RAMYA KORLAKAI VINAYAK

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Education

California Institute of Technology, Pasadena, CA, USA
Ph.D. in Electrical Engineering (June 2013 - present)
Focus Areas: Machine Learning, Convex Optimization, Clustering, Human Computation.
M.S. in Electrical Engineering (Sept 2011 - June 2013), GPA 4.1/4.0

Indian Institute of Technology Madras, Chennai, India
B.Tech in Electrical Engineering; Minor in Physics (Aug 2007 - May 2011)
GPA 9.6 (Major) and 9.5/10.0 (overall)

Awards and Scholarships

Schlumberger Foundation Faculty for the Future Fellowship (2013-2015).

IITM Certificate of Academic Distinction Awarded by the Indian Institute of Technology Madras for the academic year Aug 2009 - May 2010 for excellent academic performance.

Indian Academy of Sciences Summer Research Fellowship Awarded by Indian Academy of Sciences for pursuing research during summer 2010.

OPJEMS Scholarship (2008) Awarded by the OP Jindal Group of Industries (India) for outstanding performance in academics and leadership.

KVPY Fellowship (2005) Kishore Vaigyanik Protsahan Yojana (Young Researcher Fellowship) awarded by Indian Institute of Science, Bangalore and Department of Science and Technology, Govt. of India.

NTSE Scholarship (2005) National Talent Search Examination conducted by the National Council of Education, Research and Teaching, India.

Publications

R. K. Vinayak, B. Hassibi, "Crowdsourced Clustering: Querying Edges vs Triangles," *Neural Information Processing Systems (NIPS) 2016.*

R. K. Vinayak, B. Hassibi, "Similarity Clustering in the Presence of Outliers: Exact Recovery via Convex Program," *IEEE International Symposium on Information Theory (ISIT) 2016.*

R. K. Vinayak, S. Oymak, B. Hassibi, "Graph Clustering With Missing Data: Convex Algorithms and Analysis," *Neural Information Processing Systems (NIPS) 2014.*

R. K. Vinayak, S. Oymak, B. Hassibi, "Sharp Performance Bounds for Graph Clustering via Convex Optimization," *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP) 2014.*

Research Experience

Crowdsourced Clustering: Query Design and Robust Algorithms June 2015 - present
with Prof. Babak Hassibi, California Institute of Technology [NIPS 2016]

- We consider the problem of clustering unlabeled data using a crowd of non-expert workers. Our goal is to design queries and algorithms to infer quality data from non-expert crowd workers.

Convex Optimization based Algorithms for Clustering Large Graphs June 2013 - present
with Prof. Babak Hassibi, California Institute of Technology [ISIT 2016, NIPS 2014, ICASSP 2014]

- We cast the problem of clustering the nodes in unweighted and weighted graphs in large networks as a convex optimization problem. Our goal is to develop efficient algorithms which can work with partially observed data, and provide provable guarantees on the performance of the algorithms.

Work Experience

Software Engineering Intern June - Sept 2014
Google, Mountain View, CA, USA

- Implemented and tested a multi-dimensional clustering technique to find rings of fraudulent nodes in advertising networks which is now a part of their pipeline.
- Developed and tested tools for data preprocessing and dimensionality reduction.
- Contributed over 5000 lines of code in C++, gaining experience in parallel and distributed algorithms using MapReduce.

Summer Intern May - July 2009

AllGo Embedded Systems Pvt. Ltd., Bangalore, India

- Developed an application using socket programming in C to establish a multicast network of Zigbee sensors in a Wireless Personal Area Network according to IEEE 802.15.4 Standard for home automation.
- Ported the application to i.MX board with an ARM processor and successfully tested the application.

Teaching Experience

Graduate Teaching Assistant, Caltech. *Stochastic & Adaptive Signal Processing*, Spring '16

Graduate Teaching Assistant, Caltech. *Advanced Algorithms*, Spring '15

Graduate Teaching Assistant, Caltech. *Probability & Random Processes*, Fall '12

Other Projects

Citation Centrality and Academic Salaries March - May 2012

with Prof. Adam Wiermann, Kijun Seo & Michael Hirshleifer, California Institute of Technology

- Investigated whether measures of productivity based on citation centrality could explain academic salary.
- Analyzed 18 years of citation network data for Theoretical High Energy Physics to compute various centrality measures. We obtained the salary data of professors in public schools, and fitted a linear model incorporating the measure of centrality and seniority.
- Our study showed that the simple measure of citation count and seniority predicted salary with high confidence while sophisticated measures (like h- and g-indices) failed to do so.

Models in Population Dynamics: Stability, Limit Cycles and Chaos Jan - April 2011

with Prof. Gaurav Raina & Arun Chaganty, Indian Institute of Technology Madras, India

- Investigated the behavior of two simple population models - the delayed logistic equation and the Parez-Malta-Coutinho (PMC) model (delay differential equations).
- Showed that these two systems capture a range of dynamics. The delayed logistic model exhibits fixed points and limit cycles whereas the PMC model also exhibits chaos.
- Analytically characterized the same with Hopf bifurcation theory, and investigated the qualitative differences between the two models and resulting implications to control theory.

Mean Field Limit Based Approximations for Wireless Networks May - July 2010

with Prof. Anurag Kumar, Department of ECE, Indian Institute of Science, Bangalore, India

- Studied the behavior of a single cell wireless local area network (WLAN) using the *Scaled Node Attempt Model* and characterized the local stability of the equilibrium point.
- Performed extensive simulations in order to understand how the behavior of a real system (IEEE 802.11e WLAN standard) compares with that of a scaled node attempt model.

Analysis of IEEE 802.11n Infrastructure Wireless Local Area Networks with Channel Errors May - July 2010

with Prof. Anurag Kumar, Department of ECE, Indian Institute of Science, Bangalore, India

- Analyzed the performance of 802.11n Infrastructure WLAN with channel errors.
- Showed that the sufficient condition for the existence of a unique fixed point for an errorless system holds even when the system has channel errors.

Graduate Courses

Applied & Computational Mathematics: Concentration Inequalities, Markov Chains, Discrete Stochastic Processes and Applications, Convex Optimization, Linear Algebra and Operator Theory, Probability & Random Processes.

EE/CS: Machine Learning, Random Matrix Theory, Stochastic & Adaptive Signal Processing, Project in Networks, Ideas Behind the Web, Information Theory, Communication Theory, Multirate Signal Processing, Signals & Systems.

Programming Matlab, C/C++, Python (working knowledge).