Using Hyperstars to Create Facial-Defining Inequalities of General Binary Integer Programs

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Abstract⎯Theoretical results relating to the facial structure of the general binary integer-programming polytope $conv(\{x \in \{0, 1\}^n : Ax \le b\})$ where $A \in \mathbb{R}^{r \times n}$, and $b \in \mathbb{R}^r$ are presented. A conflict hypergraph is constructed and some induced hyperstars create valid inequalities of P^{BIP}. These inequalities are further shown to produce large dimensional faces. Some computational results show the benefit of using hyperstar inequalities for the project allocation problem.

Keywords⎯Hypergraphs, Hyperstars, Polyhedral theory, Integer programming, Project allocation problem

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