GRAPH ROUTING PROBLEMS: APPROXIMATION, HARDNESS, AND GRAPH-THEORETIC INSIGHTS

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In a typical routing problem, we are given a graph G and a collection $(s_1, t_1), \ldots, (s_k, t_k)$ of pairs of its vertices, called demand pairs, that we would like to route. In order to route a demand pair (s_i, t_i), we need to choose a path connecting s_i to t_i in G. The goal is usually to route as many of the demand pairs as possible, while keeping the congestion of the routing - the maximum load on any vertex or an edge of G - as small as possible. This general framework gives rise to a number of basic and widely studied graph routing problems, that have lead to the development of a rich toolkit of algorithmic techniques, as well as structural graph theoretic results. In this talk we will describe some of the recent developments in approximation algorithms for graph routing problems, and highlight some connections between this area and graph theory.