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Relaxations of combinatorial problems via association schemes. (English) [Zbl 1334.90100](#)

Anjos, Miguel F. (ed.) et al., Handbook on semidefinite, conic and polynomial optimization. New York, NY: Springer (ISBN 978-1-4614-0768-3/hbk; 978-1-4614-0769-0/ebook). International Series in Operations Research & Management Science 166, 171-199 (2012).

Summary: In this chapter we describe a novel way of deriving semidefinite programming relaxations of a wide class of combinatorial optimization problems. Many combinatorial optimization problems may be viewed as finding an induced subgraph of a specific type of maximum weight in a given weighted graph. The relaxations we describe are motivated by concepts from algebraic combinatorics. In particular, we consider a matrix algebra that contains the adjacency matrix of the required subgraph, and formulate a convex relaxation of this algebra. Depending on the type of subgraph, this algebra may be the Bose-Mesner algebra of an association scheme, or, more generally, a coherent algebra. Thus we obtain new (and known) relaxations of the traveling salesman problem, maximum equipartition problems in graphs, the maximum stable set problem, etc.

For the entire collection see [\[Zbl 1235.90002\]](#).

MSC:

[90C22](#) Semidefinite programming
[90C27](#) Combinatorial optimization

Cited in **1** Review
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