K-Means Clustering Based Marine Image Segmentation

N. Manahoran [1], M.V. Srinath [2]

[1]*Rector-Research & Development Division, AMET University, Kanathur,Chennai, Tamilnadu, India*

[2]*Director, Master of computer Applications, S.T.E.T Women's college, Manargudi, Thiruvarur, Tamilnadu, India*

[1] *directorresearch@ametuniv.ac.in,*[2]*sri_induja@rediffmail.com*

Abstract

The process of image segmentation scheme for marine images is used in area of marine applications in order to detect and identify any ships or boats when it is missed and is identified via satellite image are when the images are taken from a high distance. A system for the automatic identification and segmentation of an object over the water area is done by using K-Means clustering based segmentation algorithm is proposed in this paper. By using this algorithm a ship can be segmented and identified that object seen over the sea or ocean. When it is identified the ship is alone can be segmented from that image and is shown here. Peak Signal to Noise Ratio (PSNR) values are evaluated for obtaining the performance measures of our system.

Keyword: Marine Image, Segmentation, K-means, Clustering, PSNR.

1. Introduction

In the image processing field, image segmentation is said to as one of the important process to identify segment of an object from image. Some of the image segmentation technique is as discussed. A method for segmentation of Alzheimer's disease in MRI brain images is discussed in [1]. For brain regions texture features are extracted and is classified by the random forest classifier. A method to characterize the MRI brain image by extracting the features using FCM algorithm and is classified by using the SVM classifier into tumour affected and tumour free regions is discussed in [2]. A method that combines the unsupervised and semi-supervised classification for produce a fully automatic and efficient segmentation of brain images is discussed in [3]. First the median filter is applied to reduce the noise and then the background separation is done by the global thresholding and at last the FCM clustering is done for segmentation. Convolutional neural network based MRI brain image segmentation into a various tissue classes is discussed in [4]. The method uses the multiple patch sizes and multi scale information, on order to make sure that the method gets a precise segmentation details.

26

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 curve propagation while leaking at the boundary. Finally different information's are combined using several kernel fuzzy c-means in segmentation algorithm.

2. Proposed Methodology

Methodology of our proposed scheme explains about the procedure of the segmentation process and its working over the images in a stepwise manner. Fig 1 shows the complete framework of our proposed system.
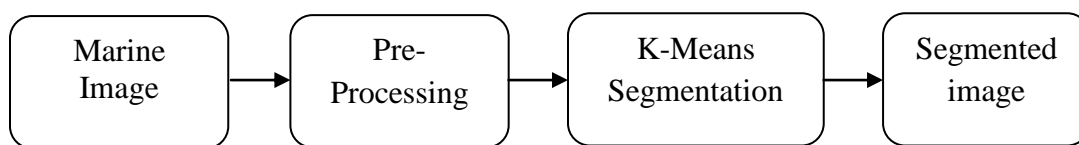

Figure 1 Block Diagram of K-Means based Marine Image Segmentation

2.1 Pre-Processing

Pre-processing step is the basic step in any image segmentation systems. This step id carried out so as to denoise the naturally available noises from the given input images and also the colour conversion process occurs where the colour images are changed into gray scale images so that the segmentation step can be made easier.

2.2 K-Means Based Segmentation

Following the pre-processing step the next step is the segmentation process from which the segmentation image is obtained from the original images. The pre-processed images are taken as an input to the segmentation process in which the K-Means algorithm uses the K-Means parameters are used to determine the latent variable distribution. Vector quantization method is also called as k-means clustering, initially from signal processing, which is admired for cluster study in data mining. To panel n annotations into k clusters, K-means clustering is used in which every observation belongs to the cluster with bordering mean, helping as a prototype of the

cluster. The segmentation outcomes will be obtained that the shape of the ship image will be shown.

3. Results

The results for our proposed marine image segmentation system by using the K-Means based segmentation algorithm are done. The images that are used here are the ship images that are taken from the long distance. The outputs are obtained as shown in fig 2. The below image is segmentation output images of the proposed method and is clearly understood that how the segmentation process of the ship image is extracted and segmented.
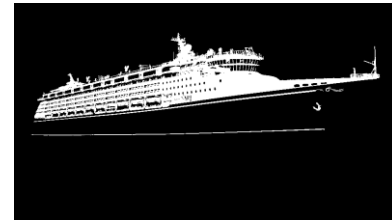
(a)   (b)

Figure 2 (a) Original Image (b) K-Means Segmented Output Image

4.   Conclusion

In the proposed system an image segmentation technique based on K-Means algorithm is explained. In this system marine image based segmentation is done for segmenting a ship image over a water surface. In this the ship is alone extracted and segmented from the water body as it is shown in the results. The performance calculation of our system is done by calculating the PSNR values of the output image and is of 91.5% of noise ratio.

Reference

1. Chaddad, A., Desrosiers, C., & Toews, M. (2016), "Local discriminative characterization of MRI for Alzheimer's disease". IEEE 13th International Symposium on Biomedical Imaging, pp. 1-5.

2. Halder, A., & Dobe, O. (2016), "Detection of tumor in brain MRI using fuzzy feature selection and support vector machine". IEEE International Conference on Advances in Computing, Communications and Informatics, pp. 1919-1923.

3. Al-Dmour, H., & Al-Ani, A. (2016), "MR Brain Image Segmentation Based on Unsupervised and Semi-Supervised Fuzzy Clustering Methods". IEEE International Conference on Digital Image Computing: Techniques and Applications, pp. 1-7.

4. Moeskops, P., Viergever, M. A., Mendrik, A. M., de Vries, L. S., Benders, M. J., & Išgum, I. (2016), "Automatic segmentation of MR brain images with a convolutional neural network". IEEE transactions on medical imaging, vol. 35, no. 5, pp. 1252-1261.

5. Pare, S., et al, (2015), "Satellite image segmentation based on different objective functions using genetic algorithm: a comparative study", IEEE International Conference on Digital Signal Processing, pp. 730-734.

6. Yugander, P., et al, (2012), "Multiple kernel fuzzy C-means algorithm with ALS method for satellite and medical image segmentation", IEEE International Conference on Devices, Circuits and Systems, pp. 244-248.