
Better Approximation for Weighted k -Matroid Intersection

Neta Singer*¹ and Theophile Thiery¹

¹EPFL – Switzerland

Abstract

We consider the problem of finding an independent set of maximum weight simultaneously contained in k matroids over a common ground set. This k -matroid intersection problem appears naturally in many contexts, for example in generalizing graph and hypergraph matching problems. In this paper, we provide a $(k+1)/(2\ln 2)$ -approximation algorithm for the weighted k -matroid intersection problem. This is the first improvement over the long-standing $(k-1)$ -guarantee of Lee, Sviridenko and Vondrák (2009). Along the way, we also give the first improvement over greedy for the more general weighted matroid k -parity problem. Our key innovation lies in a randomized reduction in which we solve almost unweighted instances iteratively. This perspective allows us to use insights from the unweighted problem for which Lee, Sviridenko, and Vondrák have designed a $k/2$ -approximation algorithm. We analyze this procedure by constructing refined matroid exchanges and leveraging randomness to avoid bad local minima.

*Speaker