

Automatic Multi-Level Thresholding Segmentation Based on Multi-Objective Optimization

Journal of Applied Computer Science & Mathematics, no. 13(6) /(2012), pp. 24-31.

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Abstract

In this paper, we present a new multi-level image thresholding technique, called Automatic Threshold based on Multi-objective Optimization "ATMO" that combines the flexibility of multi-objective fitness functions with the power of a Binary Particle Swarm Optimization algorithm "BPSO", for searching the "optimum" number of the thresholds and simultaneously the optimal thresholds of three criteria: the between-class variances criterion, the minimum error criterion and the entropy criterion. Some examples of test images are presented to compare our segmentation method, based on the multi-objective optimization approach with Otsu's, Kapur's and Kittler's methods. Our experimental results show that the thresholding method based on multi-objective optimization is more efficient than the classical Otsu's, Kapur's and Kittler's methods.

Keywords : Binary Particle Swarm Optimization, Image Segmentation, Image Thresholding, Multi-objective Optimization, Non-pare To Approach.

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