Fangjian Guo

Personal Information

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Education

2013 – present **Duke University**, Durham, NC, USA.
PhD student in the Department of Computer Science

2009 – 2013 **University of Electronic Science and Technology of China**, Chengdu, P.R.China.
B.Eng. in computer science and technology
Graduation with the highest distinction
GPA: **3.89**/4.00 (**92.6**/100) Ranking: **1**/110

Research Interests

Machine learning, Bayesian statistics and statistical physics. Modeling and understanding complex systems, including neural systems, human behaviors, social networks, recommendation systems, etc. Developing models with Bayesian nonparametric methods and inference algorithms scalable to large datasets. Discovering and understanding the connections between machine learning and statistical physics, especially in terms of graphical models, MCMC, etc.

Research Experience

Dec 2013 – present **Modeling and Calibrating Ratings across Categories**,
advised by Prof. David Dunson.
Duke University

In online rating systems, users tend to rate items with different internal standards across categories. By modeling such categorical dependence, ratings can be calibrated accordingly to remove the unfair bias and increase the diversity of recommendation systems.

◇ Proposed a Bayesian probit model to characterize the categorical dependence allowing for overlapping categories.
◇ Applied model to movie rating data.

Dec 2012 – Feb 2013 **Growth Trajectories and Causal Mechanisms of Evolution for Social Networks**,
advised by Prof. Jonathan Zhu.
Web Mining Lab, City University of Hong Kong

◇ Proposed a branching-process model to explain the dynamics of network growth.

Aug 2012 – May 2013 **The Memory of Power-law Series**,
advised by Prof. Tao Zhou.
Web Sciences Center, School of Computer Science and Engineering, UESTC

Power-law distribution emerges in empirical data from human activities and complex systems. We study how power-law naturally imposes a constraint on the memory (first-order autocorrelation) of random series, which may explain why most of empirical power-law series are found to be positively autocorrelated.

◇ Derived analytically the non-trivial bounds for the memory of permuted i.i.d. power-law sequence as a function of the exponent.
◇ Analyzed the asymptotic behavior of diverging moments with approximation methods.
◇ Validated theoretical results with both numerical simulations and empirical data.

July 2012 – Aug 2012 **Inverse Ising Problem with Pseudolikelihood Maximization**,
advised by Prof. Haijun Zhou.
Institute of Theoretical Physics, Chinese Academy of Sciences

◇ Implemented the algorithm for learning interactions by maximizing pseudolikelihood.
◇ Evaluated the algorithm by feeding samples from Monte Carlo simulation with different sizes and temperatures.

Feb 2012 – June 2012 **Predicting Link Directions via a Recursive Subgraph-based Ranking**,
advised by Prof. Tao Zhou.
Web Sciences Center, School of Computer Science and Engineering, UESTC

For incomplete directed networks, ranking is applied to the problem of predicting link directions by using other links. We propose a solution by first ranking nodes in a specific order and then predicting these links as stemming from a lower-ranked node towards a higher-ranked one.

◇ Collaborated with coauthors to develop the ranking algorithm.
◇ Analyzed the performance of the algorithm with empirical data.

Academic Activities

July 2012 CCAST summer school on statistical physics and complex systems.
Institute of Theoretical Physics, Chinese Academy of Sciences, Beijing

Graduate Coursework

Spring 2014
◇ CPS 590: Advanced Machine Learning
◇ STA 960: Statistical Stochastic Processes

Fall 2013
◇ STA 601: Bayesian and Modern Statistics
◇ STA 561: Machine Learning
◇ CPS 530: Design and Analysis of Algorithms

Honors and Awards

2013 **Duke Graduate Fellowship**
Duke University

2012 **Outstanding Winner** in 2012 Mathematical/Interdisciplinary Contest in Modeling (17 out of 5,024 teams, 0.3%).
COMAP, sponsored by SIAM, NSA and INFORMS

2012 **Outstanding Student** of the University (10 out of 4,500 undergraduates, 0.2%).
University of Electronic Science and Technology of China

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2010 – 2011 and 2009 – 2010 **National Scholarship** (Top 1%). Ministry of Education of China

Skills

Programming C/C++, Python, MATLAB, R

Typesetting LaTeX

Language Chinese (native), English (fluent)

Publications

[1] **Fangjian Guo**, Zimo Yang, and Tao Zhou. Predicting link directions via a recursive subgraph-based ranking. *Physica A*, 392(16), 2013.

[2] **Fangjian Guo**, Jiang Su, and Jian Gao. Finding conspirators in the network via machine learning. *The UMAP Journal*, 33(3), 2012. **(Outstanding Winner paper for MCM/ICM 2012)**

[3] **Fangjian Guo** and Tao Zhou. The relation between memory and power-law exponent. (in preparation).

[4] **Fangjian Guo**, Xi Chen, Christine Chai and David Dunson. Modeling and calibrating ratings across categories. (in preparation).

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