Recency-based preferential attachment models

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Preferential attachment models were shown to be very effective in predicting such important properties of real-world networks as the power-law degree distribution, small diameter, etc. Many different models are based on the idea of preferential attachment: LCD, Buckley-Osthus, Holme-Kim, fitness, random Apollonian network, and many others.

Although preferential attachment models reflect some important properties of real-world networks, they do not allow to model the so-called *recency property*. Recency property reflects the fact that in many real networks nodes tend to connect to other nodes of similar age. This fact motivated us to introduce a new class of models – recency-based models. This class is a generalization of fitness models, which were suggested by Bianconi and Barabási. Bianconi and Barabási extended preferential attachment models with pages' inherent quality or *fitness* of nodes. When a new node is added to the graph, it is joined to some already existing nodes that are chosen with probabilities proportional to the product of their fitness and incoming degree.

We generalize fitness models by adding a recency factor to the attractiveness function. This means that pages are gaining incoming links according to their *attractiveness*, which is determined by the incoming degree of the page, its *inherent popularity* (some page-specific constant) and age (new pages are gaining new links more rapidly).

We analyze different properties of recency-based models. For example, we show that some distributions of inherent popularity lead to the power-law degree distribution.

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