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FUZZY WAVELET-BASED COLOR IMAGE SEGMENTATION USING SELF-ORGANIZING NEURAL NETWORK

M. Arfan Jaffar, Muhammad Ishtiaq, Bilal Ahmed
Nawazish Naveed, Ayyaz Hussain and Anwar M. Mirza

Department of Computer Science
FAST-National University of Computer & Emerging Sciences
H-11/4, Islamabad, Pakistan
{ arfan.jaffar; m.ishtiaq; nawazish.naveed; ayyaz.hussain; anwar.m.mirza }@nu.edu.pk
balodhi@yahoo.com

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Abstract. *Image segmentation has been and is likely to be an important component of the content-based image acquisition and retrieval systems. This paper describes a new method for segmentation of color images. The proposed method uses two phases segmentation processes. In the* 1st *phase, segmentation is performed with the help of cluster validity measures and Spatial Fuzzy C-Mean (sFCM). HSV model helps in the decomposition of color image then FCM is applied separately on each component of HSV model. In the* 2nd *phase, for fine tuning, Kohonen's Self Organizing Map (SOM) neural network along with wavelets is used. SOM is a computationally expensive network. It has been observed that if SOM training performed on the wavelet-transformed image, then not only it reduces SOM training time but in this way makes more compact segments. The advantages of new method are: (i) it yields regions more homogeneous than those of other methods for color images; (ii) it reduces the spurious blobs; and (iii) it removes noisy spots. The technique presented in this paper is a powerful method for noisy color image segmentation and works for both single and multiple-feature data. Experiments were performed on standard color images. Experiments show better performance of the proposed method when compared with other approaches in practice.*

Keywords: Color image segmentation, Fuzzy c-mean, Spatial fuzzy c-mean, Cluster validity, Self-organizing neural network, Wavelets

1. **Introduction.** Image segmentation refers to the process of partitioning a digital image into multiple regions (sets of pixels). The goal of segmentation is to simplify and/or change the representation of an image into something that is more meaningful and easier to analyze [1, 2, 3, 4]. The result of image segmentation is a set of regions that collectively covers the entire image, or a set of contours extracted from the image. Each of the pixels in a region is similar with respect to some characteristics or computed property, such as color, intensity or texture. Adjacent regions are significantly different with respect to the same characteristics [5, 6]. The major application of image segmentation is Medical imaging, where it is used to locate tumors and other pathologies, measure tissue volumes, computer-guided surgery and treatment planning. Other applications of image segmentation include Content-Based Image Retrieval (CBIR), object recognition, matching of stereo pairs for 3-D reconstruction, navigation and artificial expert medical diagnosis [7].

The Content-based image retrieval systems search the repository of images based on features of the digital images rather than labels. Major features include texture, color, object structure or any other selective information that can be extracted from the image itself. According to [7], applications of CBIR systems include, expert medical systems,