

Exponentially adaptive sine-cosine algorithm for global optimization

*Mohd Falfazli Mat Jusof, Nurul Amira Mhd Rizal, Ahmad Azwan Abd Razak, Shuhairie
Mohammad, Ahmad Nor Kasruddin Nasir*

Faculty of Electrical and Electronics Engineering, Universiti Malaysia Pahang, Pekan, Pahang,
Malaysia

ABSTRACT

Sine-Cosine algorithm (SCA) is an optimization algorithm formulated based on mathematical Sine and Cosine terms. It is widely used to solve various optimization problems. However the algorithm performance in terms of accuracy is not at optimum level. This paper presents an improved SCA with a new adaptive strategy based on an exponential term. The exponential term is adopted to establish a relationship between searching agents step size and fitness cost. The agents step size is exponentially changed due to the change of the fitness cost. The proposed algorithm is tested with a set of benchmark functions in comparison to the original SCA. A statistical analysis of the algorithms performance in terms of their accuracy is conducted. A Wilcoxon Sign Rank test is adopted to check significance level of the proposed algorithm as compared to the original SCA. Based on the simulation conducted, the adaptive strategy has resulted a significance improvement of the accuracy and convergence speed.

KEYWORDS

Sine-Cosine algorithm; Exponential adaptive; Global optimization algorithm

ACKNOWLEDGMENT

This research work is financially supported by the Fundamental Research Grant Scheme (FRGS/1/2016/ICT02/UMP/02/1) with the RDU number RDU160103 which is awarded by the Ministry of Higher Education Malaysia (MOHE) via Research and Innovation Department, Universiti Malaysia Pahang (UMP) Malaysia.