Master thesis of *Cheng-Kun Yang*

On constructing stable project baseline schedules with time constraints

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In this thesis, we first propose a random project scheduling network generator by integrating additional time window or time schedule constraints with a popular project network generator (RanGen). We then give two polynomial heuristic algorithms (Greedy I and Greedy II) to solve the integer programming problems, where Greedy I exploits the special structure of the models so that it can suggest a feasible start time for each task in a topological order to reduce the objective values, while Greedy II further takes the objective weights associated with variables into consideration and improves the quality of the solutions obtained by Greedy I. To further get solutions of better qualities, we propose a genetic algorithm and conduct computational experiments to evaluate the effectiveness (optimality gap) and efficiency (running time) of our proposed algorithms (Greedy I, Greedy II, and GA) and a popular optimization solver, CPLEX. The results show that our greedy heuristics are very efficient but not as effective, GA can be both efficient and effective, while CPLEX usually consumes much more computational time and is especially inefficient for problems of larger scale.

***Keywords*:** project scheduling, stable baseline scheduling, uncertainty, genetic algorithm

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