Calinescu, Gruia; **Chekuri, Chandra**; **Pál, Martin**; **Vondrák, Jan**

Maximizing a submodular set function subject to a matroid constraint (extended abstract).

(English) Zbl 1136.90449
Fischetti, Matteo (ed.) et al., Integer programming and combinatorial optimization. 12th international IPCO conference, Ithaca, NY, USA, June 25–27, 2007. Proceedings. Berlin: Springer (ISBN 978-3-540-72791-0/pbk). Lecture Notes in Computer Science 4513, 182-196 (2007).

Let $f: 2^N \to \mathcal{R}^+ \lfloor] \dashv \backslash \wr \backslash - \lceil] \rfloor \nabla] \dashv \int \rangle \backslash \} \int \sqcap \lfloor \Updownarrow \wr \lceil \sqcap \updownarrow \dashv \nabla \int] \sqcup \{ \sqcap \backslash] \sqcup \rangle \wr \backslash , \dashv \backslash \lceil \updownarrow] \sqcup$(N,I)$beamatroid.Weconsidertheproblem\max_{S\in\mathcal{I}} f$ $approximationforthisproblem.Itisalsoknown, viaareductionfromthemax-k-coverproblem, thatthereisno(1$ - $1/e+\epsilon)-approximationforanyconstant\epsilon>0, unlessP=NP.Inthispaper, weimprovethe1/2-approximationtoa(1$ - $1/e)-approximation, whenfisasumofweightedrankfunctionsofmatroids.Thisclassoffunctionscapturesanumberofin$ $anewmethodofconstructingalgorithmswithprovenperformanceguarantee", J.Comb.Optim.8, No.3, 307-$ $-328(2004; Zbl1084.90029)]andaprobabilisticlemmaonmonotonesubmodularfunctionsthatmightbeofindependentintere$

We show that the generalized assignment problem (GAP) is a special case of our problem; although the reduction requires |N|$tobeexponentialintheoriginalproblemsize, weareabletointerprettherecent(1$ - $1/e)-approximationforGAPbyL.Fleischer, M.X.Goemans, V.S.MirrokniandM.Sviridenko["Tightapproximationalg$ $Proceedingsofthe17thAnnualACM-SIAMSymposiumonDiscreteAlgorithms, 611--620(2006)]inourframework.Th$ - $1/e)-approximationforvariantsofGAPwithmorecomplexconstraints.$

For the entire collection see [Zbl 1121.90003].

MSC:

90C27	Combinatorial optimization
05B35	Combinatorial aspects of matroids and geometric lattices
52B40	Matroids in convex geometry (realizations in the context of convex polytopes, convexity in combinatorial structures, etc.)

Full Text: DOI