Advances in Decomposition Approaches for Mixed Integer Linear Programming

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This thesis considers different decomposition approaches for mixed integer linear programming. Well-known techniques from the literature such as cutting plane methods, column generation, and logic-based Benders decomposition but also more recently developed approaches based on iteratively refined relaxations are investigated. Moreover, combinations of these algorithms and integration with other techniques such as constraint programming and/or (meta-)heuristics are considered. The aim of this thesis is twofold. First, these methods are exploited to solve challenging optimization problems. Thereby it is investigated what makes a specific approach effective for dealing with a particular application and which adjustments and extensions are important to improve performance. Second, the gained insights are used to advance the methods. The merits of the discoveries are supported by extensive computational studies that underline the potential of the proposed enhancements.