Transportation Cost Optimizer

Solving Transportation Problem Using Object-Oriented Model

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INTRODUCTION

The transportation problem is a special kind of network optimization problems. It has the special data structure in solution characterized as a transportation graph. Transportation models play an important role in logistics and supply chains. The problem basically deals with the determination of a cost plan for transporting a single commodity from a number of sources to a number of destinations. The purpose is to minimize the cost of shipping goods from one location to another so that the needs of each arrival area are met and every shipping location operates within its capacity. Network model of the transportation problem is shown in Figure 1. It aims to find the best way to fulfill the demand of n demand points using the capacities of m supply points.

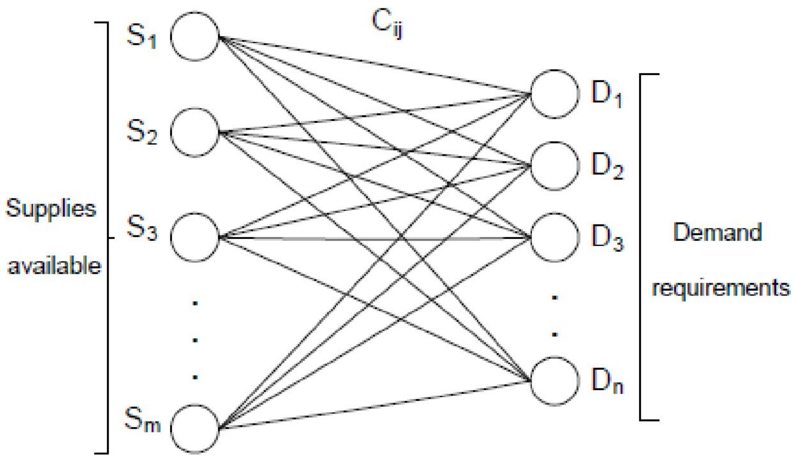

Figure 1: Network model of the transportation problem

METHODOLOGY

1. **North West Corner Rule**
   - **a)** The method starts at the northwest-corner cell (route) of the tableau. Allocate as much as possible to the selected cell and adjust the associated amounts of supply and demand by subtracting the allocated amount.
   - **b)** Cross out the row or column with zero supply or demand to indicate that no further assignments can be made in that row or column. If both the row and the column net to zero simultaneously, cross out one only and leave a zero supply (demand in the uncrossed-out row (column).

c) If exactly one row or column is left uncrossed out, stop. Otherwise, move to the cell to the right if a column has just been crossed out or below if a row has been crossed out .Go to step a).

2. **Minimum-Cost Method**
   The minimum-cost method finds a better starting solution by concentrating on the cheapest routes. The method starts by assigning as much as possible to the cell with the smallest unit cost .Next, the satisfied row or column is crossed out and the amounts of supply and demand are adjusted accordingly. If both a row and a column are satisfied simultaneously, only one is crossed out, the same as in the northwest –corner method .Next, look for the uncrossed-out cell with the smallest unit cost and repeat the process until exactly one row or column is left uncrossed.

3. **Vogel's Approximation Method (VAM)**
   Vogel's Approximation Method is an improved version of the minimum-cost method that generally produces better starting solutions.

   a) For each row (column) determine a penalty measure by subtracting the smallest unit cost element in the row (column) from the next smallest unit cost element in the same row (column).
   b) Identify the row or column with the largest penalty. Break ties arbitrarily. Allocate as much as possible to the variable with the least unit cost in the selected row or column adjust the supply and demand and cross out the satisfied row or column. If a row and column are satisfied simultaneously, only one of the two is crossed out, and the remaining row (column) is assigned zero supply (demand).
   c)
      1. If exactly one row or column with zero supply or demand remains uncrossed out, stop.
      2. If one row (column) with positive supply (demand) remains uncrossed out, determine the basic variables in the row (column) by the least cost method. Stop.
      3. If all the uncrossed out rows and columns have (remaining) zero supply and demand, determine the zero basic variables by the least-cost method Stop.
      4. Otherwise, go to step a).

CONCLUSION
Modelling linear programming problem of transportation cost optimization by techniques described above using object oriented programming in C++ helped in deriving an efficient solution to the optimization problem.

Project Link
https://github.com/ArchitParnami/Transportation-Cost-Optimizer