Abstract

We consider `Multiway Cut`, a basic graph partitioning problem in which the goal is to find the minimum weight collection of edges disconnecting a given set of special vertices called terminals. `Multiway Cut` admits a well known simplex embedding relaxation, where rounding this embedding is equivalent to partitioning the simplex. Current best known solutions to the problem are comprised of a mix of several different ingredients, resulting in intricate algorithms. Moreover, the best of these algorithms is too complex to fully analyze analytically and its approximation factor was verified using a computer. We propose a new approach to simplex partitioning and the `Multiway Cut` problem based on general transformations of the simplex that allow dependencies between the different variables. Our approach admits much simpler algorithms, and in addition yields an approximation guarantee for the `Multiway Cut` problem that (roughly) matches the current best computer verified approximation factor.