(Fractional) dimension of a poset and constraint feedback arc set problem

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Abstract

The dimension of a partially ordered set (poset) is the minimum integer k such that the partial order can be expressed as the intersection of k total orders. We prove it is hard to approximate the dimension of a poset with n elements within a factor $n^{0.5-\varepsilon}$ for any $\varepsilon > 0$. The same hardness of approximation holds for the fractional version of poset dimension.

On a positive side we consider a minimum "constrained" feedback arc set problem in tournament. We show an approximation factor of 6 for this problem. The constrained feedback arc set problem can be seen as a usual feedback arc set problem in tournament, with every edge having one of the two weights, one or infinity.

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