

Large-scale Computations of Edge-Importance Measures

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Measures that quantify the importance of edges are valuable in the analysis of various types of network data, including social networks, biological networks, computer networks and many more. With rare exceptions, the applicability of such measures to large datasets is hindered by the lack of fast algorithms for their computation.

In this talk, we will discuss how existing algorithmic tools enable the computation of significant edge importance measures on very large networks. These measures fall in the broad class of electrical measures.

At a high level, they quantify the importance of an edge as a function of the electrical flow that passes through it when electric sources are applied to different nodes on the network.

This talk is an application talk that will demonstrate how recent progress in algorithms for solving Laplacian linear systems, combined with extensive use of parallelism and careful implementations can exploit the special properties of the measures and data under consideration. In the talk we will experiment with various types and sizes of networks and demonstrate the efficacy of our tools in delivering significant network information.

We will also illuminate the differences among various electrical measures and betweenness centrality with respect to an information propagation process over the underlying network.