

Gaussian image pyramid based texture features for classification of microscopic images of hardwood species

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Abstract:

This paper presents a texture feature based approach for hardwood species classification. The three existing feature extraction techniques such as local binary pattern (LBP), local configuration pattern (LCP) and local phase quantization (LPQ) are integrated here with Gaussian image pyramid (GIP) which results in improvement of classification accuracy. The texture features are extracted at seven different decomposition levels generated by the GIP. These texture features are fed as input to linear support vector machine (SVM) classifier that uses 10-fold cross validation approach of classification. The results of combination of GIP decomposition with individual texture feature extraction techniques and linear SVM classifier have been compared. The comparison yields that Gaussian image pyramid based local phase quantization (GPLPQ) texture feature extraction technique using third (3rd) level of image decomposition results in the best classification accuracy of 98.60% for hardwood species. The proposed integration of GIP and texture feature extraction techniques also proves to be an effective tool of classification for texture surface database. For texture surface database, Gaussian image pyramid based rotation invariant uniform local configuration pattern (GPLCPriu2) has achieved 98.00% classification accuracy.

Keywords:

Gaussian image pyramid
Linear support vector machine
Local binary pattern
Local phase quantization
Local configuration pattern

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