MS1: Project Proposal

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Description

The topic of our project will be a comparison between several domain-independent heuristics applied to the job-shop scheduling problem. We will attempt to encode our scheduling problem as a CSP, and thereafter find solutions using several heauristics, which will be compared in terms of execution time and solution quality.

Case Study

For our case study we propose to implement a classical job shop problem, i.e. a problem consisting of a number of machines that can perform a number of tasks that need to be done in a predefined order in a minimum (or near minimum) time. A real life example of this could be to distribute tasks to individual with different skills within a project such as this one, fulfilling deadlines, etc.

Concepts

In order to conduct our study we will looking into the following concepts:

- CSP
- Domain independent heuristics
- Scheduling enconded as csps

Literature

The following literature will be studied:

- Artificial Intelligence - A modern approach, chapter 6.3 and chapter 11.1
- Heuristic Methods for Solving Job-Shop Scheduling Problems by A. Garrido, M. A. Salido, F. Barber, M. A. López
- Some Heuristic Rules for Job Shop Scheduling Problem by Mohamed Shouman

Evaluation aim

In our project we aspire to achieve the following evaluations for the four different aspects.

For **Dp** we aim for a score of **2**. Due to the fact that we will be involved with numerous heuristics we may not have time to go deep into all of the areas and further develop them/propose extensions.

For **Br** we aim for a score of **3**, as we be utilizing a significant amount of domain-independent heuristics in order to solve our problem.

For **Im** we aim for a score of **3**, as we will implement the milieu and each of the heuristics by ourselves.

For **An** we aim for a score of **2**. We reason that there will not be enough time for us to engage in any significant deep discussion regarding our algorithms, concidering the amount of work we will likely have to dedicate to implementation and gaining a breadth in AI planning knowledge.

Mid- and full-project estimates

Listed below are our estimations of what will have been achieved midway through the project and at completion.

Tasks to be done with at 50% completion:

- Reading of relevant literature
- Learning about encoding of scheduling problems as CSPs.
- Finding relevant heuristics and algorithms.
- Case study thoroughly designed
- 4 out of 5 heuristics implemented

Tasks to be done with at 100% completion:

- All heuristics implemented
- Heuristics compared and analysed
- Report done
- Code finished and nicely commented
- Presentation prepared

Timeline

The project timeline is listed below. The labour will be divided amongst our group members in an ad hoc-oriented fashion as we find suitable to our contemporary needs and schedules.

Timeline:
12ph for brainstorming and planning of project
8ph for reading proposed literature
4ph for deciding on which heuristics/cps/algorithms to implement
12ph implementing testing environment
40ph for implementing algorithms [halfway]
10ph analysing and comparing results
10ph writing of report
4ph prepare presentation