Graph Analysis

Sergio Yaksic

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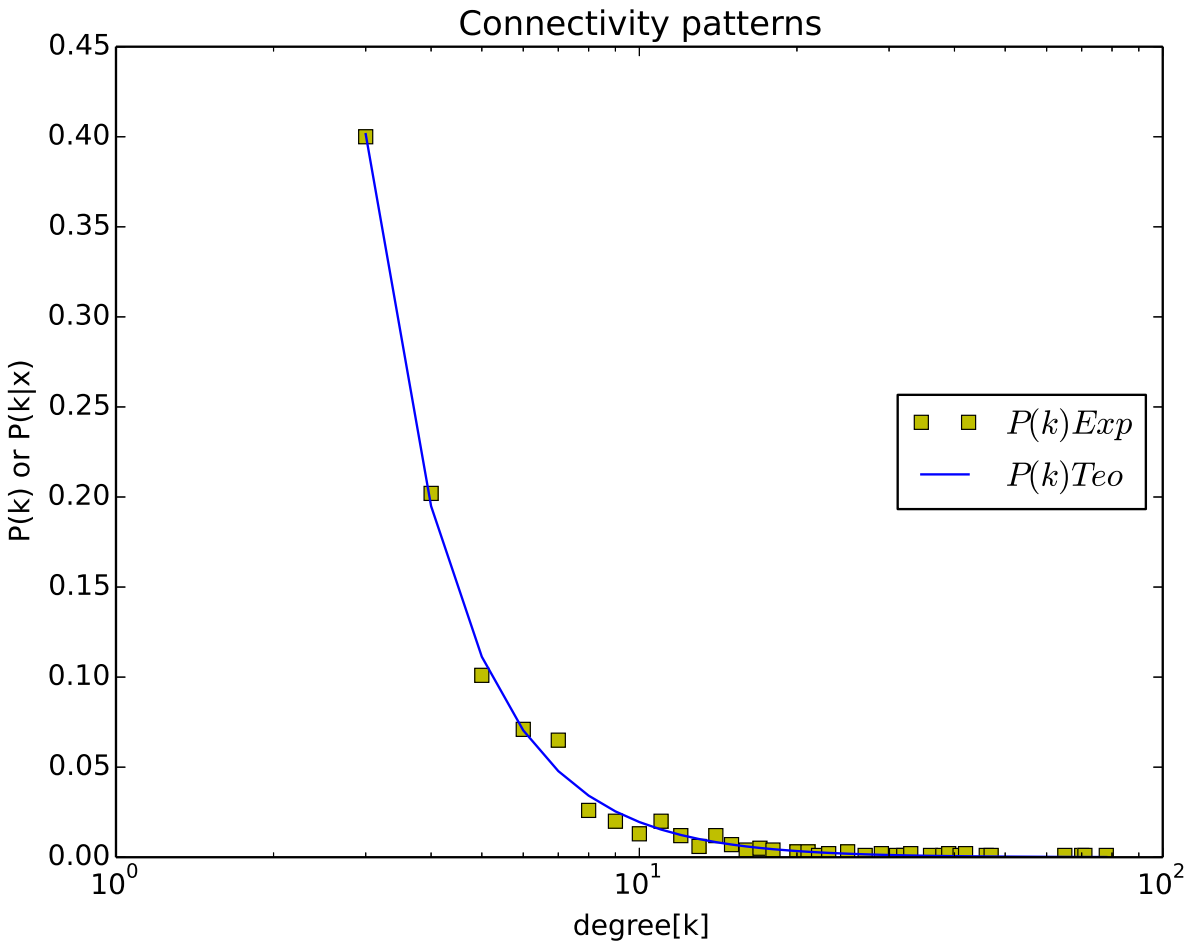
Abstract

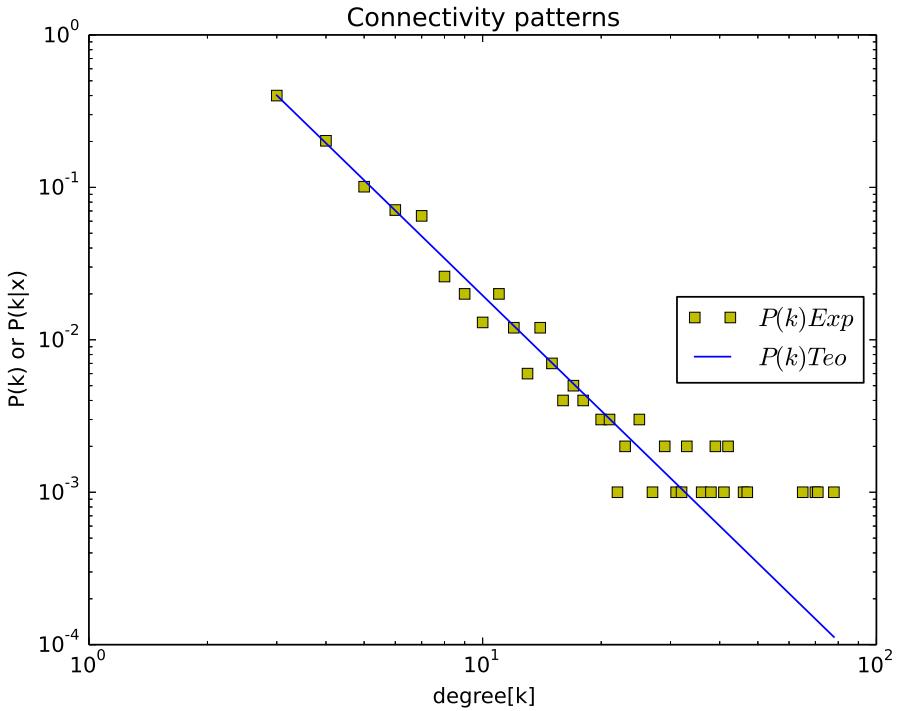
Using a python program, an statistical analysis about the connectivity patterns over scale-free graphs is presented. We compare our statistical results with the theoretical degree distribution $P(k)$ and degree-degree correlation function $P(k|x)$

Degree Distribution



Here is a plot of the degree distribution of a barabasi-albert graph. The yellow squares represent the statistical probability of choosing

Power law Distribution



$$P(k) = Ck{-}\gamma \quad (1)$$

The blue line represents the best fit (the one that minimizes the sum of squared errors) for theoretical equation 1.

Degree-degree correlation function

Using equation 2 presented by vespignati we plotted the degree-degree correlation function, that is the probability of choosing a node of degree k connected to a node of degree x.

$$P(k|x) = \frac{kP(k)}{\langle k \rangle} = \frac{kCk-\gamma}{\langle k \rangle} \tag{2}$$

Theoretical $P(k|x)$

Theoretical $P(k|x)$ using the parameters of blue curve $P(k)$ and $P(k|x = \langle k \rangle)$ as reference.