

中央研究院統計科學研究所

學術演講

講題：Inference for the Degree Distributions of Preferential Attachment Networks with Zero-Degree Nodes

演講人：Prof. Samuel P.S. Wong
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時間：2019年8月21日（星期三）上午10:30-12:00

地點：中央研究院統計科學研究所6005會議室(環境變遷研究大樓A棟)

※茶會：上午10:10開始

Abstract

The tail of the logarithmic degree distribution of networks decays linearly with respect to the logarithmic degree is known as the power law and is ubiquitous in daily lives. A commonly used technique in modeling the power law is preferential attachment (PA), which sequentially joins each new node to the existing nodes according to the conditional probability law proportional to a linear function of their degrees. Although effective, it is tricky to apply PA to real networks because the number of nodes and that of edges have to satisfy a linear constraint. This paper enables real application of PA by making each new node as an isolated node that attaches to other nodes according to PA scheme in some later epochs. This simple and novel strategy provides an additional degree of freedom to relax the aforementioned constraint to the observed data and uses the PA scheme to compute the implied proportion of the unobserved zero-degree nodes. By using martingale convergence theory, the degree distribution of the proposed model is shown to follow the power law and its asymptotic variance is proved to be the solution of a Sylvester matrix equation. These results give a strongly consistent estimator for the power-law parameter and its asymptotic normality. This talk will review the theory of this new modeling approach and will illustrate how to use it to big network analysis.

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