A new multiobjective tiki-taka algorithm for optimization of assembly line balancing

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ABSTRACT

Purpose: This study aims to propose a new multiobjective optimization metaheuristic based on the tiki-taka algorithm (TTA). The proposed multiobjective TTA (MOTTA) was implemented for a simple assembly line balancing type E (SALB-E), which aimed to minimize the cycle time and workstation number simultaneously. **Design/methodology/approach:** TTA is a new metaheuristic inspired by the tiki-taka playing style in a football match. The TTA is previously designed for a single-objective optimization, but this study extends TTA into a multiobjective optimization. The MOTTA mimics the short passing and player movement in tiki-taka to control the game. The algorithm also utilizes unsuccessful ball pass and multiple key players to enhance the exploration. MOTTA was tested against popular CEC09 benchmark functions. **Findings:** The computational experiments indicated that MOTTA had better results in 82% of the cases from the CEC09 benchmark functions. In addition, MOTTA successfully found 83.3% of the Pareto optimal solution in the SALB-E optimization and showed tremendous performance in the spread and distribution indicators, which were associated with the multiple key players in the algorithm. **Originality/value:** MOTTA exploits the information from all players to move to a new position. The algorithm makes all solution candidates have contributions to the algorithm convergence.

KEYWORDS

Line balancing; Metaheuristic; MOTTA; Multiobjective optimization; Tiki-taka algorithm

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