

DEDICATION

I dedicate my thesis to my family and many friends.

A special feeling of gratitude to my loving parents: Bushara Garma and Hikmet Mohamed Ahmed whose words of encouragement.

My sister Fawzia, have never left my side, my aunt Omalhasun Mohamed Ahmed and my uncle Bakry Mohamed.

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I dedicate this work and give special thanks to my Teachers.

And to all women suffering from breast cancer

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ABSTRACT

The breast cancer is a serious public health problem among women in the world. Mammogram breast X-ray is considered the low cost and most reliable method in early detection of breast cancer. In this thesis an approach is proposed to develop a Computer-Aided Diagnosis (CAD) system that can be very helpful for radiologist in diagnosing.

This work has tried to analyze the texture of mammography images taken from Mini MIAS data base and to find the values of various parameters of texture. Two features types, Haralick's features based on spatial grey level dependency (SGLD) matrix and based wavelet coefficients are applied for classification of each Regions of Interest (ROIs).

The proposed method for detection of breast cancer on digital mammogram classified the normal breast tissues into three classes which: fat, glandular and dense and then into normal and abnormal classes. The features discriminating to detect abnormal from normal tissues was determined by stepwise linear discriminant analysis classifier (LDA).

This study investigates whether the texture could be used to discriminate among the various breast tissue types. The proposed method focuses on SGLD matrix as parameters for texture analysis which achieved the highest accuracy that 95.7% for classification of breast tissues on digital mammograms. This is an important step in the development of a CAD for mammograms analysis being developed.

المستخلص

يعتبر مرض سرطان الثدي من أخطر مشاكل الصحة العامة التي تصيب النساء في العالم. فحص الماموغرافي هو عبارة عن فحص بالأشعة السينية و يستخدم لفحص الثدي .أن الفحص المبكر لسرطانات الثدي و التي يتم تشخيصها عن طريق فحص الماموغرافي يزيد فرصة نجاح العلاج من هذا المرض. كما يعتبر تصوير الثدي بالأشعة السينية هو الطريقة الأقل تكلفة و الأكثر موثوقية في الكشف المبكر عن سرطان الثدي. في هذه الأطروحة أقترحنا طريقة لكشف سرطان الثدي عن طريق ما يسمى بنظام التشخيص بمساعدة جهاز الحاسوب (CAD system) و التي يمكن أن تكون مفيدة جداً في التشخيص.

و قد أعتمد في هذا العمل على التحليل الملمسي (Texture analysis) لصور الماموغرام والتي تم الحصول عليها من جمعية تحليل صور الماموغرام MIAS. استخدمت معادلات هاراليك (Haralick Features) المشتقة من طريقة إحصائية تسمى ب (Spatial Grey Level Dependency matrix) و طريقة تحويلية تسمى ب (Wavelet Coefficients) حيث تكمن أهميتها في التمييز بين الخلايا المريضة والسليمة والتي تحدد بواسطة معادلة التحليل الخطي (Linear Discriminant Analysis)

الطريقة المقترحة للكشف عن سرطان الثدي على الماموجرام الرقمي هي تصنيف أنسجة الثدي السليمة الى ثلاث فئات منها: الدهون، الغدد و الانسجة الكثيفة و الانسجة المصابة بالسرطانز

وأظهرت النتائج أن أفضل طريقة في كشف سرطان الثدي هي معادلات هاراليك (Haralick) المشتقة من طريقة إحصائية تسمى ب (Spatial Grey Level Dependency matrix) و التي حققت أعلى دقة قيمتها % ٩٥.٧ مقارنة بالتشخيص المعتمد من MIAS. وتعتبر هذه الدراسة خطوة مهمة في تطوير نظام التشخيص باستخدام الكمبيوتر لتطوير تحليل صور الماموغرام.

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