A Discrete Multi Objective Artificial Bee Colony Algorithm for a Real World Electronic Device Testing Machine Allocation Problem

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Original Article

Keywords: electronic device, machine allocation, multi-objective optimization, artificial bee colony algorithm

Posted Date: January 20th, 2021

DOI: <https://doi.org/10.21203/rs.3.rs-149344/v1>

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Abstract

This paper studies the Electronic Device Testing Machine Allocation Problem (EDTMAP), aiming to improve the production of electronic devices and reduce the scheduling distance of testing machines through reasonable machine allocation. Firstly, a mathematical model is formulated for the EDTMAP to maximize both production and the opposite of the scheduling distance of testing machines. Secondly, we develop a Discrete Multi Objective Artificial Bee Colony (DMOABC) algorithm to solve the EDTMAP. A crossover operator and a local search operator are designed to improve the exploration and exploitation of the algorithm, respectively. Some numerical experiments are designed to evaluate the performance of the proposed algorithm. The experimental results demonstrate the superiority of the proposed algorithm compared with NSGA-II and SPEA2. Finally, the mathematical model and the DMOABC algorithm are applied to a real world factory that tests radio frequency modules. The result also verifies our method can significantly improve production and reduce the scheduling distance of testing machines.

Full Text

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Figures

Figure 1

Procedure of DMOABC algorithm

Figure 2

Pareto front comparisons of DMOABC, NSGA-II, and SPEA2

Figure 3

The structure diagram of WRFM

Figure 4

The production line of WRFM

Figure 5

Pareto front solutions of case