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K-Means Algorithm based Satellite Image Segmentation

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Abstract: In this study, an improved version of K-means algorithm is proposed efficiently to segment the satellite images. Segmentation of image is one of the promising and active researches in recent year. As literature prove that region segmentation will produce better results. Human visual perception is more efficient than any machine vision systems for extracting semantic information from an image. A K-means algorithm is developed to estimate parameters of the prior probabilities and likelihood probabilities. So, K-means 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.

Key words: Satellite image, segmentation, K-means, PSNR, semantic, visual perception

INTRODUCTION

Satellite image segmentation using the interactive approach to multi-objective genetic fuzzy clustering is explained by Mukhopadhyay (2016). This algorithm concurrently finds the clustering solution as well as evolves the set of legal measures that are to be optimized at the same time. The human decision maker interacts with a method and best set is obtained using adaptive learning of validity measure with a final result. Moth-flame based optimization for satellite image segmentation with multilevel thresholding is presented by Muangkote *et al.* (2016). Multilevel thresholding Moth-Flame Optimization algorithm for multilevel thresholding was developed. Most of the satellite images are tested using this method. There are 5 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 by Deepika and Vishnu (2015). Thresholding technique, active contours and K-means clustering are the three methods used for segmenting a satellite image and estimated the best method when compared to another method.

Comparative study about satellite image segmentation using clustering algorithms based on a performance of fuzzy is described by Ganesan *et al.* (2015). 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 the Genetic algorithm based on different objective functions is presented by Pare *et al.* (2015). The different objective function is employed for image segmentation using the 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 are explained by Yugander *et al.* (2012). In this research study discussed the land use and land cover classification of LISS-III satellite image using KNN and decision tree (Upadhyay *et al.*, 2016a). Image super-resolution using wavelet transformation based Genetic algorithm is presented in this study (Panda and Jena, 2016). Initial contour curve is generated using multiple kernel fuzzy C-means during the curve propagation while leaking at the boundary and the combine technique for classification of IRS P6 LISS-III satellite images (Upadhyay *et al.*, 2016b). Finally, different information's are combined using multiple kernel fuzzy C-means in segmentation algorithm and the Image super-resolution reconstruction using iterative adaptive regularization method and Genetic algorithm (Panda *et al.*, 2015).

MATERIALS AND METHODS

In this proposed system, satellite images are segmented using K-means algorithm. Before segmentation preprocessing is done using the median filter to denoise a picture to get better results. Here, first, the images are segmented using this algorithm. K-means parameters are used to determine the latent variable distribution. Block diagram of the proposed image segmentation is given in Fig. 1.

Vector quantization method is also called as K-means clustering originally from signal processing that is admired for cluster study in data mining. K-means clustering is to panel n annotations into K-groups in which each observation belongs to the cluster with the bordering mean, helping as a prototype of the group. This outcome in a partitioning of the data space into Voronoi cells.

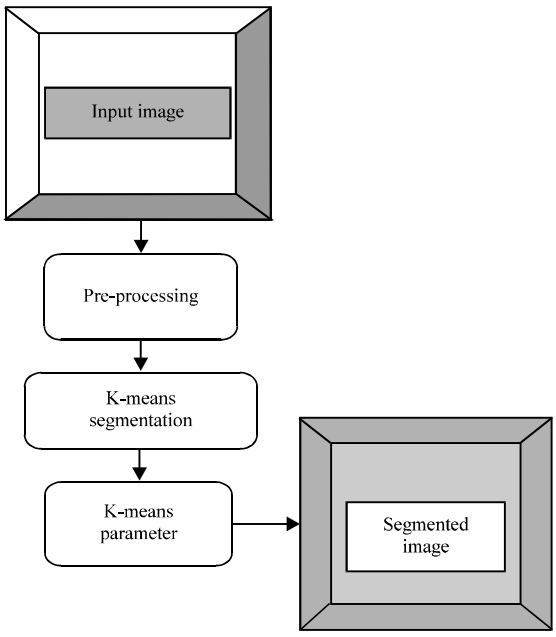

Fig. 1: Block diagram of the proposed satellite image segmentation

(a)

(b)

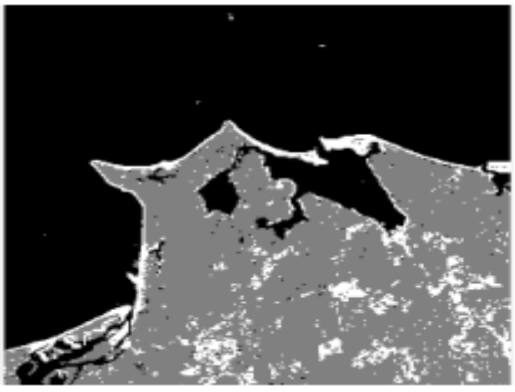

Fig. 2: a) Original image and b) Segmented image using K-means algorithm

RESULTS AND DISCUSSION

This step describes the overall performance of the proposed system. Images will suffer from the noise. The median filter is proposed in this study to denoise the picture. This study tells about proposed segmenting scheme using K-means is oppressed for satellite images. The performance of the proposed scheme is computed by PSNR value. Figure 2 shows the proposed original image, segmented image.

CONCLUSION

A novel approach to segment the Satellite images were developed using K-means 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 K-means algorithm technique. The results indicate that K-means algorithm method is a very efficient optimization and obtained PSNR value is 40.5. Future scope of this study is to use the advanced segmentation technique to get the more accurate result.

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