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Infinite limits of random graph models for self-organizing networks

Self-organizing networks are real or virtual networks that are formed by the actions of a mulitude of independent agents, who act with only local knowledge of the network. A famous example is the virtual network formed by the pages and hyperlinks of the World Wide Web; other examples include social networks, the Internet, and biological networks such as that modelling the interaction between proteins. It has been observed in various studies that such networks share a number of common graph properties. Moreover, these properties do not fit the traditional $G(n, p)$ model. In order to explain the occurrence of these characteristics, a number of new random graph models have been proposed. These are mostly based on a stochastic time process, where nodes and edges are added (and removed) at each time step.

A new approach to study these graphs is to study these models by considering the infinite graphs that result when time goes to infinity. In this talk, I will describe this method, and the results obtained from it. Particularly, I will describe a new model that incorporates the idea, coined in the literature, that new nodes "copy" the neighbourhood of an existing node, with some error. Depending on the parameters, the infinite limits of this model will exhibit some form of the property that defines R, the infinite random graph. I will also discuss some new classes of infinite graphs that arise naturally in this context.

This is joint work with Anthony Bonato.