Optimal Multilevel Thresholding Selection for Brain MRI Image Segmentation based on Adaptive Wind Driven Optimization

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Abstract

Medical image processing is one of the real research regions in the most recent four decades. Numerous researchers have contributed very great algorithms and reported outstanding results. In this paper, adaptive wind driven optimization (AWDO) based multilevel thresholding is implemented for the segmentation Magnetic Resonance Image (MRI) brain images. The axial T2-weighted MRI brain images are considered for image segmentation. The effectiveness of the AWDO for multilevel thresholding of MR images is yet to be explored, and this paper presents humble contribution in this context. The optimal multilevel thresholding is found by maximizing the very popular objectives such as between class variance (Otsu method) and Kapur's entropy. The efficiency of proposed approach was compared with the outcomes of existing algorithms like RGA, GA, Nelder–Mead simplex, PSO, BF and ABF. To check the effectiveness of the proposed algorithm, experimental results are analyzed quantitatively and qualitatively. The results showed the superiority of the proposed approach regarding better segmentation results.

Keywords

Multilevel thresholding, brain MR image segmentation, adaptive wind driven optimization, qualitative and quantitative analysis.

1 Introduction

Image segmentation plays a crucial role in medical image analysis. It is frequently used to segment an image into independent regions, which preferably compares two various true objects (Patra, Gautam and Singla, 2014). For instance, image segmentation helps in diagnosing irregularity in the brain or any part of the body from the MRI scan. In no time MRI is the most well-known clinical analytic method for recognition of any cerebrum issue, as it is a finished non-intrusive technique. Thresholding is one of the most