Feature Selection and Classification for Mammographic Microcalcification Clusters

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ABSTRACT

The microcalcifications in X-ray Mammography are the major index of breast cancer. The successful classification of mammographic microcalcifications by type (benign and malignant) is a key factor of effective treatment. Most published literature related to computer aided diagnosis (CAD) development focus on detection of mammographic microcalcifications. In this thesis, a diagnostic method with a two-staged scheme and the sequential forward selection (SFS) based feature extraction is developed to detect microcalcification clusters in X-ray mammograms. This thesis proposed a computer-aided diagnosis (CAD) system for the automatic detection two kinds of digitized X-ray mammogram database of microcalcification clusters. The proposed system consists of two main steps. Microcalcifications are detected in the first stage, the algorithm is applied for clustering and feature extraction for 35 cluster features. The discriminatory power of these features is analyzed via sequential forward selection method. Experiment results show that the Dutch ’ s Nijmegen database ’ s minimum MSE error for SVM test set was reached when the top 34 features was selected. The Taiwan ’ s Chang-Hua Christian Hospital ’ s database ’ s minimum MSE error for SVM test set was reached when the top 28 features was selected. Cluster mean and maximum gray in -viiCluster are the significant features for microcalcification clusters classification for both types of mammographic databases. Data analysis showed that features selected by the SFS out perform the features without being selected. Therefore, SFS has the potential to simultaneously reduce system complexity and increase classification performance. Keywords: Microcalcification Cluster, Feature Selection, Support

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