Abstract

Although there are several color image segmentation algorithms proposed in the literature, the image segmentation task still remains a challenge, due to very high computational complexity involved in finding the segments that are as close as possible to the ground truth. This paper proposes a color image segmentation algorithm based on 4-D Histogram, using JND color and spatial connectivity of pixels. This algorithm is an improved version of the algorithm proposed earlier in [22], which was based on limitations of human vision perception. In this work we have successfully addressed two major drawbacks of earlier work, that is missing connectivity of color segments and higher computational complexity of the segmentation algorithm. The 4D color histogram of the image is determined using JND color similarity threshold and connectivity of the neighboring pixels, by comparing current pixel with the previously encountered immediate 8-neighbor pixels. Initial segments are then merged using a slightly higher JND threshold by applying concept of agglomeration. The proposed algorithm is first tested on synthetic image dataset to validate the proposed algorithm and then applied on images in the Berkeley
segmentation datasets, BSD300 and BSD500. The performance of the algorithm is estimated using Probabilistic Rand Index (PRI) and Peak Signal to Noise Ratio (PSNR). The proposed algorithm successfully identifies connected segments and shows improved results over CCH and JND color histogram based segmentation algorithms in terms of PRI, PSNR and computational complexity.

References

17. Raghu Krishnapuram, Hichem Frigui and olfa Nasraoui, "Fuzzy possibilistic shell clustering Algorithms and their application to boundary detection and surface approximation-


Index Terms

Computer Science
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Keywords

JND threshold, 4D Color Histogram, PRI, PSNR