

ONLINE PRODUCT IDENTIFICATION SYSTEM USING ARTIFICIAL  
NEURAL NETWORKS

FARAHYAH MURNI BINTI HARUN

This report is submitted in partial fulfillment of the requirements for the award of  
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**UNIVERSITI TEKNIKAL MALAYSIA MELAKA**  
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Saya **FARAHYAH MURNI BINTI HARUN**

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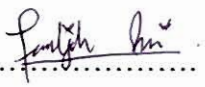
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**KHAIRUL AZHA BIN A. AZIZ**  
 Jurutera Pengajar  
 Fakulti Kejuruteraan Elektronik Dan Kejuruteraan Komputer  
 Universiti Teknikal Malaysia Melaka (UTeM)  
 Hang Tuah Jaya,  
 76100 Durian Tunggal, Melaka


Tarikh: 30 APRIL 2011

Tarikh: 03 MAY 2011

“I hereby declare that this report is the result of my own work except for quotes as cited in the references”

Signature :  :  
Author : FARAHYAH MURNI BINTI HARUN  
Date : 30 APRIL 2011

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Signature :  .....

Supervisor's Name : EN. KHAIRUL AZHA BIN A.AZIZ

Date : 03 MAY 2011

Special dedication to my loving family, friends and kind hearted supervisor Mr.  
Khairul Azha bin A.Aziz.

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## ABSTRACT

This project was discussed about online product identification system using artificial neural networks which targeting to be operated using webcam as a means of capturing images of object and neural networks system is used to analyze and classifications object. This application will involves computer and software that based on neural system and take action in monitoring and run isolation process by consider that object staying in real time situation. The big part of the project will be the programming by using MATLAB. This system uses radial basis function neural network to identify, recognize and classify the image. The webcam acquired of an object or model and MATLAB converts that image into respective grayscale and analyzes the image using radial basis function neural network. The final outcome of this system recognition reached values up to 100% for the product classifies and also the overall computing time is comfortably short.

## ABSTRAK

Projek ini membincangkan tentang Sistem Pengenalpastian Produk Dalam Talian Menggunakan Jaringan Saraf Buatan yang menyasarkan untuk beroperasi menggunakan kamera web sebagai alat menangkap gambar objek dan sistem jaringan saraf buatan digunakan untuk menganalisa dan pengkelasan objek. Aplikasi ini akan melibatkan komputer dan perisian yang berdasarkan sistem saraf dan bertindak memantau dan mengendalikan proses pengasingan dengan menganggap objek tersebut berada dalam situasi semasa. Bahagian terbesar dari projek ini adalah bahagian pengaturcaraan dengan menggunakan MATLAB. Sistem ini menggunakan rangkaian Fungsi Asas Jejarian Saraf untuk mengenalpasti, mengenali dan mengklasifikasi gambar. Kamera web yang digunakan akan mengambil gambar objek yang kemudiannya ditukarkan kepada gambar hitam putih dan kemudiannya melakukan pemprosesan gambar dengan menggunakan asas rangkaian fungsi radial saraf. Keputusan akhir dari sistem ini ialah kebolehan pengecaman objek mengikut klasifikasi mencapai 100% dan penggunaan masa untuk keseluruhan proses adalah singkat.



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## CHAPTER 1

### INTRODUCTION

#### 1.1 Project Background

Online product identification system using artificial neural networks is a project to develop an application system that can identify products in real time situation. Webcam will be connected to computer for image acquisition while process such as image processing and product identification will be done using MATLAB. Radial basis function neural network will be used for identification process. This project is targeting to be operated using webcam as a tool to acquired image and neural networks system to analyze and classified the objects.

This application will involves computer and software that based on neural system and take action in monitoring and run isolation process by consider that object staying in real time situation. This system uses radial basis function neural network to identify, recognize and classify the image. The webcam acquired of an object or model and MATLAB converts that image into respective grayscale and analyzes the image using radial basis function neural networks. The final outcome of this system recognition

reached values up to 100% for the product classifies and also the overall computing time is comfortably short.

The webcam will be used to acquire image of an object in real time situation. It will capture the models and send the data into based system. Image pre-processing will run in system (MATLAB) which the image will be converting to grayscale image from a color image before filtering process (thresholding and edge detection) has been done. Then the neural network was applied in recognition process by define the models based on classification. Due to this process, the output image from image pre-processing will be input image to neural network and this input will be compare with the train data that already done. The result will be analyzed and the product will be separated based on image detection.

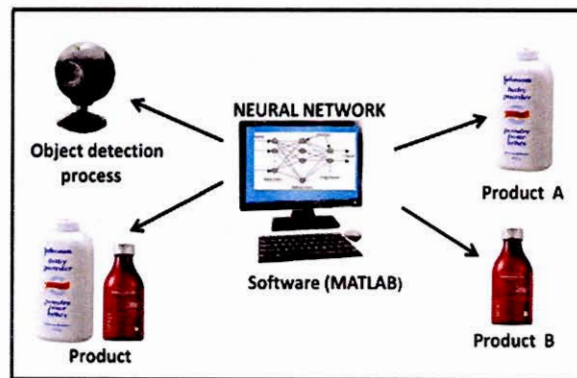


Figure 1.1: Overview of project

MATLAB is use as the platform of choice for implementation of this project because it is familiar software in most institution. MATLAB is a high-level language and interactive environment that enables to perform computationally intensive tasks faster than with traditional programming languages such as C, CH, and FORTRAN. MATLAB has excellent facilities for numerical computation and visualization, and there are many useful toolboxes (e.g. for image processing, statistics, optimization, neural networks).

## 1.2 Objectives of Project

The objective of this project is to develop application system that can identify products in real time situation. In real time and using a neural network, it can identify classification criteria such as shape, size, and separate the object based on classification. Webcam will be connected to computer for image acquisition while process such image processing and product identification will be done using MATLAB. Radial basis function neural network will be used for identification process. Besides that, this project also aimed to meet the following objectives:

- a) Design a system which can detect two objects and separate the object based on classification.
- b) Apply MATLAB programming for shape classification.
- c) Recognize the input object based on classification.
- d) Generate data analysis, exploration and visualization on shape recognition and classification.
- e) Develop a sorting based system using MATLAB software.
- f) Study and do a research in the field of image processing for sorting system.

## 1.3 Problem Statements

The ability to classify object based on color or visual appearance creates a quality control limitation in many manufacturing sectors, including the sorting of object such bottle, plastic and boxes. When sorting is performed manually, it is subjective and prone to error. Here come up with automate the task, Online Product Identification System Using Artificial Neural Networks, a develop technology that company says can reproduce human behavior in object classification tasks and produce proper time consuming for sorting process. In real time and using a neural network, it can identify classification criteria such as shape, size, and separate the object based on classification.

#### **1.4 Scope of project**

All projects have their own scope and limitation as a guideline throughout the completion of the project. This project covers design software which is MATLAB program to interface hardware computer in develop a system that can identify, sort and separate product. Then, construct the program to make sure that the program has error or not. This project aimed to apply MATLAB programming for shape and gray scale classification. It's also use radial basis function neural network as identification process. Other aspects such as the marketing of the system will not be covered in this project.

## 1.5 Methodology

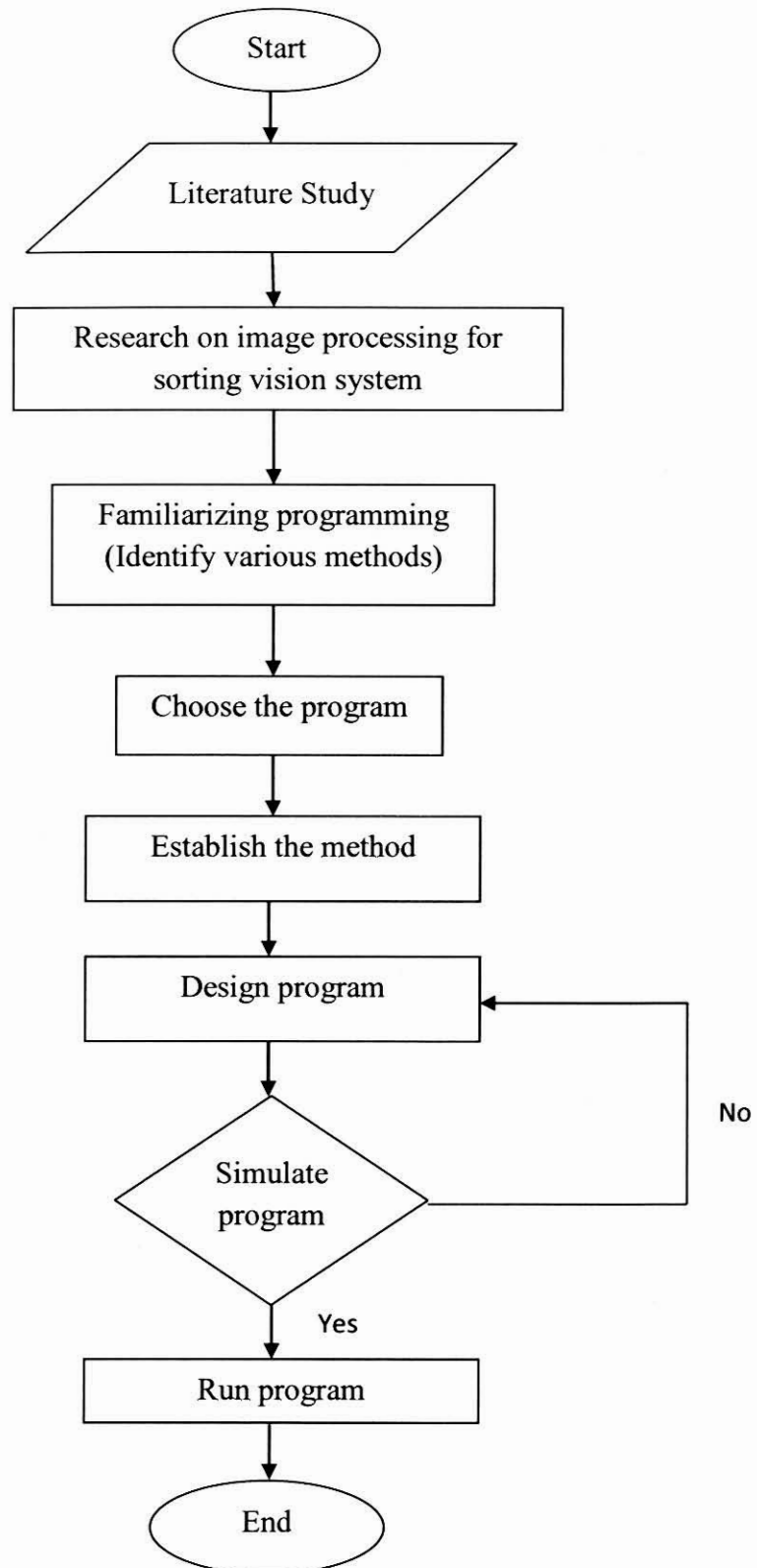


Figure 1.2: Flowchart of the project

## 1.6 Report Structure

This report contains of 5 chapters that explain detail about this project. The first chapter is about introduction of project where contain project background, objectives, problem statements, scope of project, and methodology. Methodology will show the flowchart of the project.

The second chapter is literature review about image processing, MATLAB software, neural network, and sorting method. This chapter discusses general subject or article that related to the project.

Third chapter is project methodologies which give details about method used to solve the problem to complete the project. These parts discuss of system overview, method of image processing, software development, and project planning.

The fourth chapter is about result and discussion of the project where finding and analysis throughout the research and project development from this project has being explained and last but not least is chapter five consist conclusion and recommendation. The overall conclusion of this project is showed.

## CHAPTER 2

### LITERATURE REVIEW

#### 2.1 Introduction

A literature review is a body of text that aims to review the critical points of current knowledge including substantive findings as well as theoretical and methodological contributions to a particular topic. This chapter will explain and discuss the sources and articles that are related to the project. It consist of the information about the machine vision and computer vision, the theory of the MATLAB software, image processing, neural network and parameters that is used in the project. From literature review there will be an analysis concerning the advantages and disadvantages for neural network and sorting system method in this project.