Improving Skin Cancer (Melanoma) Detection: New Method

By

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Abstract

Melanoma, the deadliest form of skin cancer, must be diagnosed early for effective treatment. Rough pigment network and qualities are important signs for melanoma diagnosis using pathologist images. The main focus of this thesis is to improve skin cancer (Melanoma) detection through introducing novel image processing approach for a computer-aided system based on pigment network and elements detection on pathology images. It is important to propose an automated system for differentiating between melanocytic nevi and malignant melanoma. This thesis describes a novel image processing approach for computer-aided pigment network and elements detection on dermoscopy / pathology images. The proposed methods provide meaningful ideas of structures, and extract features for melanoma detection. Additionally, the thesis presents efforts towards prevention of melanoma, by developing a smart system to locate pigment networks.

The thesis aims to cover a complete theoretical model for simulating the processes that takes place when a human interprets an image generated by the eye, through designing a reliable system, that can provide a screening method that "filters" lesions and melanoma in a general practice. The proposed system is to be used with a standard PC with input from a high quality digital camera, dermoscopy / microscopy slides or any other suitable hardware sources. This system analyses the structure of a mole / skin defects, detects cancer, identifies features, makes a decision and provides the result.

The result of the proposed system shows that the Skin Cancer (Melanoma) Detection strategy which uses SVM performs reasonably satisfactorily (accuracy 77.44%, sensitivity 83.60 %, and specify 70.67%). Furthermore, the SVM based wavelet Gabor (SVM-WLG) performs better than the SVM (81.61%, 88.48%, and 74.51 % accuracy, sensitivity, and specify respectively). However, the Swarm-based SVM (SSVM) performs better than the other two algorithms, with average for accuracy, sensitivity, specificity of 87.13%, 94.1% and 80.22%, respectively.

Certificate of Authorship / Originality

I certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree except as fully acknowledged within the text.

I also certify that the thesis has been written by me. Any help that I have received in my research work and the preparation of the thesis itself has been acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

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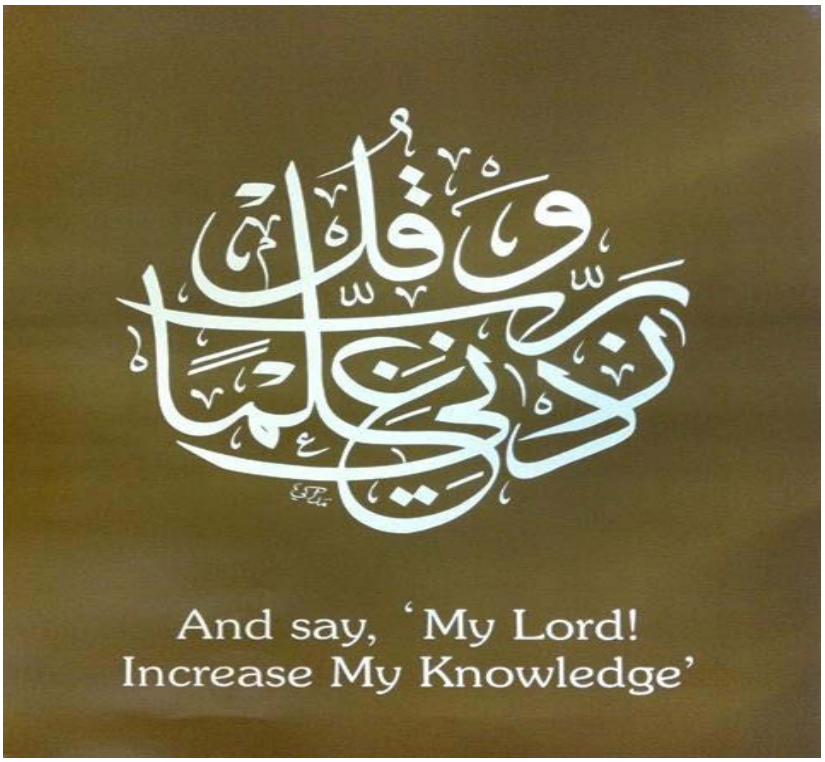

To the soul of my father and my mother

For encouraging me and pounding me with my education

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Table of Contents

Extended Table of Contents

Table of Contents

List of Figures

List of Tables