

Analyzing Citations of US Patent Data

Using a New Stochastic Generative Model

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Abstract

Patent citations can be represented by a network structure called a citation network, similar to scientific citations. We have already proposed a stochastic generative model for scientific citations that can mimic the network structure. This model combines two types of generative mechanisms, preferential attachment, and triad formation to perform edge generation, and is able to generate network structures that match the in/out-degree distributions and the distribution of the number of triangles of several citation networks. However, the model could not fit well for the patent citation network, especially on the distribution of the number of triangles. The reason may be that there exists the effect of minimizing citations to clarify its validity in the patent literature. On the other hand, academic papers tend to cite papers that are less relevant but have a large number of citations in order to show that the paper has been thoroughly surveyed. We propose a modified model that uses the ratio of triad formation as a random variable instead of a constant parameter. The proposed model provides an improved fit to the citation network of patents.