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Title

A (5/3 + ε)-Approximation for Unsplittable Flow on a Path: Placing Small Tasks into Boxes

Abstract:

In the unsplittable flow on a path problem (UFP) we are given a path with edge capacities and a collection of tasks. Each task is characterized by a subpath, a profit, and a demand. Our goal is to compute a maximum profit subset of tasks such that, for each edge e, the total demand of selected tasks that use e does not exceed the capacity of e.

The current best polynomial-time approximation factor for this problem is 2 + eps for any constant eps>0. This is the best known factor even in the case of uniform edge capacities. These results, likewise most prior work, are based on a partition of tasks into large and small depending on their ratio of demand to capacity over their respective edges: these algorithms invoke (1 + eps)-approximations for large and small tasks separately. The known techniques do not seem to be able to combine a big fraction of large and small tasks together (apart from some special cases and quasi-polynomial-time algorithms).

The main contribution of this paper is to overcome this critical barrier. Namely, we present a polynomial-time algorithm that obtains roughly all profit from the optimal large tasks plus one third of the profit from the optimal small tasks. In combination with known results, this implies a polynomial-time (5/3 + eps)-approximation algorithm for UFP.

Joint work with Fabrizio Grandoni, Tobias Mömke and Hang Zhou.

Where: República 701, Sala 33.

When: Wednesday, August 29, 13:30.

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