

An EPTAS for Budgeted Matching and Budgeted Matroid Intersection

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Abstract: We study the budgeted versions of the well known matching and matroid intersection problems. While both problems admit a polynomial-time approximation scheme (PTAS) [Berger et al. (Math. Programming, 2011), Chekuri, Vondrak and Zenklusen (SODA 2011)], it has been an intriguing open question whether these problems admit a fully PTAS (FPTAS), or even an efficient PTAS (EPTAS).

In this paper we answer the second part of this question affirmatively, by presenting an EPTAS for budgeted matching and budgeted matroid intersection. A main component of our scheme is a novel construction of representative sets for desired solutions, whose cardinality depends only on ϵ , the accuracy parameter. Thus, enumerating over solutions within a representative set leads to an EPTAS. This crucially distinguishes our algorithms from previous approaches, which rely on exhaustive enumeration over the solution set. Our ideas for constructing representative sets may find use in tackling other budgeted optimization problems, and are thus of independent interest.

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