Accepted Manuscript

Multi-spectral and panchromatic image fusion approach using stationary wavelet transform and swarm flower pollination optimization for remote sensing applications

Reham Gharbia, Aboul Ella Hassanien, Ali Hassan El-Baz, Mohamed Elhoseny, M. Gunasekaran

PII: S0167-739X(18)30831-8
DOI: https://doi.org/10.1016/j.future.2018.06.022
Reference: FUTURE 4284

To appear in: *Future Generation Computer Systems*

Received date : 5 April 2018
Revised date : 24 May 2018
Accepted date : 10 June 2018

Please cite this article as: R. Gharbia, A.E. Hassanien, A.H. El-Baz, M. Elhoseny, M. Gunasekaran, Multi-spectral and panchromatic image fusion approach using stationary wavelet transform and swarm flower pollination optimization for remote sensing applications, *Future Generation Computer Systems* (2018), https://doi.org/10.1016/j.future.2018.06.022

Multi-spectral and panchromatic image fusion approach using stationary wavelet transform and swarm flower pollination optimization for remote sensing applications

Reham Gharbia[a,f], Aboul Ella Hassanien[b,f], Ali Hassan El-Baz[c], Mohamed Elhoseny[d,f], M.Gunasekaran[e]

[a] *Nuclear Materials Authority, Egypt.*
[b] *Faculty of Computers and Information, Cairo University, Egypt.*
[c] *Faculty of science, Damietta University, Egypt.*
[d] *Faculty of Computers and Information, Mansoura University, Egypt*
[e] *University of California, Davis, USA*
[f] *Scientific Research Group in Egypt (SRGE)*
http://www.egyptscience.net

Abstract

This paper proposes a multi-spectral (MS) and panchromatic (Pan) image fusion approach based on the flower pollination algorithm optimization (FPA). The FPA is used to get an optimal fused image. The image fusion quality depends on the choice of the weight of fusion rule. The proposed approach uses FPA to optimize the weights of a fusion rule to make a perfect image fusion process. FPA is a nature-inspired algorithm, based on the characteristics of a flower pollination process. FPA averts trapping in local optimal solution. In this paper, the remote sensing image fusion based on flower pollination algorithm is compared to several states of the art image fusion approaches including Intensity-hue-saturation (IHS) image fusion; stationary wavelets transform image fusion based on the average weight fusion rule (SWT-AW) and the image fusion based on the particle swarm optimization (PSO). The experimental results used MODIS satellite series with spatial resolutions 250 m, 500 m, and 1 km, which are low spatial resolution and multispectral images; and Pan image of SPOT satellite is high spatial resolution 10 m to produce synthetic imagery at SPOT spatial resolutions and MODIS multispectral resolution at the same time. The experimental results prove that the proposed remote sensing image fusion approach can illustrate a better performance than the other approaches.