Combinatorial allocation and submodular maximization over matroids

Date Tuesday, February, 12

Time 4 pm

Location 317 Mudd

Abstract: Combinatorial allocation problems arise in situations where a finite set of ”items” should be distributed among n ”players” in order to maximize a certain ”social utility” function. More generally, this problem can be phrased as maximization of a certain set function f(S) over sets independent in a matroid M. Since such problems are typically NP-hard to solve optimally, we seek approximation algorithms that find a solution of value at least c OPT where OPT is the optimum and c¡1 a suitable constant.

A particular case of interest is the allocation problem where utility functions are assumed to be monotone and submodular. It has been known since 1978 that a greedy algorithm gives a 1/2-approximation [Nemhauser, Wolsey, Fisher] for maximizing any monotone submodular function subject to a matroid constraint, which implies the same result for the allocation problem. I will show how this can be improved to a (1-1/e)-approximation - an approximation factor which is known to be optimal.

(partly joint work with G. Calinescu, C. Chekuri and M. Pal)