

Flows on random networks: probabilistic and statistical problems

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In the last few years with the availability of large amounts of data, there has been a lot of effort in coming up with Network models trying to explain “Real world” networks as well as in trying to model dynamic processes on these networks. In connection to the above consider the following two problems:

1. Edge flow problem: Given a connected network with edge costs, suppose each node sends a unit amount of flow to every other node via the least cost path. We are interested in the amount of flow passing through various nodes and edges. What happens when the Network becomes large? Can we come up with a tractable mathematical model giving us precise asymptotic information? Using continuous time branching processes and “local information” of the neighborhood about edges we show how this can be done.
2. Multicast tree problem: In a number of problems that arise from trying to discover the underlying structure of the Internet, often it is impossible to take direct measurements at the routers. We shall discuss progress in trying to reconstruct the “Multicast” tree using only “end-to-end” measurements. Using ideas from algorithms in phylogenetics (reconstructing the “tree of life”) we show how this can be done efficiently.

List of invited speakers

Schedule for December 13