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Broadcasting Problems in Graphs

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We will consider the problem of the dissemination of information on graphs. Assume, for example, that we have a connected network where one node has a piece of information and wants to let every other node in the network know of this information. Frieze and Grimmett (1985) and subsequently Pittel (1987) considered a randomized broadcasting algorithm, which proceeds in rounds and at each round each one of the informed vertices chooses one of its neighbours uniformly at random, independently of every other vertex, and informs it. We consider this algorithm on a random graph $G(n,p)$ where $p \gg \ln n/n$. We show that the time needed until all vertices have been informed is as on the complete graph with n vertices, that is, it is not affected by the density. We also consider a quasirandom analogue of this algorithm, that is based on the rotor-router model (also known as the Propp machine). This broadcasting algorithm was introduced recently by Doerr, Friedrich and Sauerwald (2008) and it has the advantage that each vertex makes only one random choice and subsequently informs each one of its neighbours according to a predetermined cyclic ordering of them. We show that this algorithm on the complete graph evolves in the same way as the randomized broadcasting algorithm and achieves the same time bounds.

This is joint work with Anna Huber and Konstantinos Panagiotou.