A Solution space Reduction Procedure for Multicast Routing in a Communication Network

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Abstract

This paper considers a multicast routing problem where the whole communication link delay on each path(route) of the tree is subject to a given delay allowance. For the problem, a minimum tree is to be found in an integer programming approach by using path variables. An associated problem reduction property is first characterized to reduce the solution space. Then, a polynomial time column generation procedure is exploited to solve the associated linear programming relaxation with such solution space reduced. Therewith, a branch-and-price algorithm is derived to obtain the optimal integer solution(tree) for the problem. The derived algorithm is tested for it's efficiency with various numerical problems and found that the algorithm can solve practical size problems in a reasonable time.

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