



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DEVELOPMENT OF SMART COMMUNICATION TOOL FOR ASSISTING STROKE PATIENT

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor's Degree in Electrical Engineering Technology (Industrial Automation & Robotics) (Hons.)

by

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DECLARATION

I hereby, declared this report entitled “Development of Smart Communication Tool forAssisting Stroke Patient” is results of my ownresearch except as cited in references.

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Date : 1 JUNE 2016

APPROVAL

This report is submitted to the faculty of Engineering Technology of UTeM as a partial fulfilment of the requirements for the degree of Bachelor of Electrical Engineering Technology (Industrial Automation & Robotics) with Honours. The member of the supervisory is as follow:

.....

(Saleha Binti Mohamad Saleh)

ABSTRACT

Nowadays patient who affects by stroke is increasing in whole over the world. The median age of the patient who suffer in stroke is 62 years old. Stroke patient having a difficulty in remembering or tell to others what they need. These are the painful side effect of the stroke patient. The family member and others also facing some difficulty in communicating with a stroke patient. Other than that, they cause difficulty to interpret what the stroke patient needs and to fulfil the stroke patient basic need. In this project, the development of smart communication tool for stroke patient focused and reduced the burden for the stroke patient. The laptop webcam captured the image which shows by the patient. The image was sent to matlab. The Matlab will read the image. The Matlab analysed the image by using colour and edge detection. Then the analysed image were translate to the related word based on the method. The Graphic User Interface displayed the word.

ABSTRAK

Pada masa kini, pesakit strok semakin meningkat di seluruh dunia. Umur average pesakit yang mengalami strok adalah berusia dalam lingkungan 62 tahun. Pesakit strok menghadapi kesukaran untuk mengingati atau memberitahu kepada orang lain tentang apa yang mereka perlukan atau kehendaki. Ini adalah kesan sampingan yang menyukarkan pesakit strok. Ahli keluarga dan lain-lain juga menghadapi kesukaran untuk berkomunikasi dengan pesakit strok. Selain daripada itu, ia menyebabkan kesukaran untuk mentafsir keperluan pesakit dan memenuhi keperluan asas pesakit. Dalam projek ini, ianya dapat mengurangkan beban pesakit strok dengan memberi tumpuan untuk membangunkan alat komunikasi pintar untuk pesakit strok. Kamera laptop mengawal imej yang dipaparkan atau ditunjukkan oleh pesakit. Imej yang telah ditangkap dan dihantar ke Matlab. Matlab penisian menganalisis imej dengan kaedah pengesanan warna dan pengesanan pinggir. Imej yang dianalisis akan ditukarkan menjadi perkataan. GUI Matlab digunakan di dalam projek ini bagi memaparkan perkataan yang bersesuaian mengikut imej yang telah diproses.

DEDICATION

To my beloved parents (Mr Nadarajan S/O Veerappan and Mrs Vijaya D/O Raman)
and family (Jivitha D/o Nadarajan and Dines Raj S/O Nadarajan).

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CHAPTER 1

INTRODUCTION

1.0 Introduction

Nowadays, the stroke patients are increasing in whole over the world. Stroke remains a major health burden worldwide. Stroke is occurring when blood flow to the brain is disrupted. Stroke is known as a brain attack. The incidence and prevalence rates of the stroke are falling in developed states, an opposite trend is taking place in the Asia-Pacific, where an increasing figure of patients are being diagnosed with an acute stroke. The brain stop getting the oxygen and nutrients when the stroke occurs. So the brain cells start to die. There are two different kinds of stroke. There are ischemic stroke and hemorrhagic stroke. If the blood clot that blocks or plugs a blood vessel artery in the brain means it will be an ischemic stroke. The hemorrhagic stroke caused by a blood vessel in the brain that breaks and bleeds into the brain[1].

There are three types of communication problems that are facing by stroke patients. There are aphasia, dysarthria, and apraxia of speech. The aphasia means having problems in speak and understand and effect in read and write ability. The dysarthria means having a difficulty in speak clearly because of unable to control the muscles in the face, mouth, and throat. The apraxia of speech means cannot move the muscles. Because of that, it makes difficult for others to understand the patient[2].

Image processing is a process to get an image by using mathematical operations. To get the mathematical operations, need to use signal processing and the input is an image, a series of image or video. The end product of the image processing will be an image or set of characteristics. Most image processing techniques involve treating the image as two-dimensional signals and using standard signal processing techniques to it. Image processing usually refers to digital image processing[3].

Colour detection and edge detection in image processing are popular methods using in this technology world. They use these methods in agricultural, traffic signal, medical science and so on. Colour detect is the ability of an organism or machine to draw objects. It will be happen based on the wavelength of the light they reflect. Colours can be measured and quantified in various ways [4].

Edge detection is used for image segmentation it uses for detect discontinuities in brightness and finds the boundaries of objects. There is a lot of methods use in edge detection. For example, methods are Sobel, Canny, Prewitt, Roberts and fuzzy logic [5].

1.1 Problem Statement

Nowadays patient who affects by stroke is increasing in our country. The major risk for stroke is high blood. The figure 1.1 below shows the chances of surviving a critical illness for heart attack, cancer, and stroke. On 1950 year, there are 24% survival rates for stroke and on 2002 year, the survival rates for stroke were increased to 77%.

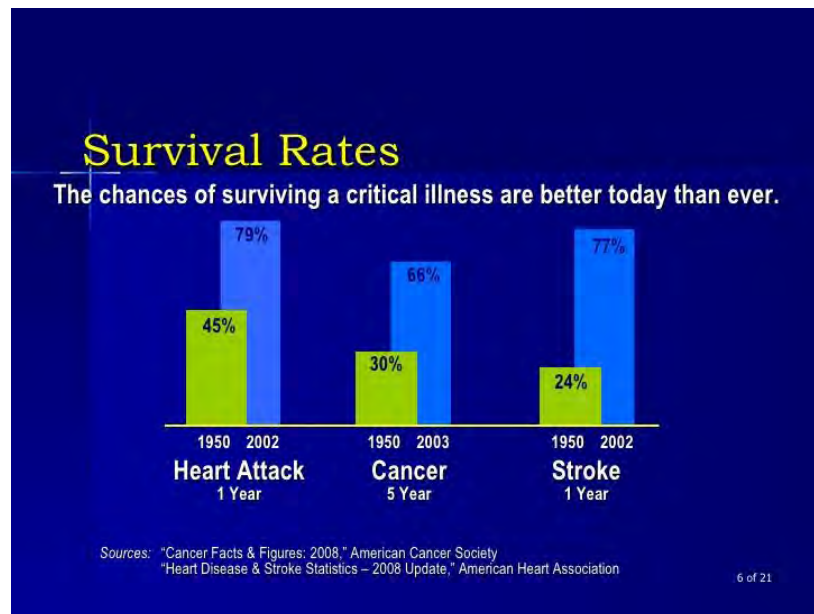


Figure 1.1: The critical illness for the heart attack, cancer, and stroke (American cancer society)

Stroke patient having difficulty in remembering and hard to communicate with their family members and others. So this project will develop a smart communication tool for help the stroke patients.

1.2 Objectives

There are some objectives that need to achieve in this project:

- i) To develop a communication system using image processing technique for the stroke patient.
- ii) To design Graphic User Interface (GUI) to display the analysed method
- iii) To compare and analyse the efficiency of the selected methods for the whole system

1.3 Scope of Project

A project involves several parts including:

- i) Image analyse using Matlab software version R2014b for colour and edge detection
- ii) Laptop webcam to capture the image
- iii) GUI used to display the suitable word

1.4 Organization of the Thesis

This research has 5 chapters which consist of introduction in chapter 1, literature review in chapter 2, methodology in chapter 3, result and discussion in chapter 4 and conclusion and recommendation in chapter 5.

Chapter 1: Introduction

In chapter 1 explains the introduction of the project, which includes the background, problem statement, objectives and the work scope of the study.

Chapter 2: Literature Review

In this chapter 2, the chapter briefly explains the review of theories, experimental works and some findings that had been done during the past research that is related to the current project. It also is known as a summary that needs to study the research or journal and summarised it. Also discussed the equipment involved.

Chapter 3: Methodology

In chapter 3, methodology and strategy to achieve the objectives is explained in detail. This chapter includes the control theory and also design procedures of the imaging process and colour detect. It is including the process steps and the flowchart for the whole project and flowchart for software.

Chapter 4: Result, Analysis, and Discussion

Chapter 4 presents the result and the findings of the study, the result from the experiments that are presented in tables, figures, drawings and graphs are discussed elaborately in the chapter. Several observations are projected from findings.

Chapter 5: Conclusion and Recommendation

In this chapter 5, the project has summarised the outcomes of this experiment. The objectives of this project are needed to achieve. The chapter also outlines several recommendations for further development and improvement of the design. Suggestions for future inventor are also provided within the

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

This chapter mainly focuses on the information and theory, previous research and comparison between methods used by the researcher. This chapter is related to stroke, image matching, colour and edge detection in image processing. There are a lot of researches related to colour detection and edge detection analysis by using Matlab. The factors and the characteristics that should consider while developing this project also been covered.

2.1 Theory

(i) Stroke

Stroke is occurring when blood flow to the brain is interrupted. Stroke is called as a brain attack. When the stroke occurs, the brain stops getting oxygen and nutrients so the brain cells begin to die. There are two kinds of stroke. There are ischemic stroke and hemorrhagic stroke. Ischemic stroke caused by the blood clot that blocks or plugs a blood vessel or artery in the brain. The hemorrhagic stroke caused by a blood vessel in the brain that breaks and bleeds into the brain. The hemorrhagic stroke

occurs with a severe headache. The main factors for the stroke are high blood pressure, obesity, high blood cholesterol, diabetes, tobacco smoking and others[1]. The figure below shows the example of hemorrhagic and ischemic stroke.

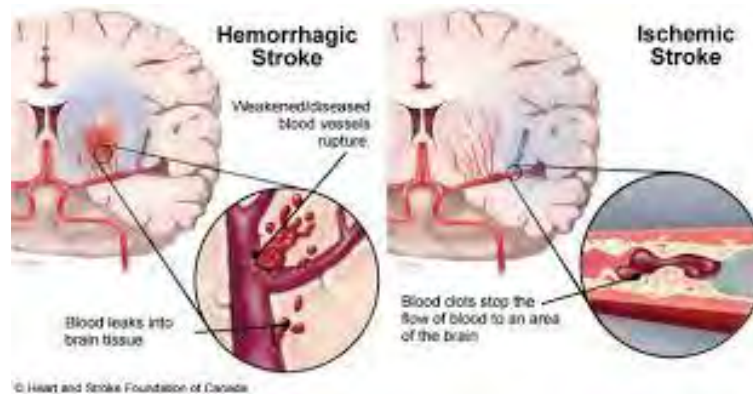


Figure 2.1: hemorrhagic and ischemic stroke (By Leslie Ritter)

There are few symptoms for getting a stroke that we can take note. Signs and symptoms often appear after the stroke has occurred. The first symptom is sudden confusion, trouble speaking or understanding speech. The second symptom is sudden numbness or weakness of the face, arm or leg. The third symptom is the sudden severe headache with no known cause. Sudden trouble walking, dizziness, loss of balance and trouble seeing in one or both eyes are also known as symptoms of stroke. Other than that, the symptoms of stroke are difficulty with swallowing and loss of coordination or consciousness. The mood changes (sudden depression), sudden pain in the face or neck and vomiting or altered consciousness are known as stroke symptoms. [6]

(ii) Image Processing

Image processing converts the image into digital form by performing some operations to get an enhanced image. There are three steps in the image processing. First is read the image from webcam or personal computer (PC). Then analyse the image which includes data compression and image enhancement. The final step gives an output image based on image analysis. The purpose of image processing is visualised, image recognition, measure the pattern of an image, image retrieval and

image sharpening and restoration[7]. Figure 2.2 shows the example of data image processing cycle.

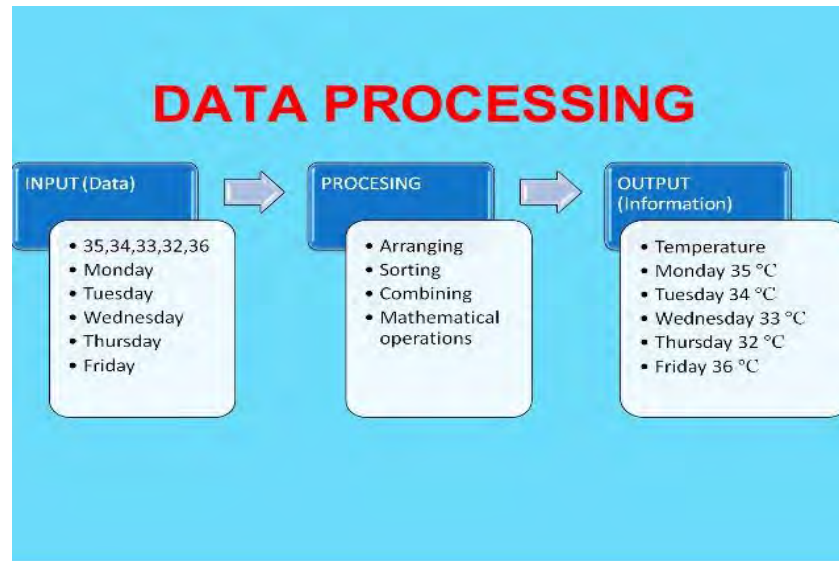
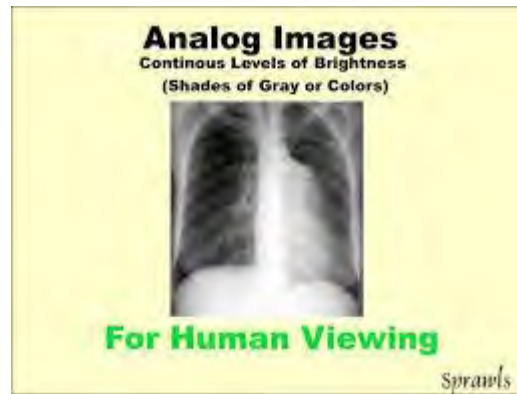


Figure 2.2: Example of Data Image Processing Cycle (Abbasi, 2013)

(a) Methods of image processing

There are two types of methods in image processing. The methods are analogue image processing and digital image processing. Analogue image processing used for hard copies such as printouts and photographs. Analogue refers to a signal where the output proportional to the input. The image analysts is a combination of personal knowledge and collateral data to image processing. Image analysts use various fundamental of interpretation while using these visual techniques. Digital image processing used to manipulate the digital images using computers. Digital image can be saved in any computer storage media. In the digital technique, there got three general phases that all the types need to undergo. There are pre- processing, enhancement and display. The digital image can decide whether want to keep or erase it. The figure below shows an example of analogue and digital image processing.



DIGITAL IMAGE PROCESSING



Figure 2.3: Example of Analogue and Digital Image Processing Method
(manpreetgrewal, 2011) (Graus, 2004)

(b) Colour Detection

The colour detection is a part of image processing that gives a different in objects based on its colour. There is no predefined function for colour detection in Matlab. If an image in Red-Blue-Green format, the format has each pixel in it possessing a set of values for each 3 channels. Based looking at the pixels of RGB values in a range, we can detect the particular colour that we want. There is having few type of coding that we can use to detect the colour in this software. [3]

(c) RGB Method

Red, blue and green are the main colour in the Matlab. For the other colour like orange, it needs to mix the red, green or blue to become the required colour. Each colour has its own pixel. The coding needs to do according to the pixel in the Matlab. Sometimes the image needs the radius to certain coding. There are having different coding for different image and the shape of the image. Figure 2.4 shows the example of colour detection by using RGB method.

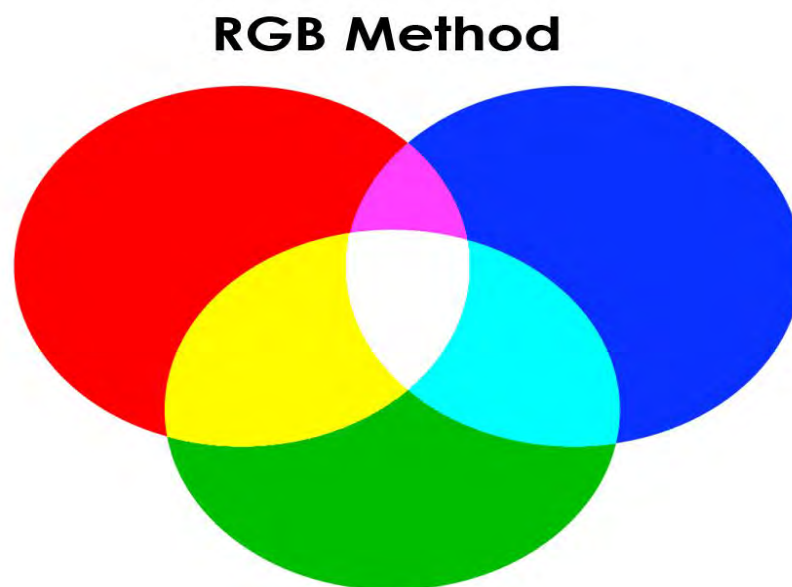


Figure 2.4: RGB method (Graus, 2004)

(d) Edge Detection

Edge detection is one of the method using in image processing. Edges are local changes of intensity in an image. The edges occur on the boundary between two regions in an image. There are four steps for the edge detection. The first is smoothing which reduce the noise of the image. Most of the researcher will use Gaussian low pass filter to smooth the image. The second step is enhancement which