

**NEURAL NETWORK BASED CLASSIFICATION OF  
MAMMOGRAPHIC MICROCALCIFICATION FOR  
BREAST CANCER DIAGNOSIS**



**INSTITUTE OF RESEARCH, DEVELOPMENT AND  
COMMERCIALISATION (IRDC)  
UNIVERSITI TEKNOLOGI MARA  
40450 SHAH ALAM, SELANGOR,  
MALAYSIA**

**BY**

**NINA KORLINA MADZHI**

**MAHANIJAH MD KAMAL**

**ROSNI ABU KASSIM**

**MARCH 2006**

Tarikh : 30 Mac 2006  
No. fail projek : 600-BRC/ST.5/3/926

Penolong naib Canselor (Penyelidikan)  
Institut Penyelidikan, Pembangunan dan Pengkomersilan (IRDC)  
UiTM, Shah Alam.

YBhg. Prof.,

**LAPORAN AKHIR PENYELIDIKAN “NEURAL NETWORK BASED CLASSIFICATION OF MAMMOGRAPHIC MICROCALCIFICATION FOR BREAST CANCER DIAGNOSIS”.**

Merujuk kepada perkara di atas, bersama-sama ini disertakan 3 (tiga) naskah Laporan Akhir Penyelidikan bertajuk “NEURAL NETWORK BASED CLASSIFICATION OF MAMMOGRAPHIC MICROCALCIFICATION FOR BREAST CANCER DIAGNOSIS”.

Sekian, Terima Kasih.

Yang benar,



**NINA KORLINA MADZHI**  
Ketua Projek Penyelidikan

# TABLE OF CONTENTS

| CHAPTER DESCRIPTION                         | PAGE |
|---|------|
| <b>SURAT SERAH LAPORAN</b>                  | i    |
| <b>RESEARCH GROUP</b>                       | ii   |
| <b>ACKNOWLEDGEMENT</b>                      | iii  |
| <b>TABLE OF CONTENTS</b>                    | iv   |
| <b>LIST OF TABLES AND FIGURES</b>           | ix   |
| <b>ABSTRACT</b>                             | xii  |
| <br>  |      |
| <b>CHAPTER 1</b>                            | 1    |
| <br>  |      |
| PROJECT BACKGROUND                          | 1    |
| 1.1 Introduction                            | 1    |
| 1.2 Objective                               | 1    |
| 1.3 Project Implementation and Methodology. | 2    |
| <br>  |      |
| <b>CHAPTER 2</b>                            | 3    |
| <br>  |      |
| MAMMOGRAPHY                                 | 3    |
| 2.1 History                                 | 3    |
| 2.2 Introduction                            | 4    |
| 2.3 Mammography                             | 5    |
| 2.3.1 Screening Mammography                 | 5    |
| 2.3.2 Diagnostic Mammogram                  | 5    |
| 2.4 Mammography Identification.             | 6    |

## ABSTRACT

Initially, mammography images of the breast were produced using standard x-ray machine, but today, the breast is imaged on state-of-the-art machines, capable of producing fine detail with minimal exposure to the patient. In this paper, the performance of recently developed neural network structure, General Regression Neural Network (GRNN), was examined on the on-line Database for Screening Mammography of University of South Florida (DDSM). This is a well used database in machine learning, neural network and image processing. They are commonly used to increase the accuracy of breast cancer diagnosis.

In this study, first we have to carry out a preprocessing step which consists to remove or attenuate the curvilinear structures present in a mammogram and corresponding to the blood vessels, veins, milk ducts, speculations and fibrous tissue. Then the gradient of the preprocessed image is calculated and finally the data from three classes of digital mammography images were used for training and testing the approximation function of GRNN structure. The three classes consist of normal, benign and cancer cases. The accuracy performances of the three classes were achieved by using the spread value of 1.2 for each class.

## CHAPTER 1

### PROJECT BACKGROUND

#### 1.1 Introduction

The digital mammography images are the main focused of doing this project. Mammography diagnostic imaging is one of the methods used in radiology to obtain breast image for diagnostic purpose. Currently, the most widely used technique for breast cancer imaging is mammogram. There are many techniques are applied to enhance and also to reduce noise in mammography images but there is still noise in mammography images. Hence, wrong diagnosing will exist because of untruthful images. However, by using MATLAB Version 6.5 Programming the images is clearer and makes easier to diagnostic. By applied filtering technique as an algorithm in MATLAB programming the noise will reduce and by applying Artificial Intelligence System such as Neural Network cancer image can be classified into cancer or benign.

#### 1.2 Objective

The objective of this project is to study on mammography images, analyze and perform enhancement on the digital mammography images and also to remove the particular interferences or noises. Nowadays there are many techniques that has been used in mammography imaging was introduced in medical world to solve this problem but there is still some noise exist and at the end effecting the images such as unclear and untruthful.

Therefore, the aim of this project is to minimize this problem. From the results gathered, it could describe the effectiveness of the technique that has been applied in the mammography images. The images will be some improvement after following this technique.