



# Simple and Effective Solution Methodology for Transit Network Design Problem

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## Abstract:

Transit Network Design Problem (TNDP) is the most important component in Transit planning and operation, in which the overall cost of the public transportation system highly depends on it. The main purpose of this study is to develop a simple and effective solution methodology for the TNDP, which goes beyond previous traditional sophisticated approaches. The solution methodology adopted in this research for the TNDP is based on partitioning the solution into two consecutive stages; Transit route Network Design Problem [TrNDP] stage and frequency setting stage. In the first stage; a deterministic solution for TrNDP is tackled to construct bus routes. The deterministic manner of the TrNDP solution relies on using linear and integer mathematical formulations that can be solved exactly with their standard solvers. In the second stage; bus frequencies are optimized among bus routes (obtained in stage 1) via Genetic Algorithm, for a total bus fleet size representing operator's main cost. The adopted solution methodology has been tested through Mandl's benchmark transit network problem. The test results showed that the methodology developed in this research is able to provide an effective solution in terms of the number of constructed routes, the direct demand coverage, and the total travel time.

## Keywords:

Transportation, transportation network design problem, transit route design, frequency setting, direct demand coverage, integer programming, genetic algorithm.

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