Fangjian Guo

Personal Information

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Education

2013 – present **Duke University, Durham, NC, USA**.
2nd-year PhD student in machine learning, Department of Computer Science
Advisor: Katherine A. Heller Committee Members: David B. Dunson, Ronald Parr
GPA: **3.97**/4.00

2009 – 2013 **University of Electronic Science and Technology of China, Chengdu, P.R.China**.
B.Eng. in computer science and technology, graduated with **highest distinction**
Advisor: Tao Zhou Thesis: *A Statistical Analysis of Diverging Moments.*
GPA: **3.89**/4.00 Ranking: **1**/110

Research Interests

Modeling Bayesian latent variable models, Bayesian nonparameteric models for hierarchical and network structures, Stochastic processes, Graphical models, Natural language processing.

Inference Scalable Bayesian inference, MCMC, Belief propagation

Theory Connecting statistical physics and machine learning, especially in graphical models and stochastic processes.

Application Modeling, understanding and predicting human behaviors, especially the interplay among structure, dynamics and contents in social processes, e.g. online/offline communications, social networking, tagging and rating. Testing sociological theories with statistical models and large-scale data. Discovering and quantifying predictive patterns with machine learning techniques and applying them to recommendation, advertising and information retrieval.

Research Experience

Jan 2015 – present **A Novel Approximate Inference Algorithm for Dirichlet Process Mixture Models**, *advised by Prof. Katherine Heller.*
Duke University

Nov 2014 – present **An EM-BP Framework for Recommendation Systems**,
advised by Prof. Henry Pfister.
Duke University

Developing efficient and accurate rating prediction algorithms via a combined scheme of expectation-maximization and belief propagation. It significantly reduces the "cold-start" problem by exploiting long-range correlations.

April 2014 – Oct 2014 **Modeling Influence in Conversations**,
advised by Prof. Katherine Heller and Prof. Hanna Wallach.
Duke University

People's language usage tend to drift towards to those influential speakers in a conversation, which is a phenomenon known as "linguistic accommodation". We discover the latent influence network by modeling the evolution of language usage over time. Our model finds interesting patterns underlying political science and movie subtitle data.

Dec 2013 – Jan 2014 **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.

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richardkwo • richardkwo

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

Dec 2014 **NIPS 2014 Workshop on Networks: From Graphs to Rich Data**.
Montreal, Quebec, Canada.

Oct 2014 **The 5th Annual Text as Data Workshop**.
Kellogg School of Management, Northwestern University, Chicago.

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

Graduate Coursework

Fall 2014
◇ STA 711: Probability & Measure Theory
◇ CPS 527: Computer Vision
◇ ECE 590: Graphical Models and Inference

Spring 2014
◇ CPS 590: Advanced Machine Learning
◇ STA 960: Statistical Stochastic Processes
◇ STA 732: Statistical Inference

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

Teaching

Fall 2014 TA & Recitation, STA 561: Probabilistic Machine Learning (graduate)
Spring 2014 TA, CPS 270: Introduction to Artificial Intelligence (undergraduate)

Honors and Awards

2013 – 2015 **Duke Graduate Fellowship**.
Duke University

2012 **Outstanding Winner in 2012 Interdisciplinary Contest in Modeling (0.3%)**.
COMAP, sponsored by SIAM, NSA and INFORMS

2012 **Outstanding Student of the University (0.2%)**.
University of Electronic Science and Technology of China

2009 – 2011 **National Scholarship**.
Ministry of Education of China

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Skills

Programming	C/C++, Python, MATLAB, R
Typesetting	LaTeX
Language	English (fluent), Chinese (native)

Publications

Peer Reviewed

[1] **Fangjian Guo**, Charles Blundell, Hanna Wallach, and Katherine A. Heller. The Bayesian Echo Chamber: Modeling influence in conversations. *AISTATS*, 2015 (to appear).

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

Working Papers

[3] **Fangjian Guo** and Henry D. Pfister. An EM-BP algorithm for matrix completion.

[4] **Fangjian Guo** and David B. Dunson. Bayesian multiplicative calibration models for recommender systems.

[5] **Fangjian Guo**, Zimo Yang, Zhidan Zhao, and Tao Zhou. The relation between memory and power-law exponent.

Workshop Papers

[6] **Fangjian Guo**, Charles Blundell, Hanna Wallach, and Katherine A. Heller. The Bayesian Echo Chamber: Modeling power and influence with mutually exciting processes and dynamic language models. In *The 5th Annual Text as Data Conference*, Kellogg School of Management, Northwestern University, October 2014.

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