the past couple of years, a few types of image analysis technique were applied to analyze the agricultural images in order to recognize and classify fruits and vegetables. The fruits recognition system could be applied as an image contents descriptor which is able to describe the low level visual features or contents of the fruit images

for the CBIR system. Colour-based and shape based analysis method were the most popular analysis techniques that have been used for both recognition and classifications of two dimensional (2D) fruit images. However, different fruit images may have similar or identical color and shape values. Thus, by using both methods are still not robust and effective enough to identify and differentiate the fruit images. Consequently, a recognition approach on 2D fruit images is proposed. This system combines colour-based, shape-based and size-based methods in order to increase the accuracy of the recognition process.

1.1 Project Summary

This project will develop a system that will recognize the 2D fruit image by extracting the features values based on colour, shape and size. Later, the extracted features will be computed to measure the distance and compare with the standard features values of every fruit example. The software solution is able to serve as a useful tool in a variety of fields, such as education, image retrieval, and plant science research. It can be applied for educational purpose to enhanced learning. It also can be used as a fruit recognition system in grocery store to automate labeling and computing the price.

1.2 Objectives of project.

The objective of this project is:

- To extract image data for fruit classification.
- To develop Fruit Recognition System that can analyze, classify and identify fruits based on shape colour and size.

- To train and test the system using Neural Network Algorithm to classify fruits in MATLAB.

1.3 Problem Statement.

The previous method need us to recognize and classified the fruit manually, but using this system, fruits can be recognize and classified automatically. On the other hand, this system only need a person to handle it. Hence, it will reduce the cost and man power.

1.4 Scope of work.

The system can only analyzes, classifies and identifies fruits based on pixels (picture) not on the real fruit itself. It also can only can be operated offline. The neural network will be trained to recognize different types of fruits.

1.5 Outline of the report

This report will be divided into five chapters. Chapter One, is an introduction on the fruit recognition itself. This chapter also will discuss about the objective of the project, problem statement and scope of the project. Chapter Two will cover the definition of fruit recognition. It includes the research findings on image analysis, classification and pattern recognition. It also will review on MATLAB and Neural Network. Chapter Three explains all the methodology used for this project. Chapter Four

will discuss on the simulation results comprehensively. Last but not least, Chapter Five will be discussing on the conclusion of the project.

CHAPTER 2

LITERATURE REVIEW

2.1 Images and pictures

Human beings are predominantly visual creatures: we rely heavily on our vision to make sense of the world around us. We not only look at things to identify and classify them, but we can scan for differences, and obtain an overall rough "feeling" for a scene with a quick glance. Humans have evolved very precise visual skills: we can identify a face in an instant; we can differentiate colours; we can process a large amount of visual information very quickly.

However, the world is in constant motion: stare at something for long enough and it will change in some way. Even a large solid structure, like a building or a mountain, will change its appearance depending on the time of day (day or night); amount of sunlight (clear or cloudy), or various shadows falling upon it.

2.1.1 Image Processing

Image processing is the extraction of meaningful information from images; mainly from digital images by means of digital image processing techniques. Image analysis tasks can be as simple as reading bar coded tags or as sophisticated as identifying a person from their face.

Computers are indispensable for the analysis of large amounts of data, for tasks that require complex computation, or for the extraction of quantitative information. On the other hand, the human visual cortex is an excellent image analysis apparatus, especially for extracting higher-level information, and for many applications including medicine, security, and remote sensing. Human analysts still cannot be replaced by computers. For this reason, many important image analysis tools such as edge detectors and neural networks are inspired by human visual perception models.

Figure 2.1: Removing noise from an image

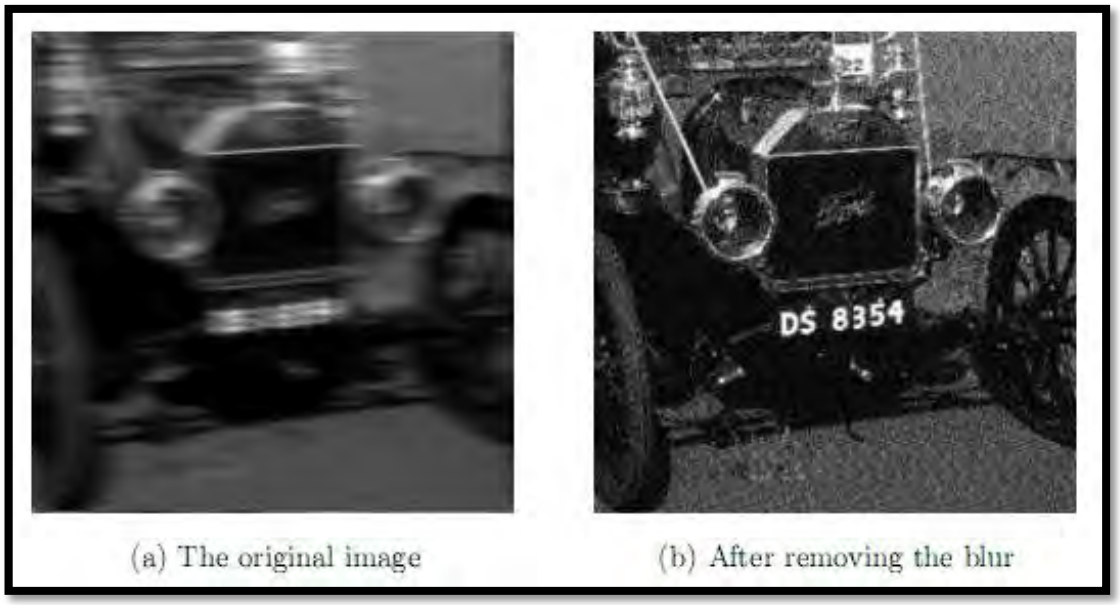

Figure 2.2: Image deblurring

In electrical engineering and computer science, image processing is any form of signal processing for which the input is an image, such as photographs or frames of video; the output of image processing can be either an image or a set of characteristics or parameters related to the image. Most image-processing techniques involve treating the