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Detection and Classification of Mammogram Images Using Principle Component Analysis and Lazy Classifiers

Authors : Rajkumar Kolangarakandy

Abstract : Feature extraction and selection is the primary part of any mammogram classification algorithms. The choice of feature, attribute or measurements have an important influence in any classification system. Discrete Wavelet Transformation (DWT) coefficients are one of the prominent features for representing images in frequency domain. The features obtained after the decomposition of the mammogram images using wavelet transformations have higher dimension. Even though the features are higher in dimension, they were highly correlated and redundant in nature. The dimensionality reduction techniques play an important role in selecting the optimum number of features from the higher dimension data, which are highly correlated. PCA is a mathematical tool that reduces the dimensionality of the data while retaining most of the variation in the dataset. In this paper, a multilevel classification of mammogram images using reduced discrete wavelet transformation coefficients and lazy classifiers is proposed. The classification is accomplished in two different levels. In the first level, mammogram ROIs extracted from the dataset is classified as normal and abnormal types. In the second level, all the abnormal mammogram ROIs is classified into benign and malignant too. A further classification is also accomplished based on the variation in structure and intensity distribution of the images in the dataset. The Lazy classifiers called Kstar, IBL and LWL are used for classification. The classification results obtained with the reduced feature set is highly promising and the result is also compared with the performance obtained without dimension reduction.

Keywords : PCA, wavelet transformation, lazy classifiers, Kstar, IBL, LWL
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