AN APPROXIMATION ALGORITHMS FOR THE TWO-MACHINE ROUTING OPEN SHOP PROBLEM

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We consider the two-machine routing open shop problem. It is assumed that the jobs are located at nodes of an undirected transportation network G. The machines have to travel between the vertices (with unit speed) to process the jobs. All machines use the shortest path between the nodes. The makespan of a feasible schedule is the interval between the instant when the machines start working or moving and the instant when the last machine returns to the initial node after finishing all its operations. The goal is to minimize the makespan. The considered problem is NP-hard, because it is a generalization of the two-machine open shop problem and the metric travelling salesman problem. Moreover, the problem is NP-hard even on a two-node network with two machine (see [4]).

In [1] $\frac{13}{8}$-approximation algorithm was presented for the two-machine routing open shop problem under the assumption that each machine must execute each job. We assume that each machine must perform its own set of jobs and some of jobs should be executed by both machines.

Examples of applications where machines have to travel between jobs include processing of big or heavy objects, scheduling of robots that perform daily maintenance operations, and planning of excursions in big museums $[1-3]$.

We present three approximation algorithms with the worst-case performance.

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