Abstract

Breast cancer is one of the major causes of death among women all over the world. An improvement of early detection and diagnosis techniques is very important for women's quality of life. Computer-Aided Detection (CAD) systems have been used for aiding radiologists in their decision in order to solve the limitations of human observers. In this context, this thesis presents a methodology for mass detection on digital mammograms.

This methodology begins with segmenting Regions of Interest (ROIs) using morphological operations and automatic thresholding. Features are extracted from the ROIs and Principal Component Analysis (PCA) is applied for reducing the features dimensionality. Finally, the methodology performs classification through Neural Networks (NNs).

The proposed system was tested on several mammographic images extracted from Digital Database for Screening Mammography (DDSM) and the Mammographic Image Analysis Society (MIAS) database. Our results showed that the proposed methodology provided more accuracy than other compared techniques.

The proposed system can be helpful to the radiologist by serving as a second reader in mammography screening, as it indicates that the use of the proposed methodology in the detection of masses is promising, since it achieves good rates of accuracy equal 99% in the detection of masses.

Chapter 1
Introduction

This chapter presents the motivation concepts for this thesis; moreover, it introduces the concept of breast cancer mass detection. Finally this chapter presents the main contributions of the research work and the thesis outline.

1.1 Research Motivation

Breast cancer is the second most cancer diagnosed among women and the second most cancer deaths in the world. It can be treated by early discovery which can significantly reduce breast cancer mortality. Mammography is at present the most efficient and cost-effective available technique for early detection of breast cancer. It is a procedure that uses low-dose X-rays to examine the human breast and it is primarily used to detect and diagnose breast cancer (J. Bozek, 2009).

Radiologists visually search mammograms for specific abnormalities. The most common breast abnormalities that may indicate breast cancer are masses and calcifications. Masses appear in the mammogram as bright regions of different sizes, margins (circumscribed, micro lobular, obscured, indistinct, and spiculated), shapes (round, oval, lobular, and irregular) and gray-level intensities and contrasts that depend on their surrounding tissues (Reston, 2003; J. Bozek, 2009). Examples of masses with circumscribed and spiculated margins and lobular and round shapes are shown in figure 1. 1 & figure 1. 2 respectively.