Abstract

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Breast Cancer Detection Using Support Vector Machine With the Aid of Electromagnetic Waves

The aim of this research is the development of a reliable tool to detect early signs of breast cancer in mammographic images. However, the specific techniques developed in this work, as well as the proposed methodology, can be adapted to detect the cancer in other organs. For years, cancer has been one of the biggest threats to human life it is expected to become the leading cause of death over the next few decades. Breast cancer is one of the most common kinds of cancer, as well as the leading cause of mortality among women. Early detection and diagnosis of breast cancer increases the chances for successful treatment and complete recovery for the patient. Mammography is currently the most sensitive method to detect early breast cancer however, the magnetic resonance imaging (MRI) is the most attractive alternative to mammogram. MRI is sensitive for detecting some cancers, which could be missed by mammography. Manual readings of mammograms may result in misdiagnosis due to human errors caused by visual fatigue. Computer aided detection systems (CAD) serve as a second opinion for radiologists. A new CAD system for the detection of microcalcifications (MCs) and masses in mammograms is proposed. The discrete wavelet transforms (DWT), the contourlet transform, and the principal component analysis (PCA) are used for feature extraction while the support vector machine (SVM) is used for classification. The system classifies normal and abnormal tissues in addition to benign and malignant tumors. The best classification rate for detecting MCs is achieved by the DWT features, the lesions were completely classified, whereas, for detecting masses the contourlet transform features proved that it has the best classification rate when determining whether the tumor is benign malignant. A further investigation was implemented using electromagnetic waves. Thus, a new electromagnetic breast model is introduced for detecting the abnormalities in the breast, especially the masses compared to MRI.