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A Novel Clustering Based Classification of Remote Sensing Images

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ABSTRACT

The performance of the spectral-based classification has been used to improve the spatial information effectively. However, it is onerous to describe multiple image scenes by using single feature due to complexity of the geospatial scenes. In this letter, based on the Markov random field (MRF) a novel frame work is developed to fuse the multiple spectral and spatial features. According to the multi feature classification the pixels in an image are separated into reliable and unreliable ones. When, the reliable pixels can be conveniently identified by using the similar labels. But, the unreliable pixels in an image are then classified by combining the multi feature classification results, by the way the classification uncertainties are minimized based on the MRF optimization. To verify the effectiveness of the proposed method, experiments are conducted on three multispectral high resolution images. The purpose of comparison has been achieved the several state-of-the-art multi feature classification methods. Moreover, classifier (i.e., Gustafson kessel classifier) are used to evaluate the performance of the proposed framework. It is demonstrate the proposed method can effectively fuse multiple features, and result of the other approaches compared.

Keywords: Classification, Onerous, Markov Random Field (MRF) and Multi feature.

1. INTRODUCTION

In recent years, high spatial resolution images has provided galore detailed and structural information for the availability of land surface. However the evolution of spatial resolution can lead to decrease in interclass variation and increase in intraclass variation in an image, which specifically minimize the separability among multiple classes in the spectral domain. Consequently, high resolution-image interpretation is inadequate for spectral-based classification approaches.

In this letter, spatial distribution of pixels is exploited to enhance the feature space for improved the classification performance. Although, classification had been developed by using various spatial features, it is complex to describe various kind of scenes due to the difficult of geospatial landscape. A familiar method to address this complexity is to stack the multiple features as a vector and it gives the input into the classifier. Simple and convenient implementation VS approach has been widely used. In, the high-dimensional feature space image that needs quite large memory space and high effective workload.

In this context, we propose a novel clustering based multiple-feature fusion approach for the classification of remote sensing images. The spatial features recruit in this framework include differential morphological profiles(DMPs), gray-level co-occurrence matrix(GLCM), multi-index features(MIFs), and gabor filter is used to improve the features in an image. By concatenating the certain kind of spatial feature and spectral bands, a sequence of classifications are performed. Consequently, the pixels in an image are separated into reliable and unreliable pixels, based on the multi feature classification results. MV is used to identify the labels of reliable pixels, where the most continuous class achieved by different classification is assigned to the pixel. After that, identification of unreliable pixels by taking the neighborhood information, but the information from an individual pixel is uncomfortable to classify them. Hence, we propose the framework to identify the labels of the unreliable pixels since, MRF optimized decision is used by considering the probabilistic outputs from adjacent pixels.

Proposed Framework

Block diagram is given by the work modules;

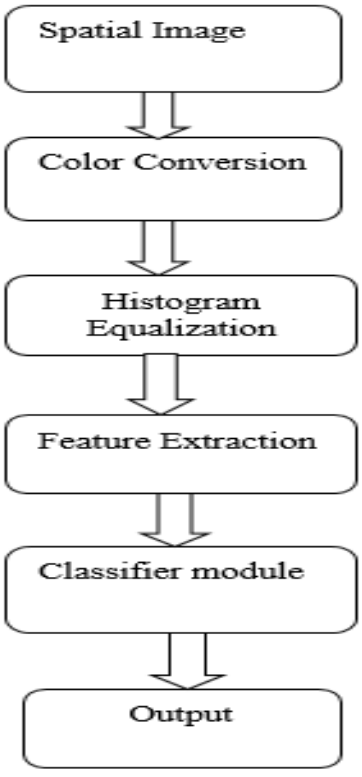

Fig.1. Block diagram

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2. MULTIFEATURE EXTRACTION

Differential Morphological Profiles

In DMPs are implemented based on the closing and opening by regenerate with the increasing size of structural elements (SEs). As the integration of DMPs, MPs are widely used to measuring the gray value variation of the MPs for every process of increasing size (SEs). In subsequently, a series of SEs, with different size are considered to exploit the multi scale characteristics of an image in this letter.

Gray-Level-Co-Occurrence Matrix

In GLCM describes how often pairs of spatial relationship of the specific value occur in a window, it can be expressed as $f_{GLCM}(x, y)$ with x and y are represents the size of the window and texture measures. A single window size is insufficient to describe the spatial information at different scales due to the multi scale characteristic in the high spatial resolution image. However, a sequence of window size are employed in our framework for the generation of GLCM. Therefore, depends on the GLCM results, texture information in an image is described by using several statistical measures.

Multi Index Features

In MIFs, aim at used to replace the high dimensional and low-level features for image by the indication result of low-dimensional information. In this context, MIFs are invented by the morphological building index, normalized difference vegetation index and morphological shadow index.

3. GABOR FILTER

Gabor filters are act as a self-similar and where all the filters can be generated from mono mother wavelet by performing rotation and dilation. The filter has an imaginary and also real component that indicating orthogonal directions. Gabor filter are widely used to extract the features of an image.

Fig.2. Feature extraction of reliable pixels

Fig.3. Feature extraction of unreliable pixels

MRF-Based multi feature combining scheme

A novel framework is developed for integrating the multi-features sources, to effectively take the merits of multiple features and describe complex image scenes, which is invented the following steps,

1) Mono-feature classification

A particular kind of spatial features and spectral bands are combined and used for producing both class label (crisp) and probabilistic (soft) outputs for each individual pixel.

2) Describing reliable and unreliable pixels

In an image the pixels present are classified into two types namely reliable and unreliable pixels. This classification is made depending on the results of mono-feature classification and full-spectral classification. In this framework, the pixels that are regarded to the identical labels by all classifiers are described as the reliable pixels, whereas the remaining pixels are assigned as unreliable pixels.

4. CLASSIFIER

It is a classifier which is used to find the Euclidean distance. It is an unsupervised learning method, fixed an image as the number of clusters, grouped were separated into more pixels and have high similarity of its Euclidean distance. By using GK classifier the used and unused surfaces are identified.
Common choises for Z:
Z=1=>Euclidean distance=>FCM
Z=diagonal accounting for variances along the axis of the data set

Here the equation of the diagonal and Euclidean distance has been given by,

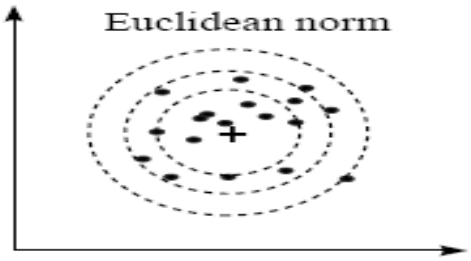

Fig.4. Euclidean norm

5. RESULT

Euclidean Median

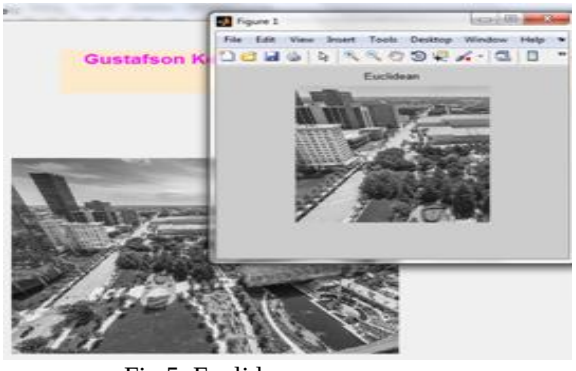

Fig.5. Euclidean mean

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Then the third step is we uses the euclidian median to find out the orgin of the image and the center position distance is calculated and segment the image.

Used area

Then the fourth step is to calculate the reliable and unreliable pixel for the spatial image. The used area in the image is obtained finally.

Fig.6. Used area

Unused area

The unused area in the image is obtained.

Fig.7. Unused area

6. CONCLUSION

In this project, the proposed framework for the classification of remote sensing image by combining multiple-feature sources, depends on the multiple spectral and single feature classification. The proposed method separated the pixels in an image into reliable and unreliable ones. Reliable pixels are classified based on MV, and the unreliable pixels are identified by using the neighboring response of the probabilistic outputs. In this, proposed framework the time complexity of the pixel identification will be reduced by using advanced classifier. It can be used to provide the effective solution of the unreliable pixels identification, and the accuracy of that pixels are improved.

REFERENCES

[1] Qikai Lu, Xin Huang, Jun Li, and Liangpei Zhang, "A novel MRF-based multifeature fusion for classification of remote sensing images," Sep 2016.

[2] X. Huang, Q. Lu, and L. Zhang, "A multi-index learning approach for classification of high-resolution remotely sensed images over urban areas," *ISPRS J. Photogramm. Remote Sens.*, vol. 90, pp. 36–48, Apr. 2014.

[3] X. Huang and L. Zhang, "An SVM ensemble approach combining spectral, structural, and semantic features for the classification of high resolution remotely sensed imagery," *IEEE Trans. Geosci. Remote Sens.*, vol. 51, no. 1, pp. 257–272, Jan. 2013.

[4] F. R. D. Siqueira, W. R. Schwartz, and H. Pedrini, "Multi-scale gray level co-occurrence matrices for texture description," *Neurocomputing*, vol. 120, pp. 336–345, Nov. 2013.

[5] L. Zhang, L. Zhang, D. Tao, and X. Huang, "On combining multiple features for hyperspectral remote sensing image classification," *IEEE Trans. Geosci. Remote Sens.*, vol. 50, no. 3, pp. 879–893, Mar. 2012.

[6] L.Bruzzone and L.Carlin, "A multilevel context-based system for classification of very high spatial resolution images," *IEEE Trans. Geosci. Remote Sens.*, vol. 44, no. 9, pp. 2587–2600, Sep. 2006.

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