

13. Preferential attachment

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Brief description: There are various growth models for random graphs that use the following idea. Consider the number of neighbours of each vertex in a graph G_n with n vertices. Suppose that the graph G_{n+1} is constructed from G_n by connecting the $(n + 1)^{\text{st}}$ vertex to one or more other vertices depending on their number of neighbours. Such models are called “preferential attachment models”. There are several variants of such models. In this project, we will consider some of the literature on such models, e.g. starting from Athreya et al., which is written in an accessible way for a student who has studied Probability to the level of BS3a *Applied Probability* and B10a *Martingales through Measure Theory*.

References:

K.B. Athreya, A.P. Ghosh and S. Sethuraman: ‘Growth of preferential attachment random graphs via continuous-time branching processes’. *Proc. Indian Acad. Sci.(Math. Sci.)* Vol. 188 (2008), No. 3, 473–494.

Prerequisites: BS3a *Applied Probability*. B10a *Martingales through Measure Theory*.

Part A *Graph Theory* may be useful.

Type: Project with possibilities for theoretical study, possibly simulation.