

Perfect Hashing, Graph Entropy, and Circuit Complexity

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Abstract

We present two simple and general techniques, both of which should find further application. First, we show that approximate compaction can be efficiently performed in constant parallel time using perfect hash functions. This allows us to show that polylogarithmic-threshold functions are in linear AC^0 .

Next, we show that the information theoretic notion of graph entropy captures some aspect of the difficulty of computing Boolean functions. We use this to derive superlinear lower bounds on the formula size of threshold and other simple Boolean functions.