Image Segmentation by Clustering Methods: Performance Analysis

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Abstract

Image segmentation plays a significant role in computer vision. It aims at extracting meaningful objects lying in the image. Generally there is no unique method or approach for image segmentation. Clustering is a powerful technique that has been reached in image segmentation. The cluster analysis is to partition an image data set into a number of disjoint groups or clusters.
The clustering methods such as k means, improved k mean, fuzzy c mean (FCM) and improved fuzzy c mean algorithm (IFCM) have been proposed. K means clustering is one of the popular method because of its simplicity and computational efficiency. The number of iterations will be reduced in improved K compare to conventional K means. FCM algorithm has additional flexibility for the pixels to belong to multiple classes with varying degrees of membership. Demerit of conventional FCM is time consuming which is overcome by improved FCM. The experimental results exemplify that the proposed algorithms yields segmented gray scale image of perfect accuracy and the required computer time reasonable and also reveal the improved fuzzy c mean achieve better segmentation compare to others. The quality of segmented image is measured by statistical parameters: rand index (RI), global consistency error (GCE), variations of information (VOI) and boundary displacement error (BDE).

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Index Terms

Computer Science | Pattern Recognition

Key words

K means | improved k means | fuzzy c means
improved c means
rand index
global consistency error
variations of information