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Lecture-7

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Methods of Transportation Problem

- the methods to find the initial basic feasible solution for a transportation problem:
- 1. North West Corner Cell Method (or) North West Corner Rule
- 2. Least Call Cell Method
- 3. Vogel's Approximation Method (VAM)

North West Corner Rule of Transportation Problem

The North West corner rule is a technique for calculating an initial feasible solution for a transportation problem. In this method, we must select basic variables from the upper left cell, i.e., the North-west corner cell.

North West Corner Rule Steps

Step 1: Select the upper-left cell, i.e., the north-west corner cell of the transportation matrix and assign the minimum value of supply or demand, i.e., min(supply, demand).

Step 2: Subtract the above minimum value from Oi and Di of the corresponding row and column. Here, we may get three possibilities, as given below.

- If the supply is equal to 0, strike that row and move down to the next cell.
- If the demand equals 0, strike that column and move right to the next cell.
- If supply and demand are 0, then strike both row and column and move diagonally to the next cell.

Step 3: Repeat these steps until all the supply and demand values are 0.

North West Corner Method Solved Example

Example 1:

Get an initial basic feasible solution to the given transportation problem using the North-west corner rule.

From	D_1	D_2	D_3	D_4	Supply
O_1	11	13	17	14	250
O_2	16	18	14	10	300
O_3	21	24	13	10	400
Demand	200	225	275	250	

North West Corner Method Solved Example

Solution:

For the given transportation problem, total supply = 950 and total demand = 950.
Thus, the given problem is the balanced transportation problem.

Step 1: Consider the upper-left corner cell, which has the value 11. The minimum value of the corresponding cell's supply and demand is 200.

Step 2: The difference between the corresponding cell's supply and demand from the minimum value obtained in the previous step is:

Supply = 250 – 200 = 50

Demand = 200 – 200 = 0

As demand is 0, we need to allocate 200 to that cell and strike the corresponding column and then move right to the next cell, i.e., the cell with the value 13.

North West Corner Method Solved Example

From	D_1	D_2	D_3	D_4	Supply
O_1	200 11	13	17	14	250-200 = 50
O_2	16	18	14	10	300
O_3	21	24	13	10	400
Demand	200-200=0	225	275	250	

North West Corner Method Solved Example

Step 3: For the cell with value 13, the minimum of supply and demand is min(50, 225) = 50.

Step 4: The difference between the corresponding cell's supply and demand from the minimum value obtained in the previous step is:

Supply = 50 – 50 = 0
Demand = 225 – 50 = 175

As the supply is 0, we need to allocate 50 to that cell and strike the corresponding column and then move down to the next cell, i.e., the cell with the value 18.

North West Corner Method Solved Example

From	D_1	D_2	D_3	D_4	Supply
O_1	200 11	50 13	17	14	50-50 = 0
O_2	16	18	14	10	300
O_3	21	24	13	10	400
Demand	0	225-50 =175	275	250	

North West Corner Method Solved Example

Step 5: For the cell with value 18, the minimum of supply and demand is min(300, 175) = 175.

Step 6: The difference between the corresponding cell's supply and demand from the minimum value obtained in the previous step is:

Supply = 300 – 175 = 125
Demand = 175 – 175 = 0

As demand is 0, we need to allocate 175 to that cell and strike the corresponding column and then move right to the next cell, i.e., the cell with the value 14.

North West Corner Method Solved Example

From	D_1	D_2	D_3	D_4	Supply
O_1	200 11	50 13	17	14	0
O_2	16	175 18	14	10	300-175 = 125
O_3	21	24	13	10	400
Demand	0	175-175 = 0	275	250	

North West Corner Method Solved Example

Step 7: For the cell with value 14, the minimum of supply and demand is min(125, 275) = 125.

Step 8: The difference between the corresponding cell's supply and demand from the minimum value obtained in the previous step is:

Supply = 125 – 125 = 0
Demand = 275 – 125 = 150

As the supply is 0, we need to allocate 125 to that cell and strike the corresponding column and then move down to the next cell, i.e., the cell with the value 13.

North West Corner Method Solved Example

From	D_1	D_2	D_3	D_4	Supply
O_1	200 11	50 13	17	14	0
O_2	16	175 18	125 14	10	125-125 = 0
O_3	21	24	13	10	400
Demand	0	0	275-125=150	250	

North West Corner Method Solved Example

Step 9: For the cell with value 13, the minimum of supply and demand is min(400, 150) = 150.

Step 10: The difference between the corresponding cell's supply and demand from the minimum value obtained in the previous step is:

Supply = 400 – 150 = 250
Demand = 150 – 150 = 0

As demand is 0, we need to allocate 125 to that cell and then move right to the next cell, i.e., the cell with the value 10. Here, we don't get any further cells to strike off.

North West Corner Method Solved Example

From	D_1	D_2	D_3	D_4	Supply
O_1	200 11	50 13	17	14	0
O_2	16	175 18	125 14	10	0
O_3	21	24	150 13	10	400-150=250
Demand	0	0	150-150=0	250	

North West Corner Method Solved Example

Also, we can see that the corresponding supply and demand for the left-out cell with the value 10 are equal. Now allocate the supply or demand value to that cell. Therefore, we can get 0's for all supplies and demands.

From	D_1	D_2	D_3	D_4	Supply
O_1	200 11	50 13	17	14	0
O_2	16	175 18	125 14	10	0
O_3	21	24	150 13	250 10	250-250=0
Demand	0	0	0	250-250=0	

North West Corner Method Solved Example

Now, we should calculate the total minimum cost using the allocated values and the corresponding cell values.

Here, the transportation path is:

O1 → D1, O1 → D2, O2 → D2, O2 → D3, O3 → D3, O3 → D4

Therefore, the total cost = (200 × 11) + (50 × 13) + (175 × 18) + (125 × 14) + (150 × 13) + (250 × 10)
= 2200 + 650 + 3150 + 1750 + 1950 + 2500
= Rs. 12,200

Home Work

Find the initial basic feasible solution of the following transportation problem.

From					Supply
	D_1	D_2	D_3	D_4	
O_1	19	20	50	10	700
O_2	70	30	40	60	900
O_3	40	8	70	20	1800
Demand	500	800	700	1400	

THANK YOU