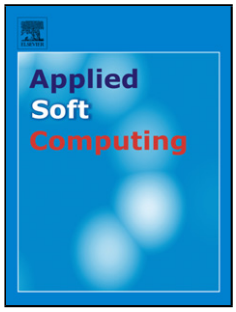

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PII: S1568-4946(18)30374-0
DOI: https://doi.org/10.1016/j.asoc.2018.06.040
Reference: ASOC 4956

To appear in: *Applied Soft Computing*

Received date: 31-10-2017
Revised date: 22-5-2018
Accepted date: 22-6-2018

Please cite this article as: Mohammadi F, Abdi H, A Modified Crow Search Algorithm (MCSA) for Solving Economic Load Dispatch Problem, *Applied Soft Computing Journal* (2018), https://doi.org/10.1016/j.asoc.2018.06.040

A Modified Crow Search Algorithm (MCSA) for Solving Economic Load Dispatch Problem

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Highligths:

- Applying a novel evolutionary optimization algorithm namely MCSA to ELD problem.
- Proposing two modification methods for improving the CSA performance.
- Applying the MCSA to five well-known ELD test systems.
- Employing four well-known benchmark functions to verify the MCSA.
- Addressing the MCSA as a highly competitive with some previous algorithms.

Abstract

This paper presents a novel evolutionary optimization algorithm namely the modified crow search algorithm (MCSA) for solving the non-convex economic load dispatch (ELD) problem which improves the crow search algorithm (CSA) by an innovative selection of the crows and adaptive adjustment of the flight length. MCSA is a population-based technique based on the intelligent behavior of the crows in finding food sources. In MCSA, each crow saves its food in hiding-places for the time it needs. Also, each crow searches environment to find the better foods by stealthily following other crows to discover their hiding-places. The proposed MCSA develops the search capability of crows in the original CSA and introduces a new way by which a destination is selected by a crow to follow. To indicate the applicability of MCSA in the ELD problem, it is applied on three different well-known test systems. The results are compared in terms of the solution quality, robustness, and computing time with other methods implying that the proposed method has a superior performance than the other techniques.

Keywords: Economic Load Dispatch (ELD), Evolutionary Algorithms, Modified Crow Search Algorithm (MCSA), Optimization.

Nomenclature

a_i, b_i, c_i	cost curve coefficients of the ith unit	Nc	number of crows in the flock
e_i, d_i	valve-point effects coefficients of the ith unit	$itrmax$	maximum number of iteration of the algorithm
P_i	generating output power of the ith unit	$X^{i,itr}$	position vector of ith crow at the iteration itr
P_i^{min}, P_i^{max}	minimum and maximum generation capacities of the ith unit, respectively	d	the number of decision variables