

A New Feature Reduction Method for Mammogram Mass Classification

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Abstract. In this paper, we present a new dimension reduction method using Wilk's Lambda Average Threshold (WLAT) for classifying the masses present in mammogram. According to Breast Imaging Reporting and Data System (BI-RADS) benign and malignant can be differentiated using its shape, size and density, which is how radiologist visualize the mammograms. Measuring regular and irregular shapes mathematically is found to be a difficult task, since there is no single measure to differentiate various shapes. Various shape and margin features of masses are extracted, which are effective in differentiating regular from irregular polygon shapes. It has been found that not that all the features are equally important in classifying the masses. In our experiment, we have used Digital Database for Screening Mammography database (DDSM) database and the classification accuracy obtained for WLAT selected features is better than Principal Component Analysis (PCA) and Image Factoring dimension reduction methods. The main advantage of proposed WLAT method are i) the features selected can be reused when the database size increases or decreases, without the need of extracting components each and every time; ii) WLAT method considers grouping class variable for finding the important features for dimension reduction.

Keywords: Digital Mammogram, Shape and margin features, Benign and Malignant, WLAT, Feature selection, Dimension Reduction, PCA.

1 Introduction

The Breast cancer is the leading cause of death in female population. Every 3 minutes, a woman is diagnosed with breast cancer, and in every 13 minutes a woman dies from the disease [1]. The exact cause of breast cancer is unknown and best known prevention is precautious diagnosis. Mammography is one of the best known techniques for early detection of breast cancer. Breast cancer death rates have been dropping steadily since 1995 due to earlier detection and increased use of mammography [1]. Computer Aided Detection (CAD) systems have been developed to aid radiologists in diagnosing cancer from digital mammograms. Several studies have proved that CAD improves breast cancer diagnostic accuracy rate by 14.2% [2].

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