

# The Maximum k-Colorable Subgraph Problem and Symmetry

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**Abstract:** Symmetry in integer programs is well known to have negative effects on the performance of branch-and-bound based solvers. Recently, several approaches to deal with this problem have been proposed. In this talk we will use the maximum k-colorable subgraph problem as a showcase to discuss polyhedral ways to handle symmetry. The goal is to find an induced subgraph of a given graph that can be colored with k colors, i.e., to assign colors to the nodes of the subgraph such that no two adjacent nodes receive the same color. We will demonstrate what happens when we combine the so-called orbitopes, which provide a generic way to handle an assignment symmetry, with the problem specific structure of the maximum k-colorable subgraph problem. We will also demonstrate by computational results that taking symmetry of the graph into account can improve the performance of a branch-and-cut algorithm.

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