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CLASSIFICATION OF LAND USING MULTI SVM ALGORITHM

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Abstract

Satellite image processing involves grouping the values of the image pixels into various meaningful categories. There are various image classification methods and techniques are available. In the existing method, the semantic segmentation is used to segment the satellite data. In the proposed system, self-organizing maps is used as the clustering technique. Self-organizing maps are used to learn and to cluster data based on similarity, topology. They are used to reduce the dimensionality of data. These self-organizing maps are inspired from the sensory and the motor mappings present in the mammal brain, which appears to be automatically organize the information topologically. Ensemble classifiers makes from many weak learners into one high dimensional ensemble model. The proposed technique is ensemble clustering with subspace discriminant algorithm used for the classification of satellite data into water, agriculture, barren land, green land. The ensemble classifier gives the best result when compared to the other existing methods.

Keywords: Satellite image, classification, segmentation, self-organizing maps, ensemble classifier.

1. Introduction

The digital image is known for processing a two-dimensional[19] picture by a digital computer. The digital image consists of an array of real or complex numbers which are represented by a finite number of bits. The image processing consists of digitizer, image processor, digital computer, storage, operator console and display. The digitizer involves in the process of converting image into a numerical representation for input into a computer. Some of the common digitizers are microdensitometer, flying spot scanner, image dissector, Videocon camera, photosensitive solid-state arrays.

The functions of image processor are image acquisition, storage, preprocessing, segmentation, representation, recognition, and interpretation and then displays the final resulting image. The process of digitalization involves sampling, quantization. There are five fundamental image processing techniques to process an image. They include image enhancement, restoration, analysis, compression, synthesis.

The image enhancement results in improving the qualities of an image, image's contrast and brightness. The image restoration restores the images with problems like geometric distortions, improper focus, noise and camera motion.Image analysis results in numerical or graphical information based on the characteristics of an image. Image compression and decompression results in reducing the data content in order to describe the image.

There are many redundant information in the images, the compression process removes all the redundancies in the satellite images. The compression reduces the size of the images, so that it is efficient for storage and transportation. The images which are acquired from satellite are helpful in tracking of earth resources, geographical mapping, weather forecasting, flood control, and other environmental applications. It is also used for automatically detecting and recognition of printed characteristics.

2. Related works

"Clustering Validation of CLARA and K-Means Using Silhouette &DUNN Measures on Iris Dataset-2019.

This paper is regarding the comparison of two techniques; Clustering Large Applications (CLARA) clustering and K-Means clustering [1] using popular Iris dataset. CLARA clustering and K-Means clustering are the two techniques of "partitioning based" clustering. One considers medoids using some random sample data to form a cluster whereas the other considers centroid (means) of the dataset to form a cluster. In this paper, Cluster plot, Silhouette plot and Dunn Index on Iris dataset are shown for both the techniques. These all are used for "cluster validation". The "Silhouette Analysis" is the measurement of an approximated average distance among the clusters.2. "A change detection model based on neighbourhood correlation image analysis and decision tree classification" by JunghoIm, John R. Jensen.

Andrea paoli, Senior Member, and EdoardoPasolli, Student Member et al [28] Clustering of Hyperspectral Images Based on Multiobjective Particle Swarm Optimization IEEE-2020.

In this paper, we present a new methodology for clustering hyper spectral images. It aims at simultaneously solving the following three different issues: 1) estimation of the class statistical parameters; 2) detection of the best discriminative bands without requiring the a priori setting of their number by the user; and 3) estimation of the number of data classes characterizing the considered image. It is formulated within a multi objective particle swarm optimization (MOPSO) framework and is guided by three different optimization criteria, which are the log-likelihood function, the Bhattacharyya statistical distance between classes, and the minimum description length (MDL).

Qing Guo, Member, IEEE, Mengmeng He, and An Li et al[26] High-Resolution Remote-Sensing Image Registration Based on Angle Matching of Edge Point Features -2018.

This paper proposes an automatic and fast image registration method based on the angle matching of edge point features (epfs). First, the original image is transformed by the Haar wavelet to get the approximate image to improve the registration speed. Second, edges in different source images are extracted by different edge detectors. Then, edge line features are transformed into epfs to get accurate positioning and stable features. Third, the initial matching point pairs (mpps) are determined by the ratio—the minimum angle to the second minimum angle between feature vectors of epfs— which is less than a threshold. Fourth, in order to enhance the registration accuracy, the random sample consensus is improved by adding the quality constraint condition to delete error mpps. Finally, the block thought is used to uniformly choose mpps to calculate the affine transform parameters, which avoids the local optimal problem and further improves the registration accuracy. Multiple high-resolution remote-sensing[4] datasets of registration experimental results indicate that the proposed method is fast implemented and has high accuracy and effectiveness in processing efficiency.

Konrad Schindler, Member, IEEE et al[33] An Overview and Comparison of Smooth Labelling Methods for Land-Cover Classification -2012.

This paper gives a systematic overview of image classification methods, which impose a smoothness prior on the labels. Both local filtering-type approaches and global random field models developed in other fields of image processing are reviewed, and two new methods are proposed. A main message of the paper is that when classifying data of high spatial resolution[8ass], smoothness greatly improves the accuracy of the result—in our experiments up to 33%. A further finding is that global random field models outperform local filtering methods and should be more widely adopted for remote sensing. Finally, the evaluation confirms that all methods already over smooth when most

effective, pointing out that there is a need to include more and more complex prior information into the classification process[9].

Zohreh S. Hosseini, Student Member, IEEE, Mohsen Mahoor, Student Member, IEEE and Amin Khodaei, Senior Member, IEEE,AMI-Enabled Distribution Network Line Outage Identification via Multi-Label SVM. - 2018.

This letter proposes an effective data mining method in identifying distribution network line outages by leveraging data collected through Advanced Metering Infrastructure (AMI). The line outage identification method is developed based on a Multi-Label Support Vector Machine (ML-SVM) classification scheme that utilizes the status of customers' smart meters as input data and accordingly identifies the outage/operational status of distribution lines. The Fβ-score is proposed to validate the performance of the classifier through numerical simulations.

3. Existing system

In the existing system, the Convolutional neural network is used. It is one of the deep learning algorithms. The convolutional neural network consists of several layers. They are convolutional layer, pooling layer, fully connecter layer.Convolutional Neural Networks (CNN) defines the powerful class of models.They have thelimits and have certain fundamental drawbacks in their network. The serious drawbacks of the convolutional neural network is that they do not encode the position and the orientation of the multiple images.They do not consider the orientation and spatial relationships between the images. They lacks in the ability to be spatially invariant to the input image.

3. Proposed method for Modified classification

In this paper, a self-organizing map or self-organizing feature map is a one type of artificial neural network, which is trained using unsupervised learning. The multi support vector machine algorithm is used for classification of land from the satellite images. The random subspace ensemble improves the accuracy of discriminant analysis. The advantage of subspace ensembles is using less memory than ensembles with all predictors and also handles the missing value.

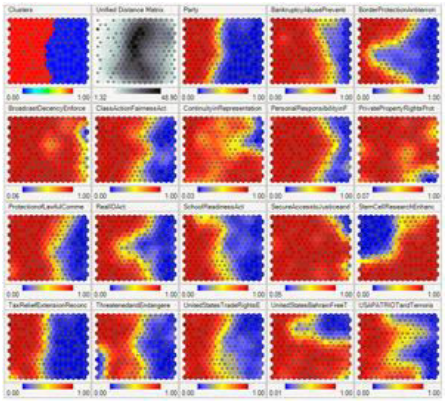


FIGURE:3.1 Self organizing maps

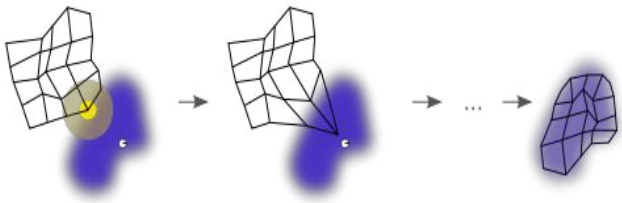
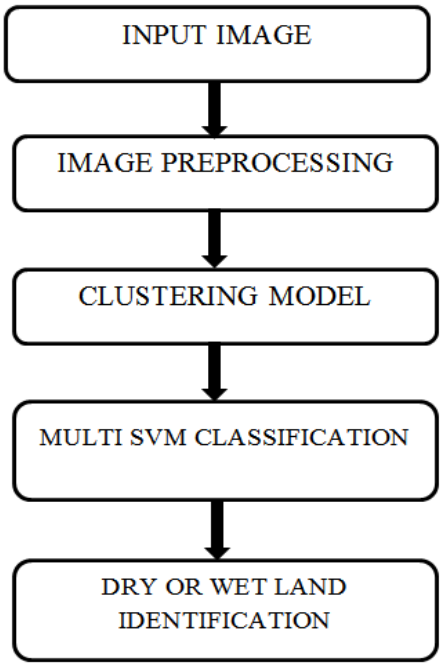


FIGURE:3.2 Clustering

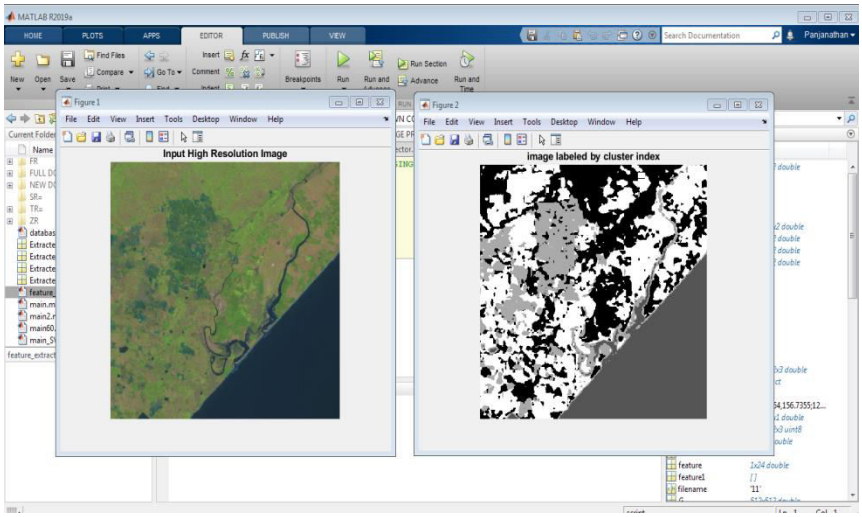
Block Diagram



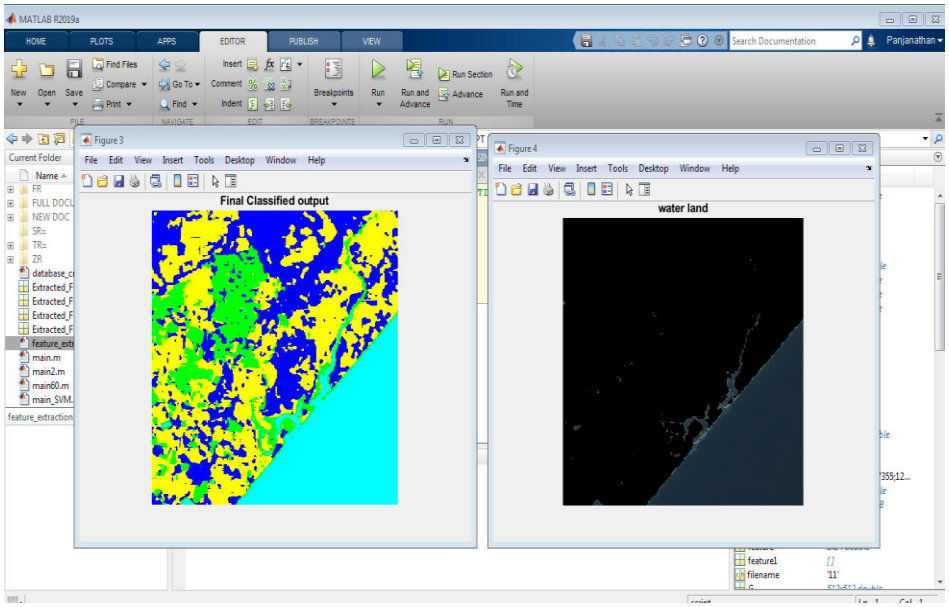
4. Resultsand discussion

The results and discussion obtained by the proposed method is used for the classification of land from the satellite image.

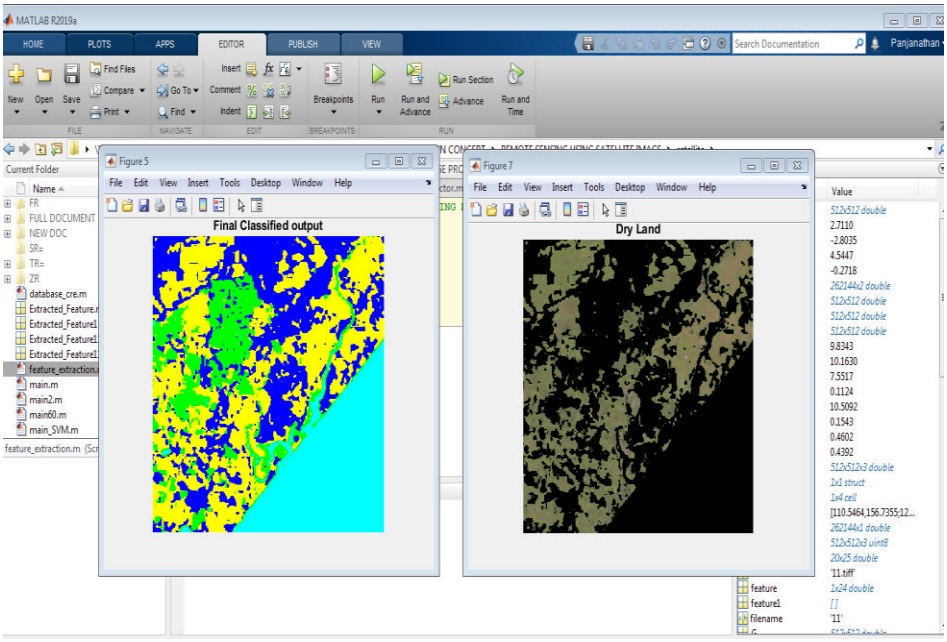
Input Images



Water land



Dry land



5. Conclusion

In this paper, proposed to address the problems of unsupervised classification in VHR panchromatic satellite images by using an HDP_IBPs model. Our contribution is, to combining the HDP with the IBP to consider the hierarchical spatial information of satellite images, for propose a nonparametric Bayesian classification[9]algorithm. On the one hand, the panchromatic image automatically classifies, without the knowledge of the number of classes in an unsupervised way with the help of HDP_IBPs model. On the other hand, the hierarchical spatial information is built in our model to make sure the spatial consistency of the classification results. However, it is also possible to apply the proposed model to multispectral satellite images by choosing a reasonable topic distribution (e.g., Gaussian distribution) instead of a multinomial distribution. In the future, we will extend the proposed model to analyze multispectral remote sensing images.

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