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RC-MMM method for finding an optimal solution for transportation problem

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Abstract

In this paper a transportation problem is applied to determined the reduction in transportation cost of tools which appeared to be an important component of the total cost of production. The algorithm determines the initial basic feasible (IBFS) solution of transportation problem to minimize the cost. The result with an elaborate illustration demonstrates that the method presented here is effective in minimizing the transportation costs.

Keywords: Transportation, minimization cost, sources, destinations, VAM, optimal solutions.

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1 Introduction

A transportation problem is one of the earliest and most important applications of linear programming problem. A certain amount of sources and a fixed amount is required to meet the demand at each number of destinations. A balanced condition ((ie) total demand is equal to total supply) is assumed. Then finding an optimal schedule of shipment of the commodity with the satisfaction of demands at each destination is the main goal of the problems. There are two main responsible for the development of transportation model which involve a number of shipping sources and number of destinations. The fist stage the (IBFS) was obtained by opting any of the available methods such as "north west corner", "matrix minima", "least cost method" and vegelis approximation method, etc. then in the next and last stage MODI (modified distribution) method

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was adopted to get an optimal solution, here a much easier approach is proposed for finding an optimal solution and very easy computations. The stepwise procedure of RCMMM method is carried out as follows.

2 Algorithm of the RC-MMM Method

STEP1 :Examine wheather the total supply equals to the total demand. If not introduce dummy row /column.

STEP2 : interchange the odd number of rows.(with supply and demand also)

STEP3 : find the difference between the smallest and next smallest costs in each row, and write them is bracket also find the difference (penalty) between the greatest and next greatest costs in each column and write them in brackets.

STEP4 : Identity the largest distribution, choose the smallest entry along the largest distribution. If there are two or more smallest element choose any one of them orbitrary.

STEP5 : Allocate $X_{ij} = Min(a_i, b_j)$ on the left top of the smallest entry in the cell (I, j) of the transportation table.

STEP6 : Recomputed the column and row difference for the reduce transportation table and go to step(5). Repeat the procedure until the rim satisfied.

2.1 ILLUSTRATION

ILLUSTRATION

	A	B	C	D	SUPPLY
X	11	13	17	14	250
Y	10	18	14	10	300
Z	21	24	13	10	400
DEMAND	200	225	275	250	

Solutions:

Using VAM Method: Since $\sum a_i = \sum b_i = 950$ the given transportation problem is balanced.

Therefor there exist a basic feasible solution to this problem.

By Vogel's Approximation method, the initial solution is as shown in the following table

By Vogel's Approximation method , the initial solution is as shown in the following table

11 200	13 50	17	14	250	(2) (1) - -
10	18 175	14	10 125	300	(4) (4) (4) (4)
21	24	13 275	10 125	400	(3) (3) (3) (3)
200	225	275	250		
(5) - - -	(5) (5) (6) -	(1) (1) (1) (1)	(0) (0) (0) (0)		

That is.,

11 200	13 50	17	14
10	18 175	14	10 125
21	24	13 275	10 125

From this table , we see that the number of non-negative independent allocations as, m+n-1=3+4-1=6. Hence the solution is non-degenerate basic feasible . The Initial Transportation cost
$= 11 \times 200 + 13 \times 50 + 18 \times 175 + 10 \times 125 + 13 \times 275 + 10 \times 125$ =Rs 12075

2.2 ILLUSTRATION

2.2.1 VSIGN RC-MMM method, the initial basic feasible solution as follows

STEP1 : Examine whether the total supply equals to the total demand is 950.

STEP2 : The odd number of rows interchange with include supply.

STEP3 : The first row brackets which are the difference between smallest and next to smallest element and first column brackets greatest and next to greatest element of the transportation table.

STEP4 : Identity the largest distribution (10) in a column choose the smallest entry during along the largest distribution is 10. If there are two or more smallest elements choose any one of them arbitrarily.

STEP5 : allocate $X_{11} = min(300, 200)$ on the left side of the smallest entry in the cell (1,1) of transportation table.

STEP6 : recomputed the column and row difference for the reduce transportation table and go to step(5). Repeat the procedure until the entire rim satisfied.

	A	B	C	D	SUPPLY
X	11	13	17	14	250
Y	10	18	14	10	300
Z	21	24	13	10	400
DEMAND	200	225	275	250	

SOLUTION:

21	24	13	10	400	(3) (3) (3) (3)
10	18	14	10	300	(4) (4) (4) -
11	13	17	14	250	(1) (1)(3)(3)
200	225	275	250		
(10)	(6)	(3)	(4)		
-	(6)	(3)	(4)		
-	-	(3)	(4)		
-	-	(4)	(4)		

21	24	13 250	10 150
10 200	18	14	10 100
11	13 225	17 125	14

From this table, we see that the number of non-negative independent allocations as, $m + n - 1 = 3 + 4 - 1 = 6$. Hence, the solution is non-degenerate basic feasible.

The initial transportation cost $= 11100$.

OPTIMAL TEST:

To find the optimal test for IBFS RC-MMM Method , since all $d_{ij} \geq 0$ the solution under the test is optimal

21 (0) (10)	24 (0) (9)	13 250	10 150
10 200	18 (0) (9)	14 (0) (13)	10 100
11 (4) (10)	13 225	17 125	14 (4) (10)

3 Conclusion

The RC-MMM Method are quite simple from the computational point of view and also, easy to understand and apply. The method presented and discussed above give us an IBFS of the transportation problem with equal or less than constrain in minimization cost and an alternative method of VAM. The method developed here ensures a solution which is very closer to the optimal solution.

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