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Solution of Assignment Problem with New method, compared with traditional existing method.

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Abstract :- *A new method for solving Assignment problem is discussed here. The method is abbreviated as MOA i.e. Method of Assignment. The solution obtained with traditional method is compared with the solution obtained with proposed method.*

Introduction

The new method namely MOA (Method of Assignment) of solution of Assignment problem is discussed here in detail with numerical example. Also the method is compared with the existing method of solution. This MOA is about creating 1s in the assignment matrix and corresponding to that 1s we do the assignment. For that purpose we have considered a Assignment problem and solved with traditional existing method. Then we have applied the MOA to the problem and obtained the solution. It is observed that the solution obtained by both methods are same. MOA is given by Singh, Dubey and Srivastava[1].

Let us consider the following assignment problem (minimization case).

	A	B	C	D
I	10	24	30	15
II	16	22	28	12
III	12	20	32	10
IV	9	26	34	16

If we solve the above assignment problem with traditional method we can obtain the following solution.
Assignments in cell (1,2), (2,3), (3,4) and (4,1) which results into the solution as 24+28+10+9 = 71.

MOA Method for solving assignment problem

Let us consider the assignment problem for solution (minimization case) that we have solved by traditional method.

Step 1 : Find out the minimum entry in each row of the matrix.

	A	B	C	D	
I	10	24	30	15	10
II	16	22	28	12	12
III	12	20	32	10	10
IV	9	26	34	16	9

Then divide each row elements by the corresponding row minimum value

	A	B	C	D
I	1	2.4	3	1.5
II	1.33	1.83	2.33	1
III	1.2	2	3.2	1
IV	1	2.88	3.77	1.77

This will result at least one 1 in each row, if there is one 1s in each column then we can go to step 3 otherwise do step 2.

Step 2 : Find the minimum entry in each column and divide the elements of column by corresponding column minimum value.

	A	B	C	D
I	1	2.4	3	1.5
II	1.33	1.83	2.33	1
III	1.2	2	3.2	1
IV	1	2.88	3.77	1.77
	1	1.83	2.33	1

After division the matrix will reduce to the following

	A	B	C	D
I	1	1.31	1.28	1.5
II	1.33	1	1	1
III	1.2	1.09	1.37	1
IV	1	1.57	1.61	1.77

Now there is at least one 1 in each row as well as in column.
Step 3 : Draw minimum number of lines such as to cover all 1s.

	A	B	C	D
I	1	1.31	1.28	1.5
II	~~1.33~~	~~1~~	~~1~~	~~1~~
III	~~1.2~~	~~1.09~~	~~1.37~~	~~1~~
IV	1	1.57	1.61	1.77

Since here the total number of lines are less than 4, the optimum assignment is not possible. So go to next step or else if the lines are 4 then we can do the assignment as in step 5.
Step 4 : Identify the minimum value which is uncovered. Here in our case it is 1.28. Now we have to divide all the uncovered elements of the row and column in which the element 1.28 lies. That is we have to divide all the uncovered elements of Row I and column C by 1.28. The resulting matrix is as follows.

	A	B	C	D
I	1	1.02	1	1.17
II	1.33	1	1	1
III	1.2	1.09	1.37	1
IV	1	1.57	1.25	1.77

Repeat step 3 and 4 until total number of lines covering 1s is as same as the size of the matrix i.e. 4.
Here the minimum number of lines can be drawn as follows.

	A	B	C	D
I	1	1.02	1	1.17
II	~~1.33~~	~~1~~	~~1~~	~~1~~
III	1.2	1.09	1.37	1
IV	1	1.57	1.25	1.77

Now the total number of lines covering 1s is 4. So we can now do the assignment. Go to step 5 for assignment.
Step 5 : From top to bottom choose those row in which only one 1 is located and do the assignment there. Remaining assignments are done so that there is only one assignment in each row as well as in column.

	A	B	C	D
I	1	1.02	1	1.17
II	1.33	1	1	1
III	1.2	1.09	1.37	1
IV	1	1.57	1.25	1.77

The cells which are highlighted shows assignment. Corresponding to original assignment matrix the solution of the problem is 71. Thus the solution obtained with the regular method is as same as that of proposed method. If the problem is of maximization case, in the method, where we have consider the minimum values row wise and column wise, we have to consider the maximum values.

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