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A New Approach to Solve Balanced Transportation Problem

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Abstract

In this paper we have introduced a new method to obtain an initial basic feasible solution. Further, we illusrtate by suitable example.

Introduction

The transportation problem is one of the sub classes of linear programming problems in which the objective is to transport various quantities of a single homogeneous commodity, that are initially stored at various origins to different destinations in such a way that the total trasportation cost is minimum.

Let a_i – quantity of commodity available at origin i

b_j – quantity of commodity needed at destination j

c_{ij} – cost of transporting one unit of commodity from origin i to destination j

and x_{ij}– quantity transported from origin i to destination j

Mathemetically, the problem may be stated as linear programming problem as follows :-

Minimize $z = \sum_{i=1}^{m}\sum_{j=1}^{n} x_{ij}c_{ij}$

subject to the constraints

$$\sum_{j=1}^{n} x_{ij} = a_i \text{ , i = 1,2,...,m}$$

$$\sum_{i=1}^{m} x_{ij} = b_j \text{ , j = 1,2,...,n}$$

and $x_j \geq 0$ for all i and j

Finding an Initial Basic Feasible Solution

South West Corner Method

Step 1 Select the south west corner cell of the transportation table and allocate as much as possible so that either the capacity of the last row is exhausted or the destination requirement of the last column is satisfied.

That is $x_{mn} = \min(a_m, b_n)$

Step 2 If $a_m > b_n$ we have left horizontally to the last but one column and make the second allocation in the cell (m, n-1)

min $x_{m\,n-1} = \min(a_m - x_{mn}, b_{n-1})$
If $b_n > a_m$

We move down vertically to the last but one row and make the second allocation

$x_{m-1\,n} = \min(a_{m-1}, b_n - x_{mn})$
If $b_n = a_m$

There is a tie for the second allocation. One can make the second allocation of the magnitude
$x_{m-1,n} = 0$ in the cell m-1,n
$x_{m,n-1} = 0$ in the cell m,n-1

Step 3 Repeat steps 1 & 2 until all the rim requirements are satisfied.

Example:

	D	E	F	G	Availa-bility
A	11	13	17	14	250
B	16	18	14	10	300
C	21	24	13	10	400
Requirement	200	225	275	250	

Since $\sum a_i = \sum b_j = 950$ This transportation problem is balanced.

	D	E	F	G	Availa-bility
A	11	13	17	14	250
B	16	18	14	10	300
C	21	24	13	[250] 10	150
Requirement	200	225	275	0	

	D	E	F	G	Availa-bility
A	11	13	17	14	250
B	16	18	14	10	300
C	21	24	[150] 13	[250] 10	0
Requirement	200	225	125	0	

	D	E	F	G	Availa-bility
A	11	13	17	14	250
B	16	18	[125] 14	10	175
C	21	24	[150] 13	[250] 10	0
Requirement	200	225	0	0	

	D	E	F	G	Availa-bility
A	11	13	17	14	250
B	16	[175] 18	[125] 14	10	0
C	21	24	[150] 13	[250] 10	0
Requirement	200	50	0	0	

	D	E	F	G	Availa-bility
A	11	[50] 13	17	14	200
B	16	[175] 18	[125] 14	10	0
C	21	24	[150] 13	[250] 10	0
Requirement	200	0	0	0	

	D	E	F	G	Availa-bility
A	[200] 11	[50] 13	17	14	0
B	16	[175] 18	[125] 14	10	0
C	21	24	[150] 13	[250] 10	0
Requirement	0	0	0	0	

The Transportation cost z
$= 200\times11 + 50\times13 + 175\times18 + 125\times14$
$+ 150\times13 + 250\times10$
$= 12,200$

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