

A Generalized Switching Method for Combinatorial Estimation

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The method of switchings is a standard tool for enumerative and probabilistic applications in combinatorics. In its simplest form, it analyzes a relation between two sets to estimate the ratio of their sizes. Via a sequence of such pairwise ratios, the relative sizes of a larger family of sets can be estimated. However, in some situations, the available relations might not form a simple chain in this manner. For example, a relation might be defined by an operation that takes an object in one set and converts it to an object that is only known to lie in some subfamily of other sets (rather than in a single known other set). Fack and McKay (2007) generalized the theory to the case where the relations form a directed graph which is acyclic except for loops. In this talk we describe two further generalizations. One generalization allows the relations to be cyclic. In the other generalization, there is a set of available relations and we can choose between them as specified by an edge-colored acyclic digraph. We illustrate the power of these generalizations with some examples.

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