

**UNIVERSITI TEKNOLOGI MARA**

**SEQUENTIAL PROCESS OF MEL FREQUENCY  
CEPSTRUM COEFFICIENT (MFCC) AND BINARY  
PARTICLE SWARM OPTIMIZATION (BPSO)  
TECHNIQUE FOR IMPROVING THE  
PERFORMANCE OF MULTI-LAYER  
PERCEPTRON (MLP) TO DETECT ASPHYXIA  
DISEASES THROUGH INFANT CRIES**

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Thesis submitted in fulfillment  
of the requirements for the degree of  
**Master of Science**

**Faculty of Electrical Engineering**

July 2012

## AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of University Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as reference work. This thesis has not been submitted to any other academic institution or non-academic institution for any other degree or qualification.

I hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, University Teknologi MARA, regulating the conduct of my study and research.

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Thesis Title : Sequential Process of Mel Frequency Cepstrum Coefficient (MFCC) and Binary Particle Swarm Optimization (BPSO) Technique for Improving the Performance of Multi-Layer Perceptron (MLP) to Detect Asphyxia Diseases through Infant Cries

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## ABSTRACT

Infant asphyxia is a condition caused by inadequate intake of oxygen suffered by newborn babies. Early diagnosis of asphyxia is important to avoid complications such as damage to the brain, organ and tissue or even death. Asphyxia occurs in infants with neurological level disturbance, which is found to affect sound of cry produced by infants. The infant cry signals with asphyxia have distinct patterns which can be recognized with pattern classifiers such as Artificial Neural Network (ANN). This study investigates the performance of feature selection techniques namely F-Ratio, Orthogonal Lest Square (OLS) and Binary Particle Swarm Optimisation (BPSO) analysis in selecting optimal features extracted from feature extraction technique; Mel Frequency Cepstrum Coefficient (MFCC). Mel Frequency Cepstrum Coefficient (MFCC) was employed to extract the significant features from infant cry. The selected MFCC features were then used to train several ANN Multi Layer Perceptron (MLP). The simulation results showed each method is able to improve classifier performance. Among three method discusses, BPSO was the best feature selection method with 96.03% classification accuracy followed by OLS (94%) and F-Ratio (93.38%).

# TABLE OF CONTENTS

	<b>Page</b>
<b>AUTHOR'S DECLARATION</b>	ii
<b>ABSTRACT</b>	iii
<b>ACKNOWLEDGEMENT</b>	iv
<b>TABLE OF CONTENTS</b>	v
<b>LIST OF TABLES</b>	ix
<b>LIST OF FIGURES</b>	xi
<b>LIST OF ABBREVIATIONS</b>	xiv

## **CHAPTER ONE: INTRODUCTION**

1.1. Background of the Study	1
1.2. Problem Statement	2
1.3. Objectives of the Study	3
1.4. Scope of the Study	3
1.5. Outline of the Thesis	4

## **CHAPTER TWO: LITERATURE REVIEW**

2.1. Introduction	5
2.2. Infant Cries	5
2.3. Infant Asphyxia	7
2.4. Pre-Processing Method	7
2.5. Feature Extraction Method	8
2.6. Feature Selection	9
2.7. Feature Reduction	11
2.8. Feature Classification	11
2.9. Summary	15

## **CHAPTER THREE: THEORETICAL BACKGROUND**

3.1.	Introduction	16
3.2.	Pre-Processing of Data	16
3.3.	Feature Extraction with Mel Frequency Cepstrum Coefficient	17
3.4.	Feature Selection Method	21
3.4.1.	Feature Selection with F-Ratio	22
3.4.2.	Feature Selection with Orthogonal Least Square	23
3.4.3.	Particle Swarm Optimization and Feature Selection Using Binary Particle Swarm Optimization	25
3.5.	Feature Reduction Using Principal Component Analysis	27
3.6.	Feature Classification Using Multilayer Perceptron Artificial Neural Network	28
3.7.	Training the Neural Network	31
3.8.	Performance Evaluation	32
3.8.1.	Receiver Operating Characteristic	32
3.8.2.	Classification Accuracy	33

## **CHAPTER FOUR: METHODOLOGY**

4.1.	Introduction	34
4.2.	Hardware Setup	36
4.3.	Infant Cry Database	36
4.4.	Pre-Processing of Infant Cry	36
4.5.	Feature Extraction with Mel Frequency Cepstrum Coefficient	37
4.6.	Feature Selection	38
4.6.1.	Feature Selection Using F-Ratio	39
4.6.2.	Feature Selection Using Orthogonal Least Square	42
4.6.3.	Feature Selection Using Binary Particle Swarm Optimization	45
4.7.	Feature Reduction Using Principal Component Analysis	50
4.8.	Pattern Classification Using Multilayer Perceptron	50