

Sarpatwar, Kanthi K.; Schieber, Baruch; Shachnai, Hadas
Constrained submodular maximization via greedy local search. (English) Zbl 07165741
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Summary: We present a simple combinatorial $\frac{1-e^{-2}}{2}$ -approximation algorithm for maximizing a monotone submodular function subject to a knapsack and a matroid constraint. This classic problem is known to be hard to approximate within factor better than $1 - 1/e$. We extend the algorithm to yield $\frac{1-e^{-(k+1)}}{k+1}$ approximation for submodular maximization subject to a single knapsack and k matroid constraints, for any fixed $k > 1$. Our algorithms, which combine the greedy algorithm of *S. Khuller* et al. [*Inf. Process. Lett.* 70, No. 1, 39–45 (1999; [Zbl 1002.68203](#))] and *M. Sviridenko* [*Oper. Res. Lett.* 32, No. 1, 41–43 (2004; [Zbl 1056.90124](#))] with local search, show the power of this natural framework in submodular maximization with combined constraints.

MSC:

90–XX Operations research, mathematical programming

Cited in **2** Documents

Keywords:

submodular functions; matroid; knapsack

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