

Assignment 2 - Planning & Scheduling

Due date:

Assignment should be submitted to Canvas before 11PM **Tuesday May 7th**

Problem 1 - Johnson's rule (30 Marks):

Consider the following instance of the two machine flow shop with the makespan as objective (i.e., an instance of $F2||C_{\max}$), which is a special case of $J2||C_{\max}$)

Jobs	1	2	3	4	5	6	7	8	9	10	11
p_{1j}	3	6	4	3	4	2	7	5	5	6	12
p_{2j}	4	5	5	2	3	3	6	6	4	7	2

- A) Write a python program to construct a schedule implementing the Johnson's rule
- B) Map out the solution of this problem on a Gantt chart and calculate the makespan

Rubric

<p>The implementation is logically well designed without inappropriate design choices (e.g., unnecessary loops)</p> <p>The Gantt chart is logically well designed and properly documented</p>	<p>The implementation always works properly and meets the specification of the algorithm</p> <p>Code is clean, understandable, and well-organized</p>	<p>The implementation works properly in limited cases</p>	<p>The implementation is incorrectly implemented</p>
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(24-30 Marks)	(15 - 23 Marks)	(8-14 Marks)	(0-7 Marks)
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Problem 2 (Tabu search) 40 Marks:

Write a python program to apply Tabu search to the following instance of F3|prmu, $p_{ij} = p_j \mid \sum w_j T_j$ with the following 4 jobs.

Jobs	1	2	3	4
p_j	9	9	12	3
d_j	10	8	5	28
w_i	14	12	1	12

- Choose as the neighbourhood all schedules that can be obtained through adjacent pairwise interchanges
- Start out with sequence 3, 1, 4, 2 (the starting sequence needs to be a parameter of the algorithm)
- Keep the length to the Tabu list equal to 2 (this needs to be a parameter of the algorithm)

<p>The implementation is logically well designed without inappropriate design choices (e.g., unnecessary loops)</p> <p>Code is well-commented</p>	<p>The implementation always works properly and meets the specification of the algorithm</p> <p>Code is clean, understandable, and well-organized</p>	<p>The implementation works properly in limited cases</p>	<p>The implementation is incorrectly implemented</p>
(30-40 Marks)	(19 - 30 Marks)	(9-18 Marks)	(0-8 Marks)

Problem 3 (Timetabling) 30 Marks:

Edmund, Graham, Kath and Sanja are university lecturers attending a conference. During this conference they have to attend in total 7 meetings. The table below contains the meetings that each of the lecturers has to attend. The field in the table contains 1 if the lecturer has to attend the meeting.

Meetings	1	2	3	4	5	6	7
Edmund	1	0	0	1	1	0	1
Graham	1	1	1	0	0	0	0
Kath	0	0	1	0	1	1	0
Sanja	1	0	1	1	1	0	0

Write a python program to formulate this problem as a graph coloring problem to schedule all seven meetings in a single afternoon between 2pm and 6pm so that the four lecturer can be present at all the meetings that he/she has to attend.

Implement the largest degree first heuristic and another heuristic of your choice to solve this problem. Give a brief description of the two heuristics and critically compare them.

Rubric:

The implementation is logically well designed without inappropriate design choices (e.g., unnecessary loops) Code is well-commented	The implementation always works properly and meets the specification of the algorithm Code is clean, understandable, and well-organized	The implementation works properly in limited cases	The implementation is incorrectly implemented
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