TRANSPORTATION PROBLEM

Finding Initial Basic Feasible Solution

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North-West Corner Method

Step1: Select the upper left (north-west) cell of the transportation matrix and allocate the maximum possible value to X_{11} which is equal to min(a_1,b_1).

Step2:

- If allocation made is equal to the supply available at the first source (a_1 in first row), then move vertically down to the cell (2,1).
- If allocation made is equal to demand of the first destination (b_1 in first column), then move horizontally to the cell (1,2).
- If $a_1=b_1$, then allocate $X_{11}= a_1$ or b_1 and move to cell (2,2).

Step3: Continue the process until an allocation is made in the south-east corner cell of the transportation table.

Example: Solve the Transportation Table to find Initial Basic Feasible Solution using North-West Corner Method.

Total Cost =19*5+30*2+30*6+40*3+70*4+20*14
= Rs. 1015

	D_1	D_2	D_3	D_4	Supply
S_1	19 **5**	30 **2**	50	10	7
S_2	70	30 **6**	40 **3**	60	9
S_3	40	8	70 **4**	20 **14**	18
Demand	5	8	7	14	34

Least Cost Method

Step1: Select the cell having lowest unit cost in the entire table and allocate the minimum of supply or demand values in that cell.

Step2: Then eliminate the row or column in which supply or demand is exhausted. If both the supply and demand values are same, either of the row or column can be eliminated.

In case, the smallest unit cost is not unique, then select the cell where maximum allocation can be made.

Step3: Repeat the process with next lowest unit cost and continue until the entire available supply at various sources and demand at various destinations is satisfied.

	D1	D2	D3	D4	Supply
S1	19	30	50	10	7
S2	70	30	40	60	9
S3	40	8	70	20	18
		8			
Demand	5	8	7	14	34

	D1	D3	D4	Supply
S1	19	50	10	7
			7	
S2	70	40	60	9
S3	40	70	20	10
Demand	5	7	14	34

	D1	D3	D4	Supply
S2	70	40	60	9
S3	40	70	20	10
			7	
Demand	5	7	7	34

	D1	D3	Supply
S2	70	40	9
		7	
S3	40	70	3
Demand	5	7	34

	D1	Supply
S2	70	2
	2	
S3	40	3
	3	
Demand	5	34

The total transportation cost obtained by this method
= 8*8+10*7+20*7+40*7+70*2+40*3
= Rs.814
Here, we can see that the ***Least Cost Method*** involves a lower cost than the *North-West Corner Method*.

Vogel's Approximation Method

Step1: Calculate penalty for each row and column by taking the difference between the two smallest unit costs. This penalty or extra cost has to be paid if one fails to allocate the minimum unit transportation cost.

Step2: Select the row or column with the highest penalty and select the minimum unit cost of that row or column. Then, allocate the minimum of supply or demand values in that cell. If there is a tie, then select the cell where maximum allocation could be made.

Step3: Adjust the supply and demand and eliminate the satisfied row or column. If a row and column are satisfied simultaneously, only of them is eliminated and the other one is assigned a ***zero*** value.Any row or column having ***zero*** supply or demand, can not be used in calculating future penalties.

Step4: Repeat the process until all the supply sources and demand destinations are satisfied.

	D_1	D_2	D_3	D_4	Supply	Row Diff.
S_1	19	30	50	10	7	**9**
S_2	70	30	40	60	9	**10**
S_3	40	8	70	20	18	**12**
		8				
Demand	5	8	7	14	34	
Col.Diff.	**21**	**22**	**10**	**10**		

	D_1	D_3	D_4	Supply	Row Diff.
S_1	19	50	10	7	**9**
	5				
S_2	70	40	60	9	**20**
S_3	40	70	20	10	**20**
Demand	5	7	14	34	
Col.Diff.	**21**	**10**	**10**		

	D_3	D_4	Supply	Row Diff.
S_1	50	10	2	**40**
S_2	40	60	9	**20**
S_3	70	20	10	**50**
		10		
Demand	7	14	34	
Col.Diff.	**10**	**10**		

	D_3	D_4	Supply	Row Diff.
S_1	50	10	2	**40**
		2		
S_2	40	60	9	**20**
Demand	7	4	34	
Col.Diff.	**10**	**50**		

	D_3	D_4	Supply	Row Diff.
S_2	40	60	9	**20**
	7	2		
Demand	7	2	34	
Col.Diff.				

The total transportation cost obtained by this method
= 8*8+19*5+20*10+10*2+40*7+60*2
= Rs.779
Here, we can see that ***Vogel's Approximation Method*** involves the lowest cost than *North-West Corner Method* and *Least Cost Method* and hence is the most preferred method of finding initial basic feasible solution.