Jordan University of Science and Technology

Knowledge-Based Constrained Function Optimization Using Cultural Algorithms with an Enhanced Social Influence Metaphor

Authors: Mostafa Ali, Robert Reynolds, Rose Ali, and Ayad Salhieh

Abstract: In this research we present a new framework based on Cultural Algorithms using an enhanced social fabric influence function to solve nonlinearly constrained global optimization problems. We identify how knowledge sources used by Cultural Algorithms are combined to direct the decisions of the individual agents during the problem solving process using an influence function family based upon a Social Fabric metaphor. Guided interactions between the population swarms and these knowledge sources produced emergent phases of problem solving. This implies that the social interaction of individuals coupled with their interaction with a culture within which they are embedded provides a powerful vehicle for the solution of these problems. Results demonstrate that this approach can successfully extract interesting emergent patterns in the Belief space and improve the search efficiency by avoiding local Optima, and converge to an approximate global minimizer asymptotically. Different parameter combinations can affect the rate of solution.