

ABSTRACT

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Selecting convex relaxations in a branch-and-bound algorithm using machine learning

SDP type of relaxations provides tight bounds for Quadratic Unconstrained Binary Optimization (QUBO) but are more expensive to solve than most LP relaxations. We propose a branch and bound framework for solving QUBOs. By default, only the LP relaxation is solved at each node of the branch-and-bound algorithm. SDP relaxations are solved parsimoniously, i.e., we only wish to solve the SDP relaxations if there is a high chance that it can fathom a given node. To predict whether a node can be fathomed by SDP bound, we propose a method that combines machine learning with solving a convex quadratic program. Our proposed approach is shown to save the number of SDP solves and computational time in a number of maxcut instances we tested.