中国科学院数学与系统科学研究院

应用数学研究所

华罗庚应用数学青年论坛

报告题目： Approximate Envy-freeness in Indivisible Resource Allocation with Budget Constraints

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地　　点：　腾讯会议　803-304-619

摘　　要： We study the fair allocation of indivisible resources under knapsack constraints, where a set of items with varied costs and values are to be allocated to a group of agents. Each agent has a budget constraint on the total cost of items she can receive. The goal is to compute a feasible allocation that is envy-free (EF), in which the agents do not envy each other for the items they receive, nor do they envy a charity, which is endowed with all the unallocated items. Since EF allocations barely exist (even without budget constraints), we are interested in the relaxed notion of envy-freeness up to one item (EF1). Our results are twofold. Firstly, for the general setting where agents have heterogeneous valuations and budgets, we show that a budget-feasible allocation that maximizes the Nash social welfare (NSW) achieves a 1/4 approximation of EF1. The approximation ratio improves gracefully when the items have small costs compared with the agents' budgets; it converges to 1/2 when the budget-cost ratio approaches infinity, and to 1 if the agents further have identical valuations. Secondly, when the agents have identical valuations, we design a polynomial-time algorithm that computes a 1/2 approximate EF1 allocation for an arbitrary number of agents. For the case of identical agents and the case of two agents, we propose polynomial-time algorithms for computing EF1 allocations.

个人简介： 现为香港理工大学助理教授。博士毕业于石溪大学计算机系，先后在牛津大学计算机科学系和德克萨斯大学奥斯汀分校电子与计算机工程系做博士后。研究兴趣包括算法博弈论与机制设计、计算社会选择与公平划分、多智能体系统、近似和在线算法、区块链理论、机器学习理论等。论文发表于 Mathematical Programming, SIAM Journal on Computing, Journal of Artificial Intelligence Research 等期刊。