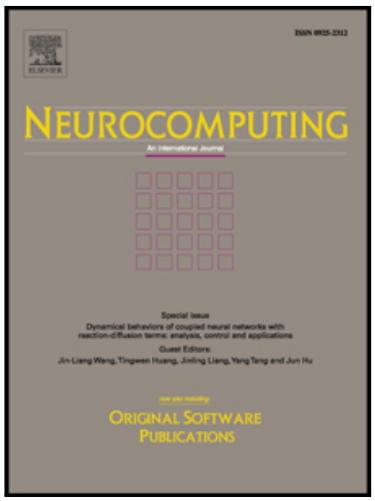

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Robust Texture Analysis of Multi-modal Images Using Local Structure Preserving Ranklet and Multi-task Learning for Breast Tumor Diagnosis

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Abstract

Robust texture analysis of multi-modal images is important for practical breast tumor diagnosis applications. Texture features based on ranklet transform were proposed for breast tumor classification of multi-modal images and improved diagnostic performance. However, two limitations still exist in these features. Ranklet transform ignores local characteristics of images which are important for texture feature extraction. In addition, due to application of multi-resolution analysis of ranklet transform, some noises or redundant information may be introduced. These issues may result in performance degradation. To solve these problems, this paper proposes a robust texture feature based on Local Structure Preserving Ranklet(LSP-Ranklet) transform and multi-task learning. First of all, multiple LSP-Ranklet images are generated via LSP-Ranklet transform. In this procedure, the distance-based weighting method is proposed to preserve local structure of images by learning local relevance between pixels. Based on LSP-Ranklet images, texture features based on Gray-Level Co-occurrence Matrix (GLCM) are extracted. To eliminate noises of extracted features, multi-task feature learning is employed to select common feature subsets which are robust for tumor classification of multi-modal images. At last, SVM model is used for tumor classification. Experimental results on our multi-modal breast ultrasound images database demonstrate the effectiveness and robustness of the proposed feature.

Key words: breast tumor diagnosis, multi-modal images, LSP-Ranklet, multi-task learning