

بسم الله الرحمن الرحيم





شبكة المعلومات الجامعية التوثيق الالكتروني والميكروفيلم



جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

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THE USE OF TRANSFER LEARNING TECHNIQUE IN DIAGNOSING MAMMOGRAM MASSES BASED ON BREAST TISSUE DENSITY

By

Neveen Mahmoud Abd-Elsalam Abd-Elkader

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
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Title of Thesis:

The Use of Transfer Learning Technique in Diagnosing Mammogram Masses Based on Breast Tissue Density

Key Words:
Deep CNN-s; Transfer Learning; Mammogram CADx

Summary:

Breast cancer is one of the most prevalent cancers, and currently many computers aided detection/diagnosis (CAD) systems are being used in clinical use. Whilst recent studies have shown that there is a high positive correlation between high breast density and high breast cancer risk. Thus, breast density classification may aid in breast lesion analysis. With this objective, we proposed a framework of two systems; the first one classifies the mammographic images into four categories of breast densities. Different sets of features (First order gray-level parameters, Gray-Level co-occurrence matrices, Laws' texture energy measurements and Zernike moment features) were investigated along with several classifiers. The results achieved a promising classification accuracy of 93.7%. While the second system classifies lesions using "Transfer learning" concept based-on pre-trained Convolutional Neural Networks, through investigating and comparing different hyper-parameters to fine-tune several pre-trained models, to find the optimal model configuration proper for each density category.

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.

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Signature:

Dedication

I dedicate my dissertation work to my family and my friends. A special feeling of gratitude to my loving parents for giving birth to me at the first place and for supporting me spiritually through my whole life. My beloved brother Abd-Elkader and my sisters Nermeen, Nesrien, and Negween who stand by me to pursue my dreams. This dissertation is dedicated also to the memory of my uncle Essam, my aunt Amal and my aunt Amany who were praying for me to pursue my doctoral degree, and they could not see my achievement. I dedicate this work and give a sincere thanks to my best friend and my soulmate Mira Okasha who has always been a major source of support.

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