

Bachelor Final Project: Machine Scheduling with a Single Server

The following parallel machine scheduling problem has been investigated in the literature. There is a set of J jobs to be processed on a set of m parallel machines. The time needed to load a job on a machine, is called the setup time s_j (j in J) and is known and given; the corresponding operation is performed by a single server. This setup time cannot be performed while a machine is processing a job. Processing job j takes time p_j (j in J). On the other hand, after the job is loaded on the machine, the machine can process a job without the server being present. Simultaneous requests of the server by the machines will result in machine idle time. The problem is to assign all jobs to machines and specify the server operations, such that the latest job finishes as soon as possible.

Additional relevant features may include:

- (1) Precedence constraints between jobs,
- (2) Other objective functions, and
- (3) Multiple servers.

The goal of this bachelor final project is to:

- (1) study the related literature, and formulate the problem as a Mixed Integer Program,
- (2) design algorithms for this problem, and evaluate its performance, and
- (3) implement algorithms, and experiment with them using realistic instances.

References:

Elidrissi, E., R. Benmansour, M. Benbrahim, D. Duvivier (2020), Mathematical formulations for the parallel machine scheduling problem with a single server, *International Journal of Production Research*, doi: 10.1080/00207543.2020.1807637

Hall, N., C. Potts, C. Sriskandarajah (2000), Parallel machine scheduling with a common server, *Discrete Applied Mathematics* 102, 223-243.

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