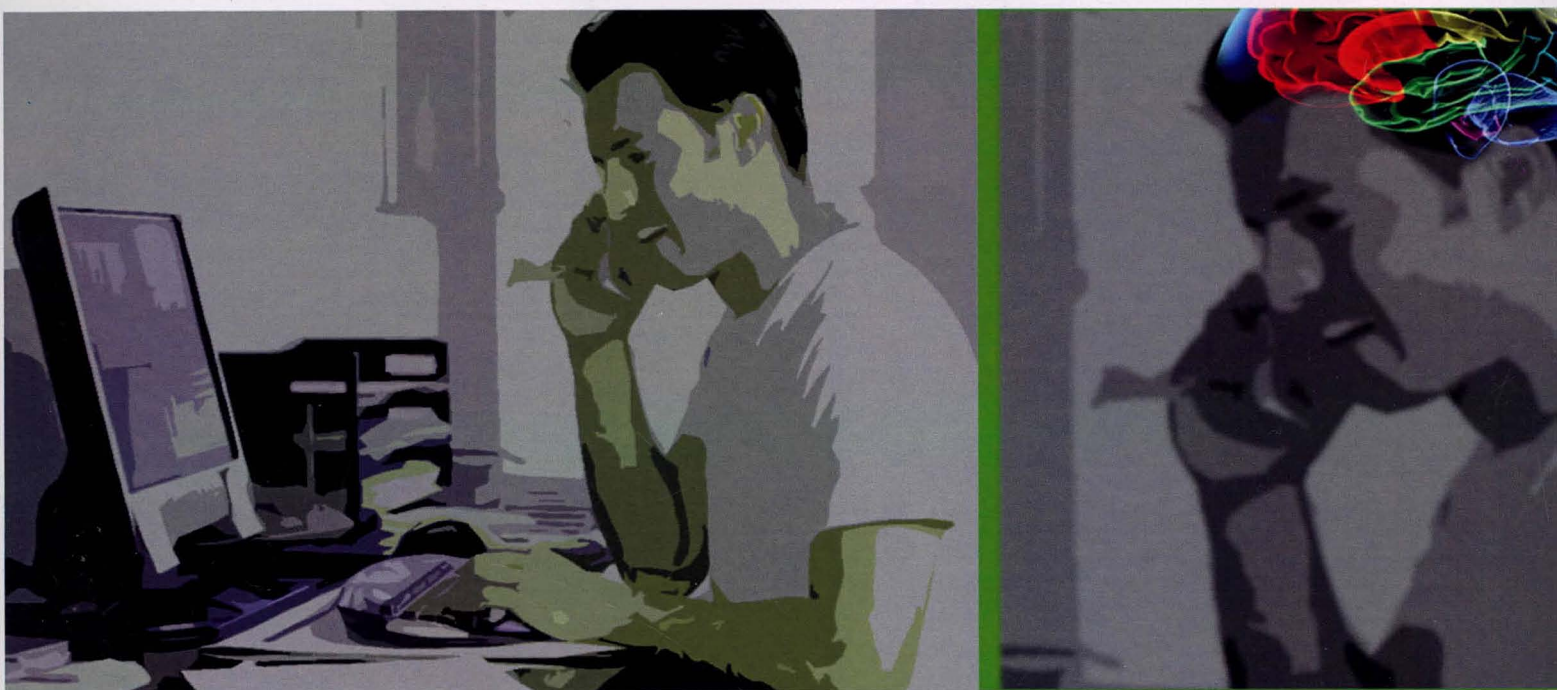


UNDERSTANDING BRAIN DEVELOPMENTAL DISORDER BASED ON EEG IN SOFT COMPUTING APPROACH

Abdul Wahab Abdul Rahman



IIUM PRESS

INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

**UNDERSTANDING BRAIN
DEVELOPMENTAL
DISORDER BASED ON EEG
IN SOFT COMPUTING
APPROACH**

Editors

Abdul Wahab Abdul Rahman



IIUM Press

Published by:
IIUM Press
International Islamic University Malaysia

First Edition, 2011
©IIUM Press, IIUM

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without any prior written permission of the publisher.

Perpustakaan Negara Malaysia
Data

Cataloguing-in-Publication

Abdul Wahab Abdul Rahman: Understanding brain developmental disorder based on EEG in soft computing approach

ISBN: 978-967-418-111-6

Member of Majlis Penerbitan Ilmiah Malaysia – MAPIM
(Malaysian Scholarly Publishing Council)

Printed by :
IIUM PRINTING SDN. BHD.
No. 1, Jalan Industri Batu Caves 1/3
Taman Perindustrian Batu Caves
Batu Caves Centre Point
68100 Batu Caves
Selangor Darul Ehsan

TABLE OF CONTENTS

Dedication	v
Table of Contents	vi
Preface	x
Acknowledgement	xii
Introduction	xiii
Viewing emotions from categorical and dimensional perspectives <ul style="list-style-type: none"> - Hamwira Sakti Yaacob - Abdul Wahab Abdul Rahman 	1
Emotion recognition based on EEG: Brain waves <ul style="list-style-type: none"> - Abdul Wahab Abdul Rahman - Norhaslinda Kamaruddin - Palaniappan L.K 	14
Emotion recognition using EEG signals <ul style="list-style-type: none"> - Normaziah Abdul Aziz - Abdul Wahab Abdul Rahman - Najwani Razali 	37
EEG emotion recognition using features of mel frequency cepstral coefficients <ul style="list-style-type: none"> - Marini Othman - Abdul Wahab Abdul Rahman 	58

- Reza Khosrowabadi	
Emotion detection from brain signals based on musical and visual stimuli - Marini Othman - Abdul Wahab Abdul Rahman - Reza Khosrowabadi	77
Understanding students' emotion while solving mathematical questions using EEG signals - Normaziah Abdul Aziz - Abdul Wahab Abdul Rahman - Marini Othman - Najwani Razali	94
Understanding stress by analyzing the brain when solving mathematical task - Abdul Wahab Abdul Rahman - Norzaliza Md. Nor	111
Classification of EEG signals for understanding affective face processing impairment in autism - Abdul Wahab Abdul Rahman - Marini Othman	135
Detection of autism spectrum disorder based on 2D affective space model (ASM) - Abdul Wahab Abdul Rahman - Najwani Razali	155
Detection of autism spectrum disorder (ASD) based on motor imitation - Abdul Wahab Abdul Rahman - Najwani Razali	177

Critical features among autistic children based on EEG for motor imitation: Dynamic analysis approach - Abdul Wahab Abdul Rahman - Najwani Razali	195
Principle component analysis for detecting autism during motor movement - Abdul Wahab Abdul Rahman - Wafaa Khazaal	215
Understanding human stress and depression with relation to cultural and language differences - Abdul Wahab Abdul Rahman - Rahnuma K.S - Hariyati - Bjorn Cruts	237
Understanding stress using EEG-VA approach - Abdul Wahab Abdul Rahman - Rahnuma K.S	252
Understanding driver behavior based on driver identification and driver's emotion verification - Abdul Wahab Abdul Rahman - Norzaliza Md. Nor	271
Understanding driver behavior according to brain signal and DASS 21 analysis - Abdul Wahab Abdul Rahman - Norzaliza Md. Nor	303
Post accident analysis by using valence arousal approach (VAA) - Abdul Wahab Abdul Rahman - Norzaliza Md. Nor	334

<ul style="list-style-type: none"> - Hariyati - Norhaslinda Kamaruddin 	
<p>Understanding driver behavior based on the relationship between pre-post accident and pre-cursor emotion</p> <ul style="list-style-type: none"> - Abdul Wahab Abdul Rahman - Norzaliza Md. Nor - Norhaslinda Kamaruddin - Hariyati 	358
<p>Understanding long term memory effect towards driver's pre-emotion by using EEG</p> <ul style="list-style-type: none"> - Abdul Wahab Abdul Rahman - Norzaliza Md. Nor - Hariyati - Norhaslinda Kamaruddin 	383
<p>Classifying users emotions towards the quranic recitation using EEG: A preliminary study</p> <ul style="list-style-type: none"> - Akram M. Zeki - Ahmed M. Zeki - Daeng A.Z.Z - Rosyuhadah Tahir 	404

**CLASSIFYING USERS EMOTIONS TOWARDS THE
QURANIC RECITATION USING EEG: A
PRELIMINARY STUDY
AKRAM M. ZEKI, AHMED M. ZEKI, DAENG A.Z.Z.
AND ROSYUHADAH TAHIR**

20.0 Abstract

A method to detect and recognize emotional effects of Quranic recitation towards both Muslims and non-Muslims is proposed. The method uses four basic emotions which are Happy, Calm, Fear, and Sad to classify which of these four emotions the user will invoke when the Quranic recitation is presented to the participants. EEG signals are collected from the brain signals from the scalp. KSDE feature extraction is used to extract the prominent features of the participant and MLP is used to classify which of the four basic emotions was invoked when listening to the Quran. Results show that the most prominent emotion that has been detected by the MLP is Calm.