On the optima localization for the 2-machine routing open shop with unrelated travel times

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The routing open shop model first introduced in [1, 2] is considered. In this model the sets of jobs and machines are given and each machine has to perform operations of each job (with given processing times) in arbitrary order similar to the classic open shop scheduling problem. Jobs are distributed among the nodes of some transportation network represented by edge-weighted graph. Weight of edge represents travel distance between the correspondent nodes and. All the machines are initially located at a predefined special node referred to as *the depot* and have to travel with unit speed between the nodes of transportation network to process their operations. The goal is to minimize the makespan which is the time moment of returning of the last machine to the depot after processing all the operations. This problem is proved to be NP-hard even in the simplest non-trivial case with two machines on a link [1].

The standard lower bound $\bar{R}$ for the optimum of the routing open shop was introduced in [2]. It was proved that optima for any instance with two machines and two nodes always belongs to the interval $[\bar{R}, \frac{6}{5}\bar{R}]$ and the bounds are tight. This result was generalized on the case of three nodes in [4].

In this paper we consider the generalization of the two machine routing open shop with individual machines' travel times [3]. We prove that for cases of two and three nodes with both proportional and unrelated travel times optima for any problem instance belongs to the interval $[\bar{R}, \frac{5}{4}\bar{R}]$ and the bounds of the interval are tight.

References

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