UNIVERSITI TEKNOLOGI MARA

ALPHA AND BETA EEG SUB-BANDS CHARACTERIZATIONS IN DIFFERENTIATING HUMAN STRESS LEVEL USING NON-PARAMETRIC TECHNIQUE

NOOR HAYATEE ABDUL HAMID

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ABSTRACT

Electroencephalographic or EEG signals has become as one of the popular bio-transducer in medical and psychological research area. The origin of EEG signals from human brain gives extra benefit in measuring emotions as the brainwaves react concurrently according to the emotions. Human stress level is subjective depending on how each person reacts to the stress situation. Today, many types of diseases caused by psychology and mental health have increased recently. Early detection on psychology and mental health problem such as depression has now become very important. The current technique in diagnosing mental health is tedious and required medical doctors or expertise to conduct assessment or take patients through questionnaires and interviews which is time consuming. Thus, a quick and simple method to determine initial stage of mental health is necessary to shorten the diagnosis time. This study aims to examine the correlation between stress level and frontal brain activation which later reveal the Alpha and Beta band characteristics towards stress level [1, 2]. Whereas, the relationship between amount of brain activity at left and right frontal lobe due to negative emotions has not yet been discovered. The analysis is expected to show that there is a unique characteristic between EEG ESD values and Human Stress Level. Cohen's PSS-10 questionnaires is used to evaluate the level of natural event stressor from the score obtained by samples. The stress level is divided into Index 1 (Low Stress) and Index 2 (High Stress) group based on the Cohen's PSS-10 score. The measurement of EEG and Cohen's PSS-10 had been carried out among 95 volunteer, all of them are from under graduate and post graduate students of Fakulti Kejuruteraan Elektrik (FKE), Universiti Teknologi MARA (UiTM) Shah Alam. Since the sample background is from healthy and conscious group, therefore the study is focuses only at Alpha and Beta EEG sub-bands [3]. By using EEG off-line analysis, the EEG ESD data are computed according to its sub-bands to obtain EEG Human Stress Pattern. From the analysis, it was found that there is significant relationship between EEG and Human Stress Level. Spearman Rho's correlation is implemented to justify the findings where it proves that there is significant correlation between right brain and high stress level; in this context Alpha and Beta EEG Sub-bands. Thus the characteristics of Alpha and Beta waves in human stress level can be projected for the psychology and mental health diagnosis.

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TABLE OF CONTENTS

		Page
CONFIRMATION BY PANEL OF EXAMINERS		**ii**
AUTHOR'S DECLARATION		**iii**
ABSTRACT		**iv**
ACKNOWLEDGEMENT		**v**
TABLES OF CONTENTS		**iv**
LIST OF TABLES		**ix**
LIST OF FIGURES		**x**
LIST OF ABBREVIATIONS		**xiii**
CHAPTER ONE: INTRODUCTION		**1**
1.1	Background	1
1.2	Problem Statement	3
1.3	Research Objective	4
1.4	Research Scope and Limitations	4
1.5	Thesis Organization	5
CHAPTER TWO: LITERATURE REVIEW		**7**
2.1	Introduction	7
2.2	EEG Signals and Brain Characteristics	7
2.3	Stress	13
2.4	Method of Analyzing EEG Signals	16
2.5	Artifacts Removal	18
2.6	EEG Signal Processing Techniques	19
2.7	EEG Features	21
2.8	Cohen's Perceived Stress Scale (PSS-10)	22
2.9	Chapter Summary	24

CHAPTER THREE: THEOROTICAL BACKGROUND **31**

3.1 Introduction 31

3.2 EEG Signal Pre-Processing 31

3.2.1 Artefact Removal 32

3.2.2 Band Pass Filter Setting 32

3.2.3 Windowing Functions 35

3.2.4 Filter Coefficient 36

3.3 EEG Signal Pre-Processing 37

3.3.1 Energy Spectral Density 38

3.4 Statistical Analysis in EEG Datasets 39

3.4.1 Normality Test 39

3.4.2 Measures of Center: Mean or Average $\boldsymbol{x}$ 40

3.4.3 Box Plot 41

3.4.4 Measures of Variability: Standard Deviation $\boldsymbol{\sigma}$ 42

3.4.5 Spearman's Rho Correlation $\boldsymbol{r}$ 42

3.5 Cohen's Perceived Stress Scale (PSS-10) 43

3.6 Chapter Summary 43

CHAPTER FOUR: METHODOLOGY **45**

4.1 Introduction 45

4.2 Experimental Set Up and Data Collection 47

4.2.1 Subject Selection 48

4.2.2 Measurement Set Up 50

4.2.3 Cohen's PSS-10 Stress Measurement 51

4.2.4 Constructing Human Stress Index 53

4.2.5 EEG Data Acquisition 54

4.3 EEG Signal Processing 56

4.3.1 EEG Feature Extraction 59

4.4 Stress Analysis 61

4.5 Chapter Summary 63