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Row Minima Method

obtain the initial basic feasible solution of the following transportation problem using Row minima method.

		Warehouse			
		W_1	W_2	W_3	Supply
Factory	F_1	15	19	11	200
	F_2	13	7	17	160
	F_3	25	23	15	90
Demand		180	120	150	450

Soln:- The sum of supply is equal to sum of Demand Hence the given transportation problem is Balanced.

As per Row minima method the minimum value is selected from each row and allocation will be made accordingly

		Warehouse			
		W_1	W_2	W_3	Supply
Factory	F_1	15 $_{11}$	19 $_{12}$	11 $_{13}$ 150	~~200~~ 50
	F_2	13 $_{21}$	7 $_{22}$	17 $_{23}$	160
	F_3	25 $_{31}$	23 $_{32}$	15 $_{34}$	90
Demand		180	120	~~150~~ 0	

In the above table, At Row 1, Row minimum is 11 at cell (1,3)

The corresponding supply & demand values are 200 and 180/5 resp.

The minimum of these values is 150
Hence allocate 150 units to the cell (1,3) & subtract the same from supply and demand values of the cell (1,3)

In this process, the demand of the warehouse w3 is fully satisfied. Hence deleting that column & resultant matrix is given below

		warehouse w1	warehouse w2	supply
Factory	F_1	15 50 (11)	19 (12)	50 ~~0~~
	F_2	13 (21)	7 (22)	160
	F_3	25 (31)	23 (32)	90
demand		~~180~~ 130	120	

we can see that, in above table supply of 50 units are left ∴ The entire capacity of Row 1 is not exhausted ∴ we cannot move further to next Row (i.e. until 1st row is not eliminated we cannot select minimum value from Row 2)

∴ In above table, at Row 1, Row minimum is 15 at cell (1,1)

The corresponding supply and demand values are 50 and 1

The minimum of these values is 50 Hence allocate 50 units to the cell (1,1) & subtract the same from supply and demand values of the cell (1,1)

In this process, the supply of the factory F1 is fully exhausted. Hence deleting that Row & resultant matrix is given below.

		W1	W2	Supply
Factory	F_2	13 (21)	7 (22)	120 ~~160~~ 40
	F_3	25 (31)	23 (32)	90
Demand		130	~~120~~ 0	

Now, we move to second row, select minimum value from Row2

The Row minimum is 7 at cell (2, 2)

And the corresponding supply & demand values are 160 and 120

The minimum of these values is 120 Hence, allocate 120 units to the cell (2, 2) & subtract the same from supply & demand values of the cell (2,2

In this process, the demand of the warehouse w_2 is fully ~~exhausted~~ satisfied. Hence deleting that column of resultant matrix is given below.

Factory	w_1	supply
F_2	13 [40] 21	~~40~~ 0
F_3	25 [90] 31	~~90~~ 0
Demand	~~130~~ ~~90~~ 0	

In the above table, only one warehouse (i.e. destination) is left out ∴ supplies of factory F_2 & F_3 are matched with the demand of the warehouse (w_1) as shown in table.

⇒ The initial basic feasible solution by applying Row Minima method is to the given problem is shown in following table.

	w_1	w_2	w_3	supply
F_1	15 [50] 11	19 12	11 [150] 13	200
F_2	13 [40] 21	7 [120] 22	17 25	160
F_3	25 [90] 31	23 32	15 33	90
Demand	180	120	150	

∴ Total cost = $15 \times 50 + 11 \times 150 + 13 \times 40 + 7 \times 120 + 25 \times 90$

$= 750 + 1650 + 520 + 840 + 2250$

∴ Total cost = 6010 RS.

* Column minima Method.

obtain the Initial Basic feasible solution of the following Transportation problem using column minima Meth...

Factory \ Warehouse	W1	W2	W3	Supply
F1	15	19	11	200
F2	13	7	17	160
F3	25	23	15	90
Demand	180	120	150	450 / 450

Soln:- In the given matrix the sum of supply is equal to sum of Demand. Hence the given Transportation problem is Balanced.

As per column minima method, the minimum value is selected from each column and allocation will be made accordingly.

Factory \ Warehouse	W1	W2	W3	Supply
F1	15 (11)	19 (12)	11 (13)	200
F2	13 160 (21)	7 (22)	17 (23)	~~160~~ 0
F3	25 (31)	23 (32)	15 (33)	90
Demand	~~180~~ 20	120	150	

In the above table,

In first column, minimum value is 13 at cell (2, 1)

The corresponding supply & demand values are 160, and 180 resp.

The minimum of these values is 160
Hence allocate 160 units to the cell (2, 1) & subtract the same from supply and Demand values of the cell (2, 1)

In this process, the supply of factory F2 is fully exhausted. Hence deleteing that Row & the resultant data is given below.

		Warehouse W1	W2	W3	Supply
Factory	F1	15 20 11	19 12	11 13	~~200~~ 180
	F3	25 31	23 32	15 33	90
Demand		~~20~~ 0	120	150	

In the above table, In column 1, 20 units of Demand are remaining ∴ we cannot move towards the column until column 1 eliminated

So we select next smallest value from column 1, the minimum value is 15 at cell (1, 1)

The corresponding supply and demand values are 200 & 20 resp.
The minimum of these values is 20

Hence, allocate 20 units to the cell (1,1) & subtract the same from supply & demand values of the cell (1, 1)

In this process, the demand of warehouse w1 is fully satisfied
Hence deleting that column (i.e w1) & the resultant data is given below.

Factory	warehouse w2	w3	supply
F1	19 (120) 12	11 13	~~180~~ 60
F3	23 32	15 33	90
Demand	~~120~~ 0	150	

Now, we move to second column, & select minimum value from column 2
The column minimum is 19 at cell (1, 2).
And the corresponding supply & demand values are 180 and 120
& the minimum of these values is 120
Hence allocate 120 units to the cell (1, 2) & subtract the same from supply & demand values of the cell (1, 2)

In this process, the demand of the warehouse W2 is fully satisfied. Hence, deleting that column & the resultant data is given below.

		W3	Supply
Factory	F1	11 60	~~60~~ 0
	F3	15 13 90 33	90
Demand		~~150~~ 90	

Now, we move towards third column & select minimum value from column3 The column minimum is 11 at cell (1, 3). And the corresponding supply & Demand values are 60 & 150 & the minimum of these values is 60

Hence allocate 60 units to the cell (1,3) & subtract the same from supply & demand values of the cell (1,3)

In this process, the supply of Factory F1 is fully exhausted. Hence deleting that row F1 & resultant data is given below.

	W3	Supply
Factory F3	15 90 33	~~90~~ 0
Demand	~~90~~ 0	

In the above table the supply & demand values are matched.

∴ The Initial Basic feasible solution by applying Column Minima Method to the given problem is shown in following table.

Factory \ warehouse	W1	W2	W3	Supply
F1	15 [20] (11)	19 [120] (12)	11 [60] (13)	
F2	13 [160] (21)	7 (22)	17 (23)	
F3	25 (31)	23 (32)	15 [90] (33)	
Demand				

∴ Total cost = $15 \times 20 + 19 \times 120 + 11 \times 60$

$+ 13 \times 160 + 15 \times 90$

$= 300 + 2280 + 660 + 2080 + 1350$

∴ Total cost = 6670 Rs.

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(1) Solve the following transportation problem by Row Minima method.

	D1	D2	D3	D4	Supply
S1	6	3	5	4	22
S2	5	9	2	7	15
S3	5	7	8	6	8
Demand	7	12	17	9	45 / 45 Balanced

Ans:-

	D1	D2	D3	D4	Supply
S1	6 (11)	3 [12] (12)	5 [1] (13)	4 [9] (14)	22
S2	5 (21)	9 (22)	2 [15] (23)	7 (24)	15
S3	5 [7] (31)	7 (32)	8 [1] (33)	6 (34)	8
Demand	7	12	17	9	

∴ Total cost = $3 \times 12 + 5 \times 1 + 4 \times 9 + 2 \times 15 + 5 \times 7 + 8 \times 1$

$= 36 + 5 + 36 + 30 + 35 + 8$

∴ Total cost = 150

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② solve the following transportation problem by Column Minima method:

Source	Destination D1	D2	D3	Supply
S1	10	13	6	10
S2	6	7	13	12
S3	8	22	2	8
Demand	6	11	13	30 / 30 Balanced

Ans:-

	D1	D2	D3	Supply
S1	10 (11)	13 [5] (12)	6 [5] (13)	10
S2	6 [6] (21)	7 [6] (22)	13 (23)	12
S3	8 (31)	22 (32)	2 [8] (33)	8
Demand	6	11	13	

∴ Total cost = 13×5 + 6×5 + 6×6 + 7×6 + 2×8

= 65 + 30 + 36 + 42 + 16

∴ Total cost = 189 Rs.