

iMOPSE greedy runner - User's Manual

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Introduction

This document describes what the iMOPSE greedy runner is and how to use it.

iMOPSE greedy runner is an open source tool released for students and researchers to quickly obtain a solution to the Multi-Skill Resource-Constrained Project Scheduling Problem (MS-RCPS). Since the problem is NP-hard, the greedy approach is far optimal, but its results may be used as a baseline comparison to a more robust approaches.

Greedy runner can be run in two optimization modes. First of them is focused on optimizing cost of the schedule. In this mode the algorithm assigns the cheapest available resource to each task. This mode is deterministic, which means it always returns the same solution. The second mode is focused on duration optimization. It randomizes the task-resource assignments and then set the start time of each task to the earliest possible start time, while regarding finish time of all its predecessors and the finish time of assigned resource. Due to the first step of this approach, this mode is non-deterministic. It may produce different results each time it is run.

The runner will always create a valid schedule, which does not violate any of the constraints.

Technical Requirements

To use the iMOPSE greedy runner, Java Runtime Environment (version 1.8 or newer) has to be provided .

How to use the Greedy Runner - step by step

To use the iMOPSE greedy runner, a runner .jar file along with the problem definition file is required.

There are two parameters:

- evaluation_type - mode, either 'cost' or 'duration'
- definition_file - file path to the .def file

Using the runner works similar to any .jar file:

```
java -jar GreedyRunner.jar evaluation_type definition_file
```

Assuming that the definitions file are located inside the definitions directory and we want to use the duration mode, the following command should be used:

```
java -jar GreedyRunner.jar duration definitions\100_10_26_15.def
```

The command results in the following:

```
SUCCESS
```

```
Duration: 498
```

```
Cost: 122760.70000000001
```

The first line informs that the process has succeeded. It may also result in a failure in case of an IOException, for example due to lack of permission to read the file. The second and third line inform about the duration and cost of the resulting schedule respectively.

Reference article

Myszkowski P.B., Laszczyk M., Nikulin I., Skowroński M.E. "iMOPSE: a library for bicriteria optimization in Multi-Skill Resource-Constrained Project Scheduling Problem", in review process, Soft Computing Journal.