Interval posets, parity representations, binary partitions, and antiprisms

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Abstract

Given a poset, one obtains another poset by considering the collection of intervals of the first, partially ordered by inclusion. (There are various possibilities, depending, for instance, upon whether one considers the empty set as being an "interval.") This construction has found use in the study of convex polytopes and other places. We describe a new method of representation of posets by utilizing certain geometric complexes in $\mathbb{R}^d$ having vertices in $\mathbb{Z}^d$. The striking feature of this method of representation is that taking the interval poset corresponds to dilation by a factor of 2 of the geometric complex. We explore connections with the integer partitions of posers of 2 into powers of 2.

Keywords: poset, interval, convex polytopes.