

Homework Exercise

Exercise 4-1:

Create a simple example which has a large value of T_{Average}/T^* for the greedy algorithm. Create another example to maximize T_{Average}/T^* for the greedy algorithm.

Exercise 4-2:

Create a simple example to demonstrate the usefulness of the sorted greedy algorithm. Create another example to maximize $T_{\text{Average}}/T_{\text{Sorted}}$ where T_{Average} is the average makespan by the greedy algorithm and T_{Sorted} is the makespan obtained by the sorted greedy algorithm. The value of $T_{\text{Average}}/T_{\text{Sorted}}$ can be viewed as the usefulness of the sorted greedy algorithm. If this value is close to 1, the performance of the sorted greedy algorithm is almost the same as the average performance of the greedy algorithm (i.e., the sorted greedy algorithm is not useful in comparison with the greedy algorithm).

General Settings of Load Balancing

Each machine has a different processing time of each job (each machine is good at processing some jobs) .

Example:

Three Machines (M1, M2, M3) and 15 Jobs (J1, J2, ..., J15)

Processing time (t_{ij}):

	J1	J2	J3	J4	J5	J6	J7	J8	J9	J10	J11	J12	J13	J14	J15
M1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
M2	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30
M3	3	6	9	12	15	18	21	24	27	30	15	15	15	15	15

Exercise 4-3

Design an algorithm to solve this example, and explain your algorithm using this example. Then, show your algorithm as a general algorithm where the processing time of job j on machine i is given by t_{ij} ($i = 1, 2, \dots, m; j = 1, 2, \dots, n$).