Subsequently Direct Right Maximum Minimum Financial plan Eventual Procedure for Sheltered and Fanatical Rectangular Arrangement

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Abstract: In this research, the proposed algorithm is Next Immediate Right Maximum Minimum Allotment method. This algorithm is to calculate the optimal value of cost for the Travelling agent to reduce the transportation cost. The expressed algorithm is very useful to derive the allotment in every sector of the rectangular matrix without any disturbance in degeneracy condition.

Keywords: Assignment problem, Degeneracy, Maximum, Minimum, Optimum cost, Pay off Matrix (POM), Pivot Element, Right, Transportation problem.

1. Introduction

The transportation problem is one of LPP (Special case)[1][2]. This lead to minimize the cost with maximum utilization[3][4].Here every supply and demand will have its own properties to satisfy the degeneracy condition.[5]

Evidently Transportation problems have an application in Biomedical Engineering and Hospital field.[6-8]. Ethically Transportation models take part in an essential role in medicine distribution management along with cost minimizing and improving service in effective manner. [1],[3], [9],[10]

2. Algorithm:

Next Immediate Right Maximum Minimum Allotment (Nirmxmia)

STEP 1: Construct the Transportation Table (TT) for the given pay off matrix (POM).

STEP 2: Choose the maximum element from POM.

STEP 3: Supply the maximum demand for the minimum element of the next immediate right side column (or) row of the chosen maximum element column in NCTT.

STEP 4: Select the next maximum element in newly CTT and repeat the step 2 & 3 until degeneracy condition satisfied.

STEP 5: In case, maximum element column is in extreme right, then shift the entire column where the minimum element appears to the right of the maximum element column.

NOTE: If the given pay off matrix is not balanced then balance the payoff matrix by introducing Zero column or Zero row and allot demand and supply for the row or column in the very last iteration.

Example 1: Consider the following Balanced POM to achieve minimum cost.

	D_1	D_2	D_3	D_4	Supply
S_1	10	30	50	10	7
S_2	70	30	40	60	9
S_3	40	8	70	20	18
Demand	5	8	7	14	34

Table 1

By Applying the above said Procedure, We get

Step 1: Here the Maximum cost is 70 in (2, 1) and (3, 3) in NCTT, we got the tie up with maximum cost, so we considered the maximum cost 70 along with the maximum demand 7, (Here 70 is a Pivot Element & highlighted with Violet Colour in the following table 1.1). Select the minimum cost 10 from the next immediate right side of the Pivot element and allot the maximum possible demand 7 units. Blue colour marked row is not considered for the next iteration.

	D_1	D_2	D_3	D_4	Supply
S_1	10	30	50	10 $\boxed{7}$	0
S_2	70	30	40	60	9
S_3	40	8	70	20	18
Demand	5	8	7	7	27

Table 1.1

Step 2: Here the Maximum cost is 70 in (2, 1) and (3, 3) in NCTT, we got the tie up with maximum cost, so we considered the maximum cost 70 along with the maximum demand 7, (Here 70 is a Pivot Element & highlighted with Violet Colour in the following table 1.2). Select the minimum cost 20 from the next immediate right of the Pivot element column and allot the maximum possible demand 7 units. Blue colour marked column is not considered for the next iteration.

	D_1	D_2	D_3	D_4	Supply
S_2	70	30	40	60	9
S_3	40	8	70	20 $\boxed{7}$	11
Demand	5	8	7	0	20

Table 1.2

Step 3: Here the Maximum cost is 70 in (2, 1) and (3, 3) in NCTT, we got the tie up with maximum cost, so we considered the maximum cost 70 along with the maximum demand 7, (Here 70 is a Pivot Element & highlighted with Violet Colour in the following table 1.3). Here we interchange second and third column along with their demand. Select the minimum cost 8 from the next immediate right side of the Pivot element and allot the maximum possible demand 8 units. Blue colour marked row is not considered for the next iteration.

	D_1	D_3	D_2	Supply
S_2	70	40	30	9
S_3	40	70	8 $\boxed{8}$	3
Demand	5	7	0	12

Table 1.3

Step 4: Here the Maximum cost is 70 in (2, 1) and (3, 3) in NCTT, we got the tie up with maximum cost, so we considered the maximum cost 70 along with the maximum demand 7. (Here 70 is a Pivot Element & highlighted with Violet Colour in the following table 1.4). Here we interchange first and third column along with their demand Select the minimum cost 40 from the right side of the Pivot element and allot the maximum possible demand 3 units. Blue colour marked row is not considered for the next iteration.

	D_3	D_1	Supply
S_2	40	70	9
S_3	70	40 $\boxed{3}$	0
Demand	7	2	9

Table 1.4

Step 5: Here the Maximum cost is 70 in TT (2, 1), (Here 70 is a Pivot Element & highlighted with Violet Colour in the following table 1.5). Supply the maximum possible supply 7 units in NCTT (2, 3) and 2 units in NCTT (1, 2) which leads to the solution satisfying all the conditions.

	D_3	D_1	Supply
S_2	40 $\boxed{7}$	70 $\boxed{2}$	0
Demand	0	0	0

Table 1.5

The resulting initial feasible solution is given below.

	D_1	D_2	D_3	D_4	Supply
S_1	10	30	50	10 $\boxed{7}$	7
S_2	70 $\boxed{2}$	30	40 $\boxed{7}$	60	9
S_3	40 $\boxed{3}$	8 $\boxed{8}$	70	20 $\boxed{7}$	18
Demand	5	8	7	14	34

Table 1.6

Optimum Cost:

Supply	2	3	3	2	1	3
Demand	1	1	2	3	4	4
Cost	140	120	64	280	70	140
Optimum Cost						814

Table 1.7

Example 2: Consider the following Balanced POM to achieve minimum cost.

	D_1	D_2	D_3	D_4	D_5	Supply
S_1	3	4	6	8	9	20
S_2	2	10	1	5	8	30
S_3	7	11	20	40	3	15
S_4	2	1	9	14	16	13
Demand	40	6	8	18	6	78

Table 2

By Applying the above Mentioned Procedure, We get the resulting initial feasible solution is given below.

	D_1	D_2	D_3	D_4	D_5	Supply
S_1	3 $\boxed{11}$	4	6	8 $\boxed{9}$	9	20
S_2	2 $\boxed{22}$	10	1 $\boxed{8}$	5	8	30
S_3	7	11	20	40 $\boxed{9}$	3 $\boxed{6}$	15
S_4	2 $\boxed{7}$	1 $\boxed{6}$	9	14	16	13
Demand	40	6	8	18	6	78

Table 2.1

Optimum Cost:

Supply	1	2	4	4	2	1	3	3
Demand	1	1	1	4	3	4	4	5
Cost	33	44	14	6	8	72	360	18
Optimum Cost							555	

Table 2.2

Example 3: Consider the following Balanced POM to achieve minimum cost.

	D_1	D_2	D_3	D_4	D_5	Supply
S_1	100	150	200	140	35	400
S_2	50	70	60	65	80	200
S_3	40	90	100	150	130	150
Demand	100	200	150	160	140	750

Table 3

By Applying the Proposed algorithm, we get the resulting initial feasible solution is given below.

	D_1	D_2	D_3	D_4	D_5	Supply
S_1	100	150 $\boxed{110}$	200 $\boxed{150}$	140	35 $\boxed{140}$	400
S_2	50	70 $\boxed{40}$	60	65 $\boxed{160}$	80	200
S_3	40 $\boxed{100}$	90 $\boxed{50}$	100	150	130	150
Demand	100	200	150	160	140	750

Table 3.1

Optimum Cost:

Supply	3	1	2	3	1	2	1
Demand	1	2	2	2	3	4	5
Cost	4,000	16,500	2,800	4,500	30,000	10,400	4,900
Optimum Cost							73,100

Table 3.2

3. Comparison with existed methods:

3.1 Comparison with North West Corner method (NWC):

EXAMPLE	NWC	RMiMxA	ACCURACY IN %
1	970	814	119.16
2	878	555	158.19
3	92450	73100	126.47
AVERAGE ACCURACY			134.60

Table 1

3.2 Comparison with Least Cost method (LCM):

EXAMPLE	LCM	NIRMxMiA	ACCURACY IN %
1	814	814	100
2	555	555	100
3	63550	73100	86.93
AVERAGE ACCURACY			95.64

Table 2

3.3 Comparison with Vogel's Approximation method (VAM):

EXAMPLE	VAM	NIRMxMiA	ACCURACY IN %
1	734	814	90.17
2	267	555	48.10
3	66300	73100	90.69
AVERAGE ACCURACY			76.32

Table 3

4. Results and discussion:

Average Accuracy	
With NWC	134.60
With LCM	95.64
With VAM	76.32
Overall Accuracy	102.18

Table 4

The proposed methodology gives **2.18 %** more accuracy in the optimal feasible solution than the existed optimization methods.

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