A Memory-based Multistart Heuristic for a Discrete Cost Multicommodity Network Design Problem

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Multicommodity flow problems arise widely as basic models in the context of network flows applications such as telecommunication networks, transportation problems, and logistics. In these applications, the flows that cross the network share the same resources simultaneously and are defined by their own constraints. Each edge connecting two nodes in the network has an associated cost that is fixed or proportional to its use. This paper focuses on a network design problem in which the costs are associated with the capacities installed in the edges. Particularly, the network design problem studied has discrete and step-wise increasing cost functions on the edges, for which exact methods are inefficient. Heuristics based on shortest path and maximum flow algorithms are proposed for the approximate solution of the problem in the framework of a multistart algorithm with adaptive memory. A vocabulary building intensification mechanism supported by the resolution of a linear program is also explored. The resulting algorithm obtained the best known solutions for some instances in the literature.