Abstract

This thesis deals with the implementation and evaluation of one class of separation algorithms for mixed integer programming (MIP) solver software. This class comprises those separation algorithms which use relaxations of mixed integer constraints as their input. These typically are the flow cover cut, flow path cut, and cMIR cut separation algorithms. This thesis discusses the implementation of these three separation algorithms in detail and points out important implementation details. Furthermore, it describes algorithmic improvements for the aggregation and bound substitution steps of the cMIR cut separation algorithm. Concerning the flow path cut separation algorithm, it defines a new family of valid inequalities, called the path mixing inequalities, and shows their relation to the flow path inequalities. It also introduces two new separation algorithms to explicitly generate path mixing cuts and shows how path mixing cuts can be generated using a cMIR cut separation algorithm implemented in a certain way. Finally, a number of implementation details are evaluated in a computational study. This computational study also includes comparisons between the described implementations and introduces a new type of diagram to compare the results of computational experiments with separation algorithms.