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Bin packing with general cost structures. (English) Zbl 1274.90304

Summary: Following the work of Anily et al., we consider a variant of bin packing called BIN PACKING WITH GENERAL COST STRUCTURES (GCBP) and design an asymptotic fully polynomial time approximation scheme (AFPTAS) for this problem. In the classic bin packing problem, a set of one-dimensional items is to be assigned to subsets of total size at most 1, that is, to be packed into unit sized bins. However, in GCBP, the cost of a bin is not 1 as in classic bin packing, but it is a non-decreasing and concave function of the number of items packed in it, where the cost of an empty bin is zero. The construction of the AFPTAS requires novel techniques for dealing with small items, which are developed in this work. In addition, we develop a fast approximation algorithm which acts identically for all non-decreasing and concave functions, and has an asymptotic approximation ratio of 1.5 for all functions simultaneously.

MSC:
90C27 Combinatorial optimization
90C59 Approximation methods and heuristics in mathematical programming

Software:
Knapsack

Full Text: DOI Link

References:


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