

Comparison of feature extraction techniques for classification of hardwood species

Arvind R. Yadav¹, R. S. Anand², M. L. Dewal³, Sangeeta Gupta⁴ & Jayendra Kumar⁵

¹Department of Electronics & Communication Engineering, Parul Institute of Engineering & Technology, Waghodia, Vadodara, Gujarat, India

²Department of Electrical Engineering, Indian Institute of Technology Roorkee, Roorkee, Uttarakhand,

³IndiaDepartment of Electrical Engineering, Graphic Era University, Dehradun, Uttarakhand, India

⁴Botany Division, Forest Research Institute, Dehradun, Uttarakhand, India

⁵Department of Electronics & Communication Engineering, National Institute of Technology Jamshedpur, Jharkhand, India

Abstract:

The texture of an image plays an important role in identification and classification of images. The hardwood species of an image contains four key elements namely: vessels (popularly known as pores in cross-section view), fibres, parenchyma's and rays, useful in its identification and classification. Further, the arrangements of all these elements possess texture rich features. Thus, in this work investigation of existing texture feature extraction techniques for the classification of hardwood species have been done. The texture features are extracted from greyscale images of hardwood species to reduce the computational complexity. Further, linear support vector machine (SVM), radial basis function (RBF) kernel SVM, random forest (RF) and linear discriminant analysis (LDA) have been employed as classifiers to investigate the efficacy of the texture feature extraction techniques. The classification accuracy of the existing texture descriptors has been compared. Further, principal component analysis (PCA) and minimal-redundancy-maximal-relevance (mRMR) feature selection method is employed to select the best subset of feature vector data. The PCA reduced feature vector data of co-occurrence of adjacent local binary pattern (CoALBP24) texture feature extraction technique has attained maximum classification accuracy of $96.33 \pm 1.14\%$ with the help of LDA classifier.

Keywords:

Texture features, Support vector machine, SVM, Feature selection, Hardwood species

Link: <https://www.inderscienceonline.com/doi/pdf/10.1504/IJCSYSE.2018.091390#d24414e91>