

Swarm simulations of the power law distribution models

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Abstract

Power law distributions have been observed and investigated by researchers for many decades, reaching back over a hundred years to Pareto and his observation of power law distribution of the size of income, followed by power law distribution of word frequencies, city sizes and many other in the areas of biology, chemistry, linguistics, economy and most recently computer science. Since power law distributions play such an important role in many areas it is natural to investigate their properties and construct models leading to their emergence. Many such models have been proposed but no definite conclusions were reached. Most recently, results in computer science demonstrate power law distribution in the number of links between web pages in the World Wide Web network, other research suggests power law for the file size distribution. These observations inspire computer scientists to attempt the construction of power law models followed by their computer simulations. Here we use several Swarm simulations to investigate such models. We base our simulations on existing models where incremental growth and preferential attachment are the key ingredients for the emergence of power laws as well as expand those to include new variables. A new model without the incremental growth requirement is also proposed.

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