

Simulated kalman filter with modified measurement, substitution mutation and hamming distance calculation for solving traveling salesman problem

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ABSTRACT

Simulated Kalman Filter (SKF) solves optimization problems by finding the estimate of the optimum solution. As a multi-agent algorithm, every agent in the population acts as a Kalman filter by using a standard Kalman filter framework, which includes a simulated measurement process and a best-so-far solution as a reference. This paper presented an overview of the research progress in SKF from the day it was introduced until the present day, discussing the progress, improvements, modifications, and applications of SKF. The fundamental and standard algorithm were first introduced. Then, the work on the algorithm improvements was surveyed. Finally, the remaining unresolved problems and some directions of SKF research were discussed. We reviewed 57 SKF papers. 16 of them on fundamental improvements, 9 on extension of the algorithm to discrete problems and 25 on their applications. Researchers have worked on ideas to improve exploration capability to prevent premature convergence by trying prediction operators, opposition-based learning, and different iteration strategies. There were also attempts to hybridize SKF with other famous algorithms such as Particle Swarm Optimization (PSO), Gravitational Search Algorithm (GSA), and Sine Cosine Algorithm (SCA) to improve its performance. Lastly, a single-agent variant of SKF and a multi-objective SKF were introduced. SKF algorithms and its variants have been implemented in at least nine areas of applications: drill path optimization, airport gate allocation problem (AGAP), assembly sequence planning (ASP), system identification, feature selection, image template matching, controller tuning, wireless sensor network, and engineering design problem. The literature reviewed solely depended on the keyword search that contained the terms simulated Kalman filter from December 2015 to the present date. This is the first review paper on SKF. It is hoped that this survey would be beneficial for the researchers of this area and attracting interest towards the algorithm.

KEYWORDS

Combinatorial; Simulated kalman filter; Travelling salesman problem

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