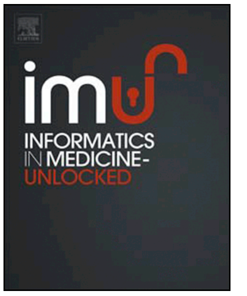

An innovative exact method for solving fully interval integer transportation problems

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PII: S2352-9148(18)30098-4
DOI: 10.1016/j.imu.2018.04.007
Reference: IMU 106

To appear in: *Informatics in Medicine Unlocked*

Received Date: 2 February 2018
Revised Date: 25 April 2018
Accepted Date: 25 April 2018

AN INNOVATIVE EXACT METHOD FOR SOLVING FULLY INTERVAL INTEGER TRANSPORTATION PROBLEMS

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Abstract: A new method namely, the mid-width method, is proposed herein for finding the optimal interval solution to an interval biomedical transportation problem in which shipping cost, supply and demand parameters are real intervals. The mid-width method is an exact method and is developed on two independent transportation problems which are obtained from a fully integer transportation problem. A numerical example in the field of pharmaceutical logistics is presented for understanding the solution procedure of the suggested method. Furthermore, the proposed method is extended to fuzzy transportation problems.

Ke**ywords:** Transportation problem, Real intervals, Mid-width method, Optimal interval solution, Triangular fuzzy numbers.

1. Introduction

Solving the interval transportation problem, researchers have divided the problem into two sub-problems namely, upper and lower level. Firstly, the upper level problem is solved and after that, the lower level problem with upper bound constraints on the decision variables is solved. This concept motivated us to develop the proposed methodology.

Several well-organized techniques for solving transportation problems with the assumption of precise source, destination parameter, and penalty factors were established. In real-life models, these conditions may not always be fulfilled. To deal with imprecise coefficients in transportation problems, many researchers [4-6,8-10,18,20] have proposed fuzzy and interval programming techniques for solving them. A new method viz., the fuzzy technique is used to solve an interval transportation problem, by considering the right bound and the midpoint of the intervals was proposed by Das et al.[6]. Sengupta and Pal [18] presented a new fuzzy orientation method for solving interval transportation problems by considering the midpoint and width of the interval in the objective function. Palmer et al. [11] demonstrated an efficient method for solving optimal stopping problems with a probabilistic constraint, in to which they have optimized the expected cumulative cost, but constrained by an upper bound on the probability that the cost exceeds a specified threshold. A new method called, the separation method was developed to solve integer interval transportation problems based on the zero-point method [13] by Pandian and Natarajan [14].

Cuenca Mira et al. [1] studied the multi-objective optimization problems. For this they were concerned with the parametric decomposition theorem. Chou et al. [2] determined that the