

Decision Making Theory

Week 7

Assignment Method

Assignment Method

- ☑ A special class of linear programming models that assign tasks or jobs to resources
- ☑ Only one job (or worker) is assigned to one machine (or project)

MINIMIZATION

Example

- ☑ Build a table of costs or time associated with particular assignments

Typesetter			
Job	A	B	C
R-34	\$11	\$14	\$ 6
S-66	\$ 8	\$10	\$11
T-50	\$ 9	\$12	\$ 7

Step 1

Typesetter	A	B	C
Job			
R-34	\$11	\$14	\$ 6
S-66	\$ 8	\$10	\$11
T-50	\$ 9	\$12	\$ 7

Step 1a - Rows

Typesetter	A	B	C
Job			
R-34	\$ 5	\$ 8	\$ 0
S-66	\$ 0	\$ 2	\$ 3
T-50	\$ 2	\$ 5	\$ 0

Step 1b - Columns

Typesetter	A	B	C
Job			
R-34	\$ 5	\$ 6	\$ 0
S-66	\$ 0	\$ 0	\$ 3
T-50	\$ 2	\$ 3	\$ 0

Step 1

- Check whether we can assign a typesetter to a certain job. See the cell with value “0”.

Typesetter \ Job	A	B	C
R-34	\$ 5	\$ 6	\$ 0
S-66	\$ 0	\$ 0	\$ 3
T-50	\$ 2	\$ 3	\$

A assigned to job S-66

B cannot assigned to S-66 since it has been assigned to A. Therefore, additional procedure need to be done.

Step 2 and 3

Step 2 - Lines

Typesetter	A	B	C
Job			
R-34	\$ 5	\$ 6	\$ 0
S-66	\$ 0	\$ 0	\$ 0
T-50	\$ 2	\$ 3	\$ 0

Because only two lines are needed to cover all the zeros, the solution is not optimal

The smallest uncovered number is 2 so this is subtracted from all other uncovered numbers and added to numbers at the intersection of lines

Step 3 - Subtraction

Typesetter	A	B	C
Job			
R-34	\$ 3	\$ 4	\$ 0
S-66	\$ 0	\$ 0	\$ 5
T-50	\$ 0	\$ 1	\$ 0

Step 4

Step 2 - Lines

Typesetter \ Job	A	B	C
R-34	\$ 3	\$ 4	\$ 0
S-66	\$ 0	\$ 0	\$ 5
T-50	\$ 0	\$ 1	\$ 0

Because three lines are needed, the solution is optimal and assignments can be made

Start by assigning R-34 to worker C as this is the only possible assignment for worker C.

Job T-50 must go to worker A as worker C is already assigned. This leaves S-66 for worker B.

Step 4 - Assignments

Typesetter \ Job	A	B	C
R-34	\$ 3	\$ 4	\$ 0
S-66	\$ 0	\$ 0	\$ 5
T-50	\$ 0	\$ 1	\$ 0

Optimal

Step 4 - Assignments

Typesetter \ Job	A	B	C
R-34	\$11	\$14	\$ 6
S-66	\$ 8	\$10	\$11
T-50	\$ 9	\$12	\$ 7

Typesetter \ Job	A	B	C
R-34	\$ 3	\$ 4	\$ 0
S-66	\$ 0	\$ 0	\$ 5
T-50	\$ 0	\$ 1	\$ 0

From the original cost table
Minimum cost
= \$6 + \$10 + \$9 = \$25

MAXIMIZATION

Example

- ✓ Build a table of efficiencies of British in Patrol Sectors

SHIP	SECTOR			
	A	B	C	D
1	20	60	50	55
2	60	30	80	75
3	80	100	90	80
4	65	80	75	70

Identify the highest rating score

Example

- ☑ Compute opportunity costs of British Ships

Subtract each rating from the maximum rating score

SHIP	SECTOR			
	A	B	C	D
1	80	40	50	45
2	40	70	20	25
3	20	0	10	20
4	35	20	25	30



$=100-20$

Step 1

SHIP	SECTOR			
	A	B	C	D
1	80	40	50	45
2	40	70	20	25
3	20	0	10	20
4	35	20	25	30

Step 1a - Rows

SHIP	SECTOR			
	A	B	C	D
1	40	0	10	5
2	20	50	0	5
3	20	0	10	20
4	15	0	5	10

Step 1b - Columns

SHIP	SECTOR			
	A	B	C	D
1	25	0	10	0
2	5	50	0	0
3	5	0	10	15
4	0	0	5	5

Step 1

- Check whether we can assign a ship to a certain sector. See the cell with value “0”.

SHIP	SECTOR			
	A	B	C	D
1	25	0	10	0
2	5	50	0	0
3	5	0	10	15
4	0	0	5	5

Ship 4
assigned to
sector A

Ship 3
assigned to
sector B

Ship 2
assigned to
sector C

Ship 1
assigned to
sector D

Optimal

Step 4 - Assignments

SHIP	SECTOR			
	A	B	C	D
1	20	60	50	55
2	60	30	80	75
3	80	100	90	80
4	65	80	75	70

SHIP	SECTOR			
	A	B	C	D
1	25	0	10	0
2	5	50	0	0
3	5	0	10	15
4	0	0	5	5

From the original cost table

Maximum efficiencies

$$= 65 + 100 + 80 + 55 = 300$$

EXERCISE

9-37

In a job shop operation, four jobs may be performed on any of four machines. The hours required for each job on each machine are presented in the following table. The plant supervisor would like to assign jobs so that total time is minimized. Find the best solution.

JOB	MACHINE			
	W	X	Y	Z
A12	10	14	16	13
A15	12	13	15	12
B2	9	12	12	11
B9	14	16	18	16

9-41(1)

Roscoe Davis, chairman of a college's business department, has decided to apply a new method in assigning professors to courses next semester. As a criterion for judging who should teach each course, Professor Davis reviews the past two years' teaching evaluations (which were filled out by students). Since each of the four professors taught each of the four courses at one time or another during the two-year period, Davis is able to record a course rating for each instructor.

9-41(2)

These ratings are shown in the table. Find the best assignment of professors to courses to maximize the overall teaching rating.

PROFESSOR	COURSE			
	STATISTICS	MANAGEMENT	FINANCE	ECONOMICS
Anderson	90	65	95	40
Sweeney	70	60	80	75
Williams	85	40	80	60
McKinney	55	80	65	55

9-48 (1)

The XYZ Corporation is expanding its market to include Texas. Each salesperson is assigned to potential distributors in one of five different areas. It is anticipated that the salesperson will spend about three to four weeks in each area. A statewide marketing campaign will begin once the product has been delivered to the distributors.

9-48 (2)

The five sales people who will be assigned to these areas (one person for each area) have rated the areas on the desirability of the assignment as shown in the following table. The scale is 1 (least desirable) to 5 (most desirable). Which assignments should be made if the total of the ratings is to be maximized?

9-48 (3)

	AUSTIN/ SAN ANTONIO	DALLAS/ FT. WORTH	EL PASO/ WEST TEXAS	HOUSTON/ GALVESTON	CORPUS CHRISTI/ RIO GRANDE VALLEY
Erica	5	3	2	3	4
Louis	3	4	4	2	2
Maria	4	5	4	3	3
Paul	2	4	3	4	3
Orlando	4	5	3	5	4

TAKE HOME TEST

Take Home Test

- Buka companion website untuk buku: Quantitative Analysis for Management, 11th ed. (Link lihat di blog)
- Buka **Internet Homework Problem** chapter 7 dan chapter 9.
- Chapter 7: Pilih dan selesaikan 1 soal dengan menggunakan metode grafik dan 1 soal dengan metode simpleks.
- Chapter 9: Pilih dan selesaikan 1 soal model transportasi (initial solution dan optimization) dan 1 soal model penugasan (assignment model).

THANK YOU