
The Department of Electrical and Computer Engineering

Fragkiskos Papadopoulos

Title: Popularity versus similarity in growing networks

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Room KENTP-E002, Old Campus
University of Cyprus

Abstract:

Preferential attachment is a powerful mechanism explaining the emergence of scaling in growing networks. If new connections are established preferentially to more popular nodes in a network, then the network is scale-free. Here we show that not only popularity but also similarity is a strong force shaping the network structure and dynamics. We develop a framework where new connections, instead of preferring popular nodes, optimize certain trade-offs between popularity and similarity. The framework admits a geometric interpretation, in which preferential attachment emerges from local optimization processes. As opposed to preferential attachment, the optimization framework accurately describes large-scale evolution of technological (Internet), social (web of trust), and biological (E.coli metabolic) networks, predicting the probability of new links in them with a remarkable precision. The developed framework can thus be used for predicting new links in evolving networks, and provides a different perspective on preferential attachment as an emergent phenomenon.

Biography:

Fragkiskos Papadopoulos is a Lecturer of the Electrical Engineering and Information Technology Department at Cyprus University of Technology. He received the Diploma in Electrical and Computer Engineering from the National Technical University of Athens, Greece, in 2002. In 2004 and 2007 he received respectively the M.S. and Ph.D. degrees in Electrical Engineering from the University of Southern California, Los Angeles. During 2007-2009 he was a postdoctoral research scholar at the Cooperative Association for Internet Data Analysis (CAIDA) at the University of California, San Diego, and during 2009-2010 he was a visiting Lecturer at the Electrical and Computer Engineering Department of the University of Cyprus. As a Ph.D. student he also held internship positions at both CAIDA and AT&T Labs-Research. Fragkiskos' research interests lie in the area of Computer Networking and Network Science.