



Stability in Matching Markets with Complex Constraints

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We consider a new model of many-to-one matching markets in which agents with multi-unit demand aim to maximize a cardinal linear objective subject to multidimensional knapsack constraints. The choice functions of agents with multi-unit demand are therefore not substitutable. As a result, pairwise stable matchings may not exist and, even when they do, may be highly inefficient. We provide an algorithm that finds a group-stable matching that approximately satisfies all the multidimensional knapsack constraints. The degree of the constraint violation is proportional to the sparsity of the constraint matrix. The algorithm therefore provides practical error bounds for applications in several contexts, such as refugee resettlement, matching of children to daycare centers, and meeting diversity requirements in colleges. A novel ingredient in our algorithm is a combination of matching with contracts and Scarf's Lemma.

For full version of our paper, please see <http://web.ics.purdue.edu/nguye161/complexconstraint.pdf>.

CCS Concepts: • **Social and professional topics**; • **Theory of computation** → **Algorithmic game theory and mechanism design**;

Additional Key Words and Phrases: Market Design, Stable Matching, Scarf Lemma

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