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Fuzzy C-Means Algorithm Based Satellite Image Segmentation

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Article Info	ABSTRACT
	In this paper, an improved version of Fuzzy C-Means (FCM) algorithm is proposed efficiently to segment the satellite images. Segmentation of Image is one of the promising and active researches in recent years. As literature prove that region segmentation will produce better results. Human visual perception is more effective than any machine vision systems for extracting semantic information from image. A FCM algorithm is developed to estimate parameters of the prior probabilities and likelihood probabilities. So FCM algorithm is used for segmenting background and island extraction is done based on pixel intensity. Finally Peak Signal to Noise Ratio (PSNR) is calculated and it has better results than other.

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1. INTRODUCTION

Image Segmentation helps in extracting the similar features from the images based on their color, intensity and groups them together using various segmentation techniques. Before performing segmentation on images, sometimes image denoising must be done to remove the noises from the images and certain edge detectors like sobel, prewitt, kiresh are employed.

2. BACKGROUND

Satellite image segmentation using interactive approach to multi-objective genetic fuzzy clustering is explained in [1]. This algorithm concurrently finds the clustering solution as well as evolves the set of legality measures that are to be optimized at the same time. Human decision maker is interacts with method and best set is obtained using adaptive learning of validity measure with final result. Moth-flame based optimization for satellite image segmentation with multilevel thresholding is presented in [2]. Multilevel thresholding moth-flame optimization algorithm for multilevel thresholding was developed. Most of the satellite images are tested using this method. There are five existing methods are compared here for solving thresholding problems like differential evolution algorithm, genetic algorithm, particle swarm optimization, artificial bee colony algorithm and moth-flame optimization algorithm. Satellite image segmentation using different techniques is discussed in [3]. Thresholding Technique, Active Contours and K-means Clustering are the three techniques used for segmenting a satellite image and estimated the best method when compared to other method.

Comparative study about Satellite image segmentation using clustering algorithms based on performance of Fuzzy is described in [4]. Clustering approaches based on possibilistic c means, possibilistic fuzzy c means and fuzzy-C-Means is compared and these algorithms were tested with performance with more number of satellites. Comparative study about satellite image segmentation using genetic algorithm

based on different objective functions is presented in [5]. Different objective function is employed for image segmentation using genetic algorithm. Tsallis, Otsu and Kapur's are the three objective functions compared based on genetic algorithm for optimal multilevel thresholding. Satellite and medical image segmentation based on multiple kernel fuzzy c-Means algorithm with ALS method is explained in [6]. Initial contour curve is generated using multiple kernel fuzzy c-means during the curve propagation while leaking at the boundary. Finally different information's are combined using multiple kernel fuzzy c-means in segmentation algorithm.Image super resolution reconstruction using iterative adaptive regularization method and genetic algorithm explained in [7]. Media Access Delay and Throughput Analysis of Voice Codec with Silence Suppression on Wireless Ad Hoc Network also described in [8]. An integrated interactive technique for image segmentation using stack based seeded region growing and thresholding method is discussed in [9]. For analyzing the optimal performance of pest image segmentation is discussed as in [10]. Image segmentation based on doubly truncated generalized Laplace mixture model and k means clustering is discussed in [11].

3.   THE PROBLEM

Some of the problems in satellite image segmentation system are the segmentation of the satellite image may vary with the intensity variations in the satellite image. So in order to overcome the intensities variations in the segmented image we are proposing a new satellite image segmentation method.

4.   PROPOSED SOLUTION

In this proposed system, satellite images are segmented using FCM algorithm. Before segmentation pre processing is done using median filter to denoise an image to get better results. Here, first the images are segmented using this algorithm. FCM parameters are used to determine the latent variable distribution. Block diagram of the proposed image segmentation is given below.

FCM is a method of clustering which allows one piece of data to belong to two or more clusters. It is maximum used for pattern recognition. Clustering or cluster analysis involves assigning data points to clusters (also called buckets, bins, or classes), or homogeneous classes, such that items in the same class or cluster are as similar as possible, while items belonging to different classes are as dissimilar as possible.
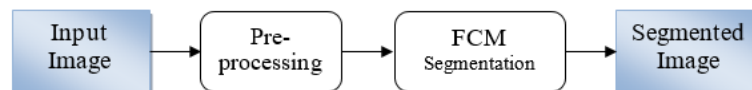

Figure 1. Block Diagram of the Proposed Satellite Image Segmentation

5.   RESULTS AND DISCUSSION

This step describes the overall results of the proposed system. Normally images will suffer from the noise. Median filter is proposed in this paper to denoise the image. This section tells about proposed segmenting scheme using FCM is oppressed for satellite images. Performance of the proposed scheme is computed by PSNR value. Figure 2 shows the proposed (a) original image, (b) segmented image.

(a)   (b)
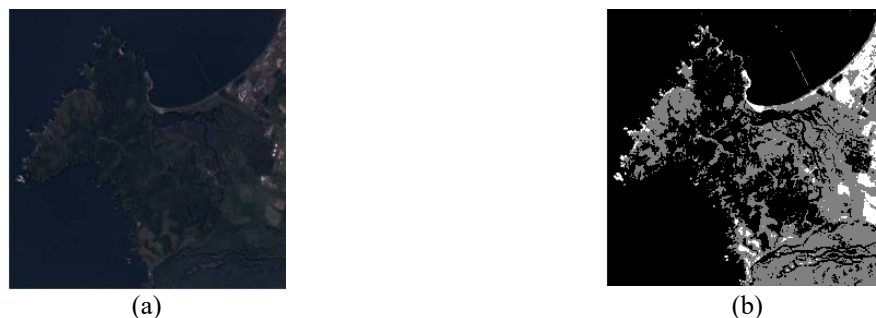
Figure 2. (a) Original image and (b) Segmented Image using FCM algorithm

6.   CONCLUSION

A novel approach to segment the satellite images were developed using FCM is proposed. From the investigational results the image segmentation using the proposed method was found to be more visually tempting than other existing algorithms. Figure 2 shows the proposed segmented image using FCM algorithm technique. The results show that FCM algorithm method is a very efficient optimization and obtained PSNR value is 36.23. Future scope of this paper is to use the advanced segmentation technique to obtain more accurate result.

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