Uncovering Evolutionary Ages of Nodes in Complex Networks

Zhu Guimei, Yang Huijie, Yang Rui, Ren Jie, Li Baowen, Lai Ying-Cheng

(Submitted on 11 Jul 2011 (v1), last revised 20 Feb 2012 (this version, v2))

In a complex network, different groups of nodes may have existed for different amounts of time. To detect the evolutionary history of a network is of great importance. We present a general method based on spectral analysis to address this fundamental question in network science. In particular, we argue and demonstrate, using model and real-world networks, the existence of positive correlation between the magnitudes of eigenvalues and node ages. In situations where the network topology is unknown but short time series measured from nodes are available, we suggest to uncover the network topology at the present (or any given time of interest) by using compressive sensing and then perform the spectral analysis. Knowledge of ages of various groups of nodes can provide significant insights into the evolutionary process underpinning the network.

Comments: 10 pages, 6 figures, accepted by EPJB 2012 Feb

Subjects: **Physics and Society (physics.soc-ph)**; Social and Information Networks (cs.SI); Data Analysis, Statistics and Probability (physics.data-an)

Cite as: **arXiv:1107.1938 [physics.soc-ph]**

(or **arXiv:1107.1938v2 [physics.soc-ph]** for this version)

Submission history

From: Zhu Guimei [view email]

[v1] Mon, 11 Jul 2011 05:42:00 GMT (869kb)

[v2] Mon, 20 Feb 2012 07:07:23 GMT (650kb)

Which authors of this paper are endorsers?