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ACCEPTED MANUSCRIPT

Fuzzy C-Means and Region Growing based Classification of Tumor from Mammograms using Hybrid Texture Features

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Highlights

- Breast Cancer is considered one of the most serious syndromes in females around the globe.
- FCMRG algorithm is proposed to segment the tumor in mammograms.
- Feature extraction involves Local Binary Pattern Gray-Level Co-occurrence Matrix (LBP-GLCM) and Local Phase Quantization (LPQ) techniques.
- For individual and hybrid feature sets, the mRMR algorithm has been employed as a feature selection mechanism.
- Kappa statistic has been used to assess the effectiveness of the classification.
- Enhanced classification accuracy has been observed through k-fold cross-validation method on MIAS & DDSM datasets.

Abstract

Identifying abnormality using breast mammography is a challenging task for radiologists due to its nature. A more consistent and precise imaging based CAD system plays a vital role in the classification of doubtful breast masses. In the proposed CAD system, pre-processing is performed to suppress the noise in the mammographic image. Then segmentation locates the tumor in mammograms using the cascading of Fuzzy C-Means (FCM) and region-growing (RG) algorithm called FCMRG. Features extraction step involves identification of important and distinct elements using Local Binary Pattern Gray-Level Co-occurrence Matrix (LBP-GLCM) and Local Phase Quantization (LPQ). The hybrid features are obtained from these techniques. The mRMR algorithm is employed to choose suitable features from individual and hybrid feature sets. The nominated feature sets are analysed through various machine learning procedures to isolate the malignant tumors from the benign ones. The classifiers are probed on 109 and 72 images of MIAS and DDSM databases respectively using k-fold (10-fold) cross-validation method. The enhanced classification accuracy of 98.2% is achieved for MIAS dataset using hybrid features classified by Decision Tree. Whereas 95.8% accuracy is obtained for DDSM dataset using KNN classifier applied on LPQ features.

Keywords:

Breast cancer, Computer-aided diagnosis (CAD), Mammograms, Masses, Micro-calcification, Segmentation

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