

Fast gradient methods for network flow problems

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Abstract

In this talk we present a new approach for finding approximate solutions to different network problems related to multi-commodity flows. We consider simple subgradient schemes and schemes based on the smoothing technique. The fastest of our methods solves the maximal concurrent flow problem in $O(\frac{qm}{\delta})$ iterations, where δ is the related accuracy, m is the number of arcs in the graph, and q is the number of commodity sources. Each iteration of these schemes is very simple and does not require any sophisticated operations (e.g. shortest path computation). Its complexity is of the order $O(mq \ln q)$ operations. The application of our approach needs a preliminary computational stage consisting in finding all node-to-node maximal flows, which takes $O(n^2 m \ln n)$ operations, where n is the numbers of nodes in the graph.