بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار

MONA MAGHRABY

EARLY DETECTION OF ALZHEIMER'S DISEASE USING MAGNETIC RESONANCE IMAGING AND DIFFUSION TENSOR IMAGING

By

Eman Nabeel AbdAllah Marzban

A Thesis Submitted to the

Faculty of Engineering at Cairo University

in Partial Fulfillment of the

Requirements for the Degree of

DOCTOR OF PHILOSOPHY

in

Biomedical Engineering and Systems

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
GIZA, EGYPT
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Under the Supervision of

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Title of Thesis:

Early Detection of Alzheimer's Disease Using Magnetic Resonance Imaging and Diffusion Tensor Imaging

Key Words:
MRI, DTI, Alzheimer's, CAMs, Deep learning

Summary:

Recently, classification and prediction of several diseases can be performed via machine learning methodologies. Of particular importance comes the neurodegenerative diseases, those related to losing neurons and brain cognitive functions, which encompasses Alzheimer's Disease (AD). The large amount of data being readily-available and the increasing computer powers help boost the unleashed growing usage of these machine learning algorithms. The objectives of this work were 1) to find out the class activation maps (CAMs) deriving the network decision, and 2) to detect AD and its earlier pathology; namely, the mild cognitive impairment (MCI), from healthy controls (HC) in robust and low-cost network design. Both tasks were implemented using convolutional neural networks (CNNs).

Disclaimer

I hereby declare that this thesis is my own original work and that no part of it has been submitted for a degree qualification at any other university or institute.

I further declare that I have appropriately acknowledged all sources used and have cited them in the references section.

Name: *Eman N. Marzban* Date:

Signature:

Dedication

It was such a great trip; through which I faced a lot of hurdles and disappointments and also, I was able to learn a lot.

It would not have been without Allah's support and my parents' that this work had ever reached fruition.

I would like to express my gratitude to my great parents and my siblings; ***Raghda***, ***Ahmad***, and ***Nouran***, for their support in all the tight times, struggles and distresses I have been through.

"Strength does not come from winning. Your struggles develop your strengths. When you go through hardships and decide not to surrender, that is strength". A. Schwarzenegger

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Table of Contents

List of Figures