

Approximate solutions of differential equations based on combined planning of genetic and ant colony algorithms

Nasser Mikaeilvand, Akram Javadi, Hassan Hosseinzdeh *

Abstract

Many of the applications in the areas of physics, chemistry, economic and ... can be described in terms of differential equations. Predictions, quantum mechanics, wave propagation and dynamics of capital market are one of these cases. Ant colony optimization (*ACO*) is an appropriate algorithm for finding approximate solutions to solve combinatorial optimization problems, in which, artificial ants by moving on the problem curve and leaving traces on the curve, just like real ants that leave signs on their movement path, cause the next generation artificial ants can provide better solutions to the problem. Genetic algorithm is a method based on mutation and crossover operators. Genetic algorithm has a wide search area that prevents the algorithm from trapping in local solution, and (*ACO*) algorithm has high accuracy and high convergence speed that the combination of these two algorithms create an algorithm with maximum efficiency. Therefore, the main goal of this research is investigation the compatibility and usability of new hybrid ant colony-genetic algorithm for solving ordinary and partial differential equations and creating accurate analytical solution to these types of equations.

*Department of Mathematics, Ardabil branch, Islamic Azad University, Ardabil, Iran.