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RESEARCH ARTICLE

SOLVING TRANSPORTATION PROBLEMS USING ICMM METHOD.

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Abstract

The most important and successful application in the optimization technique refers to Transportation Problem. The objective of Transportation Problem is to minimize the cost. In this paper a proposed method [ICMM] builds the initial solution which reveals the minimum Transportation Problem cost compared to the existing method and also we obtained an optimal solution and illustrated with numerical examples

Introduction:-

Transportation problem is a special case of linear programming problem. It plays an important role in logistics & supply chain management for reducing cost & improving service. It helps in solving problems on distribution and transportation of resources from place to another. In this paper we introduce ICMM method for solving transportation problem which is very helpful for decision maker who are dealing with logistic & supply chain problems. The ICMM solution is illustrate with the help of numerical examples.

Transportation Problem:-

Algorithm of the ICMM method:-

Step 1:-

Examine whether the total supply equals to the total demand. If not introduce dummy row/column

Step 2:-

Interchange the odd number of columns (with supply & demand also)

Step 3:-

Find the difference between the smallest costs in each column and write them in bracket also find the difference between the greatest and next greatest costs in each row and write them in bracket.

Step 4:-

Identify the largest distribution choose the smallest entry along the largest distribution, if there are two or more smallest element choose any one of them arbitrary

Step 5:-

Allocate $X_{ij} = \min(a_i,b_i)$ on the left top of the smallest entry in the cell(i,j) of the transportation table.

Step 6:-

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

Step 7:-

After determine the initial solution ,The next step is to arrive the optimum solution for transportation problem

Illustration Using VAM Method:-

	A	B	C	D	supply
X	11	13	17	14	256
Y	10	18	14	10	300
Z	21	24	13	10	400
Demand	200	225	275	250	

Solution:

using VAM method since $\sum a_i = \sum b_j = 950$

The given transportation problem is balanced, therefore there exist a basic feasible solution to this problem
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)	(1)	(0)	
.	(5)	(1)	(0)	
.	(6)	(1)	(0)	
.	.	(1)	(0)	

11 / 200	13 / 0	17	14	250
10	18 / 175	14	10 / 125	300
21	24	13 / 275	10 / 125	400
200	225	275	250	

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

Illustration Using ICMM Method:-

Using ICMM Method the initial basic feasible solution as follows

Step 1:
Examine whether the total supply equals to the total demand is 950

Step 2:
The odd number of column interchange with include demands

Step 3:
The first column brackets which are the difference between smallest and next smallest element and first row brackets greatest and next to greatest element of the transportation table.

Step 4:
Identify the largest distribution(5) in a column choose the smallest entry during along the largest distribution is 10. If there are two or more smallest element choose any one of them arbitrary

Step 5:
Allocate x_{ij}=min(225,450) on the left side of the smallest entry in the cell(1,1) of transportation table

Step 6:
Recomputed the column and row difference for the reduce transportation table and goto step(5). repeat the procedure until the entire rim satisfied

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

Solution:-

17	13 / 225	11 / 25	14	250
14 / 125	18	10 / 175	10	300
13 / 150	24	21	10 / 250	400
275	225	200	250	
(1)	(5)	(1)	(0)	
(1)	-	(1)	(0)	
(1)	-	(1)	-	
(1)	-	(10)	-	

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

The Initial transportation cost
= 13*225+11*25+14*125+10+175+13*150+10*250
=Rs 11150/-

To find the Optimal Solution for ICMM method:-

	v_1=13	v_2=11	v_3=9	v_4=10
u1=2	**2** **17** **13**	13 225	11 25	**2** **14** **10**
u2=1	14 125	**1** **18** **11**	10 175	**1** **10** **10**
u3=0	13 150	**0** **24** **11**	**0** **21** **9**	10 250

All $d_{ij} \geq 0$,

Optimal solution for Transportation problem = 13*225+11*25+14*125+10+175+13*150+10*250
= Rs 11150/-

Conclusion:-

The ICMM method is an attractive method which is very simple, easy to understand the proposed method provides an optimal solution which is a main features of this method it avoids large number of iteration directly for the given transportation problem.

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