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A Modified Ant Colony Algorithm to determine the Initial Basic Feasible Solution in Balanced Transportation Problems

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The transportation problem is a special problem of logistics management in Operations Research. It considers how to manage resources optimally. The problem is formulated based on linear programming, and the primary objective is to minimize the total cost of transporting the goods from each distribution centre to various warehouses. Based on the amount of supply available at each distribution centre and the amount of demand for warehouses, this problem consists of two types. They are balanced and unbalanced transportation problems. The main step in solving the transportation problem is to obtain an initial basic feasible solution. The optimal solution is efficiently selected according to the accuracy of that solution value. Accordingly, the main objective of this research paper is to test the accuracy of the solution obtained by modifying the ant colony algorithm and applying it to balanced transportation problem (BTP). In this study, the ant colony optimization algorithm, which is a heuristic optimization process based on the foraging behavior of ants, is applied to seek the initial basic feasible solutions. The proposed algorithm is designed to be applicable to transportation problems. The proposed algorithm was implemented using MATLAB to solve some BTPs. Here, 25 problems have been tested, and the algorithm has provided solutions with equal efficiency with an optimal solution of 92%. Its solutions were compared with those of the existing methods for BTPs. Thereby It has been shown that the initial basic feasible solutions obtained by using the proposed alternative algorithm can be obtained with efficiency and accuracy.

Keywords: Ant colony optimization algorithm, Balanced transportation problem, initial basic feasible solution, MATLAB software, Optimal solution