

HAND GESTURE RECOGNITION SYSTEM FOR AUTOMATIC PRESENTATION
SLIDE CONTROL

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PRESENTATION SLIDE CONTROL

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ABSTRACT

Human gesture contains much information and can be useful in human-computer interaction (HCI). In this project, we introduce a gesture recognition system that makes use of hand gesture to control Microsoft Office PowerPoint slide show. The gesture recognition system is able to recognize continuous hand gesture before stationary background, and consists of real time image sampling, hand extraction and hand gesture recognition. Input to the system is a sequence of images containing hand gesture taken real time camera. Output from the system is used to control Microsoft Office Power Point slide show, with the ability to perform four actions of next, previous, start and stop slide show. On average, the system has gesture recognition of 80%.

ABSTRAK

Isyarat tangan manusia mengandungi banyak maklumat dan ia adalah berguna untuk interaksi manusia-komputer. Dalam projek ini, satu sistem pengiktirafan tangan isyarat yang mampu mengawal persembahan slaid Microsoft Office PowerPoint telah dibangunkan. Sistem pengiktirafan tangan isyarat ini akan dapat mengiktiraf isyarat tangan di latar belakang yang static dan mengandungi fungsi pensampelan imej masa sebenar, pengambilan imej tangan dan pengiktirafan isyarat tangan. Input kepada sistem itu akan menjadi suatu urutan imej-imej yang mengandungi isyarat tangan yang mengambil masa sebenar daripada kamera. Output daripada sistem akan digunakan untuk mengawal persembahan slaid Microsoft Office Power Point, dengan kemampuan untuk melaksanakan empat tindakan iaitu slaid seterusnya, slaid sebelumnya, permulaan slaid dan penghentian slaid. Pada purata, sistem ini mempunyai kadar pengiktirafan sehingga 80%.

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CHAPTER 1

INTRODUCTION

1.1 Introduction to Digital Image Processing

“A picture paints thousands words” this is how valuable an image as described by wise man. Vision is the most advanced of human senses, and hence images play the single most important role in human perception. And with the birth of digital computer, it opened up a new chapter for digital image processing which then encompassed a wide and varied field of applications. These include ultra-sound, electron microscopy and computer-generated images.

A digital image may be defined as a two-dimensional functions, $f(x,y)$ where x and y are spatial coordinates, and the amplitude of f at any pair of coordinates (x,y) is called the intensity or gray level of the image at that point. When x,y , and the intensity values of f are finite, discrete quantities, we call the image a digital image. Digital image is composed of a finite number of elements, each of which has a particular location and value. These elements are called picture elements, image elements or pixels. Pixel is the term most widely used to denote the elements of a digital image [1].

As described by Rafael C. Gonzalez and Richard E. Woods [1], there are no clear-cut boundaries in the continuum from image processing at one end to computer vision at the other. However, one useful paradigm is to consider three types of computerized processes in this continuum: low-level, mid-level, and high-level

processes. Low-level processes involve primitive operations such as image preprocessing to reduce noise, contrast enhancement, and image sharpening. A low-level process is characterized by the fact that both its inputs and outputs are images. Mid-level processing on images includes segmentation (partitioning an image into regions or objects), description of those objects to reduce them to a form suitable for computer processing, and classification (recognition) of individual objects. Mid-level process is characterized by the fact that its inputs are images, but its outputs are attributes extracted from those images. Finally, higher-level processing involves “making senses” of an ensemble of recognized objects, as in image analysis, and performing the cognitive functions normally associated with vision [1].

1.2 Problem Statement

During a presentation associated with slide show, it is always cumbersome for the presenter to speak and control navigation input such as mouse/keyboard at the same time. Usually the presenter would get another person to control the mouse/keyboard while he/she speak to the audience. Therefore it is nice to have if one can use hand gestures to control presentation slide, without depending on other person. A presenter can speak and at the same time, wave his/her hand in front of a webcam to control the movement of his/her presentation slide.

1.3 Objectives

This project is aimed to resolve the problem statement described above. A hand gesture recognition system will be developed to recognize continuous hand gesture before stationary background. The recognition system would consist of real time hand tracking, hand extraction and hand gesture recognition. Input to the system will be a sequence of images taken real time USB web cam. The output from the system would feed into a program that is used to control Microsoft Power Point slide show.

1.4 Scope of Study

A sequence of sample images will be captured from streaming video from a webcam. Hand gesture recognition system will process the images and determine any present of hand gesture. The output from the system will be fed into MS presentation slide show in real time. Hence, a proper hand gesture detected by the system would control the slide movement.

The system will have the ability to perform four actions of next, previous, start and stop slide show. On average, the system has gesture recognition of 80%.

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