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Multi-index assignment problems: an overview

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In this presentation we give an overview of applications of, and algorithms for, special cases of multi-index assignment problems (MIAPs). MIAPs, and relatives of it, have a long history in combinatorial optimization, both in applications as well as in theoretical results, starting at least in the 1950's. A prominent example of a MIAP is the so-called axial three index assignment problem (3AP) which has many applications in a variety of domains including clustering and production. A description of 3AP is as follows. Given are three n-sets R, G, and B. For each triple in R X G X B a cost-coefficient c(i,j,k) is given. The problem is to find n triples such that each element is in exactly one triple, while minimizing total cost. We show positive and negative results for finding an optimal solution to this problem that depend upon different ways of how the costs c(i,j,k) are specified.