Asymptotic behaviour of gossip processes and small world networks

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Abstract

Both small world models of random networks with occasional long range connections and gossip processes with occasional long range transmission of information have similar characteristic behaviour. The long range elements appreciably reduce the effective distances, measured in space or in time, between pairs of typical points. In this paper, we show that their common behaviour can be interpreted as a product of the locally branching nature of the models. In particular, it is shown that both typical distances between points and the proportion of space that can be reached within a given distance or time can be approximated by formulae involving the limit random variable of the branching process.

Keywords: Small world graph, gossip process, branching process approximation.
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