Chapter 9

Land Cover Classification
Using the Proposed Texture Model and Fuzzy k–NN Classifier

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ABSTRACT

Texture feature is a decisive factor in pattern classification problems because texture features are not deduced from the intensity of current pixel but from the grey level intensity variations of current pixel with its neighbors. In this chapter, a new texture model called multivariate binary threshold pattern (MBTP) has been proposed with five discrete levels such as -9, -1, 0, 1, and 9 characterizing the grey level intensity variations of the center pixel with its neighbors in the local neighborhood of each band in a multispectral image. Texture-based classification has been performed with the proposed model using fuzzy k-nearest neighbor (fuzzy k-NN) algorithm on IRS-P6, LISS-IV data, and the results have been evaluated based on confusion matrix, classification accuracy, and Kappa statistics. From the experiments, it is found that the proposed model outperforms other chosen existing texture models.

INTRODUCTION

The term land cover refers to the biophysical attributes of the surface of the earth. Land cover classification involves classifying the remotely sensed image into various land cover types such as land, vegetation, and water. Texture is a measure of variation
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in pixel intensities existing in the local neighborhood of a digital image. In this chapter, a new texture model called Multivariate Binary Threshold Pattern (MBTP) is proposed for land cover classification and the performance of the proposed texture model is evaluated through experiments conducted on IRS-P6, LISS-IV data.

BACKGROUND

Texture feature is a decisive factor in pattern classification problems because texture features are not deduced from the intensity of the current pixel but from the gray level intensity variations of current pixel with its neighbors. The proposed model uses five discrete levels such as -9,-1, 0, 1 and 9 for characterizing the gray level intensity variations of the center pixel with its neighbors in the local neighborhood of each band in a multispectral image. For land cover classification, the proposed model MBTP has been used along with fuzzy k-Nearest Neighbor (Fuzzy k-NN) classifier.

MAIN FOCUS OF THE CHAPTER

Related Work

A variety of texture models are found in literature. Local Binary Pattern (LBP) (Ojala et al. 2001), a texture model with discrete levels 0 and 1 was proposed for characterizing patterns in gray level images. The classification accuracies of LBP and its derivatives were found better in many applications. A multivariate extension of LBP texture model, Multivariate Local Binary Pattern (MLBP) (Lucieer et al. 2005) was proposed for remotely sensed images and it was suggested that the texture features of bands with their cross relations can register the pattern in the neighborhood. Xiaoyang et al. (2010) proposed Local Ternary Pattern with discrete levels 0, 1 and -1 for face recognition under difficult lighting conditions. Multivariate Local Texture Pattern (MLTP) (Suruliandi, 2009), an extension of Local Texture Pattern (Suruliandi and Ramar, 2008) with 0, 1 and 9 as discrete levels, was proposed for land cover classification of remotely sensed images. A computationally simple feature, the multilevel local pattern histogram (MLPH) (Dai et al. 2011) was proposed for synthetic aperture radar (SAR) image classification which produced better results than other commonly used features. In another work (Suruliandi and Jenicka, 2015), a comparative study of texture models was performed and it was found that MLTP texture model outperformed other models taken for study. In order to include directional information in conventional LBP,
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Avinash Navlani and Nidhi Dadhich (2017). *Applying Predictive Analytics Within the Service Sector* (pp. 176-197).
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EMG-Based Mobile Assessment System for Neck and Shoulder Fatigue
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