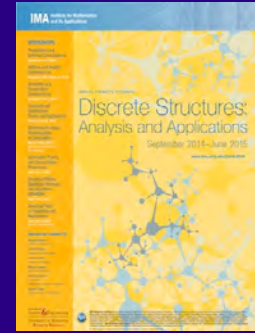
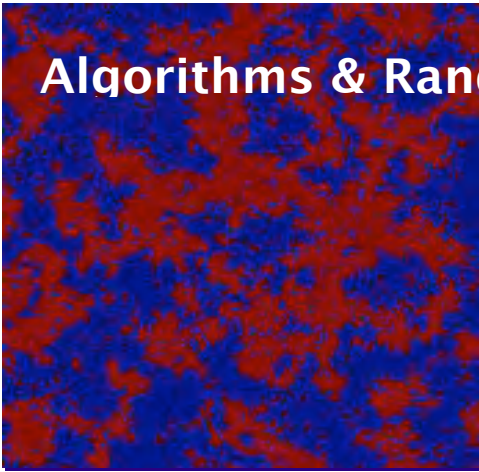


Algorithms & Randomness Center : Annual Report 2014



2014 in Review:



This year, the Algorithms and Randomness Center (ARC) has continued its tradition of hosting talks, welcoming visitors to “think tank” research discussions, organizing workshops and other annual events, and sponsoring students projects and postdocs. In May 2014, Prasad Tetali stepped down

as ARC Director and Dana Randall took the reins.

ARC faculty, postdocs and students continue to win distinguished research awards. Most notably, we congratulate Dick Lipton for winning the 2014 Knuth Prize for a career of deep contributions across many areas of theoretical computer science.

Prasad Tetali has been the main organizer for a year in Discrete Structures at the Institute of Mathematics and its Applications (IMA) in Minnesota. Many ARC faculty have helped organize events, including one hosted on the Georgia Tech campus this spring.

ARC has taken a leadership role in helping develop a new strategic initiative in Data Science and Engineering at Georgia Tech. Srinivas Aluru and Dana Randall are leading a group of faculty building new cross-campus efforts in data science, including utilizing ARC’s strengths in algorithms,

optimization, statistics, machine learning and discrete mathematics, all increasingly important as data challenges continue to evolve.

Board and Committee Members:

Advisory Board: Jennifer Chayes (Microsoft Research), William Cook (Waterloo), Zvi Galil (Georgia Tech), Ravi Kannan (Microsoft-India), Richard Karp (UC-Berkeley), Richard Lipton (Georgia Tech), and Laszlo Lovasz (Hungarian Academy of Sciences).

Steering Committee: Ton Dieker (ISyE), Vladimir Koltchinskii (Math), Sebastian Pokutta (ISyE), Justin Romberg (ECE), Prasad Tetali (Math), Santosh Vempala (CS), Eric Vigoda (CS).

Student Fellowship Committee: This committee evaluates ARC student fellowship applications. During 2014, the committee consisted of Gregory Blekherman (Math), Santanu Dey (chair, ISyE), and David Goldberg (ISyE), Milena Mihail (CS) and Santosh Vempala (CS).

Acknowledgments: The ARC Director and faculty thank our excellent CS staff, especially Elizabeth Ndongi for lead support in Spring 2014 and Dani Denton in Fall 2014 for contributing to all ARC activities. We are also grateful to Francella Tonge (CS) and Annette Rohrs (Math) for additional support and to Josie Giles (IRIM) for tremendous help with the website design.

RESEARCH ACTIVITIES

Research Projects

Graduate Students

Since Spring 2008, over 60 students from various schools have received up to 50% RA funding by ARC, matched by the Ph.D. advisors. The continuing support of competitive research proposals from the graduate students resulted in the following winners for 2014: (Lists of previous winners can be found on the ARC website.)

Spring 2014:

[Gustavo Angelo](#), (Advisors : Shabbir Ahmed and Santanu S. Dey, ISyE) “A polyhedral study of all-different polytopes”;

[Spencer Backman](#), (Advisor: Matt Baker, Math) "A Complex Valued Hypergraph Laplacian";

[Andreas Galanis](#), (Advisor: Eric Vigoda, CS) "Hardness of Approximately Counting Colorings";

[Sara Krehbiel](#), (Advisor: Chris Peikert, CS) "Paying for Privacy";

[Robert Krone](#), (Advisor: Anton Leykin, Math) “Algorithms for Equivariant Ideals and Varieties”;

[Andrew Massimino](#), (Advisor: Mark Davenport, ECE) “Constrained Adaptive Sensing”;

[Sarah Miracle](#), (Advisor: Dana Randall, CS) “Markov Chains to Model Segregation and Biased Surfaces”;

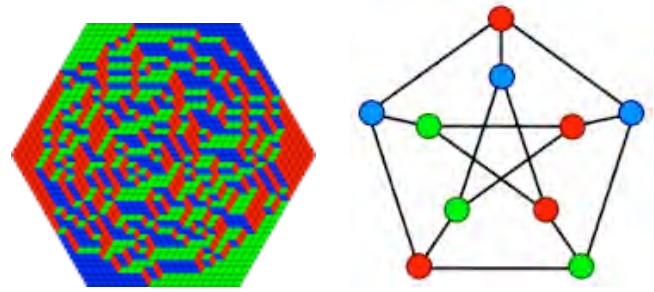
[Aurko Roy](#), (Advisor: Santosh Vempala CS) "Learning a Polytope."

Fall 2014:

[Burak Kocuk](#) (Advisors: Santanu Dey and Andy Sun, ISyE) “A Polyhedral Study of DC Transmission Switching Problem”;

[Guido Lagos](#) (Advisor: Ton Dieker, ISyE) “Exact Sampling of Random Walk Paths up to the Maximum”;

[Ioannis Pannageas](#) (Advisor: Prasad Tetali, Math) “Replicator dynamics, Equilibria and Diversity in Evolution.”



Research Discussions

The ARC ThinkTank:

An important objective of ARC is to help provide consulting and other help on algorithmic questions. To facilitate this, ARC hosts research lunches featuring guests from various branches of the Sciences and the Engineering on a regular basis. The guest lecturer gives a brief 15 minute presentation, after which the discussion is typically interactive with an intent to model, analyze and help solve problems from a rigorous, algorithmic perspective.

In 2014, concrete research projects were initiated with visitors from industry and academia. Contact us to suggest new topics!

Recent example:

Guest: Dan Campbell (GTRI) on Inferring Dependencies in Cyber-Systems.

Undergraduate Involvement

CS undergraduate Ryan Keane has collaborated with Dana Randall and her graduate students Prateek Bhakta and Sarah Miracle on simulations of segregation models.

ARC faculty have also given research presentations in a CS undergraduate seminar run by Dylan McKay.

RESEARCH HIGHLIGHTS

Conference Publications

ARC faculty, postdocs, and students show strong presence in competitive, top-level international conferences such as CRYPTO, RANDOM-APPROX, SODA, STOC, and ITCS (GT Co-authors highlighted below):

SODA 2014:

“Improved Approximation Algorithm for Two-Dimensional Bin Packing,” **Nikhil Bansal** and **Arindam Khan**

“Clustering and Mixing Times for Segregation Models,” **Prateek Bhakta**, **Sarah Miracle** and **Dana Randall**

“On Computability of Equilibria in Markets with Production,” **Jugal Garg** and **Vijay Vazirani**

“A Cubic Algorithm for Computing Gaussian Volume,” **Ben Cousins** and **Santosh Vempala**

RANDOM-APPROX 2014:

“#BIS-Hardness for 2-Spin Systems on Bipartite Bounded Degree Graphs in the Tree Nonuniqueness Region,” Jin-Yi Cai, **Andreas Galanis**, Leslie Ann Goldberg, Heng Guo, Mark Jerrum, Daniel Stefankovic and **Eric Vigoda**

“On Sharp Thresholds in Random Geometric Graphs,” Milan Bradonjic and **Will Perkins**

“Ferromagnetic Potts Model: Refined #BIS-hardness and Related Results,” **Andreas Galanis**, Daniel Stefankovic, **Eric Vigoda** and **Linji Yang**

CRYPTO 2014:

“New and Improved Key-Homomorphic Pseudorandom Functions,” **Abhishek Banerjee** and **Chris Peikert**

“Faster Bootstrapping with Polynomial Error,” **Jacob Alperin-Sheriff**, **Chris Peikert**



STOC 2014:

“Inapproximability for Antiferromagnetic Spin Systems in the Tree Non-Uniqueness Region,” **Andreas Galanis**, Daniel Stefankovic and **Eric Vigoda**

“Fourier PCA and Robust Tensor Decomposition,” Navin Goyal, **Santosh Vempala** and **Ying Xiao**

“Constant Rank Bimatrix Games are PPAD-Hard,” **Ruta Mehta**

“Dichotomies in Equilibrium Computation, and Complementary Pivot Algorithms for a New Class of Non-Separable Utility,” **Jugal Garg**, **Ruta Mehta**, and **Vijay V. Vazirani**

“The Power of Localization for Efficiently Learning Linear Separators with Noise,” Pranjali Awasthi, **Maria Florina Balcan** and Philip M. Long

ITCS 2015:

“Natural Selection as an Inhibitor of Genetic Diversity: Multiplicative Weights Updates Algorithm and a Conjecture of Haploid Genetics,” **Ruta Mehta**, **Ioannis Panageas** and **Georgios Piliouras**

SODA 2015:

“The Matching Polytope Does Not Admit Fully-Polynomial Size Relaxation Schemes,” **Gábor Braun** and **Sebastian Pokutta**

“Minors and Dimensions,” **Bartosz Walczak**.

“Phase Transitions in Random Dyadic Tilings and Rectangular Dissections,” **Sarah Cannon**, **Sarah Miracle** and **Dana Randall**

RESEARCH HIGHLIGHTS

(continued)

Honors & Awards

Dick Lipton won the **2014 Knuth Prize** for advances in Algorithms and Complexity!



From the ACM announcement: Lipton has been selected as the winner of the 2014 Knuth Prize for inventing new computer science and mathematical techniques to tackle foundational and practical problems in a wide range of areas in graph algorithms, computation, communication, program testing, and DNA computing.

Also notable this year, ISyE faculty **David Goldberg** and **Sebastian Pokutta** were recipients of NSF CAREER Awards.

Pokutta also was appointed Coca-Cola Early Career Professor, won best paper at EGRIE's annual meeting for "Convergence of Capital and Insurance Markets: Pricing Aspects of Index-Linked Catastrophic Loss Instruments," and delivered a keynote at the 5th Cargese Workshop on Combinatorial Optimization.

Santosh Vempala presented plenary talks at ICML and RANDOM on "High-Dimensional Sampling Algorithms," the SIAM Discrete Math Biennial Conference on "the Complexity of Graph and Hypergraph Expansion Problems," and the Indo-US Symposium on Learning and Algorithms on "The Complexity of Unsupervised Learning."

Prasad Tetali spoke at an ICM Satellite conference in South Korea, was appointed Adjunct Professor of Math & CS at Emory University and he will be a plenary speaker at Random Structures & Algorithms in Pittsburgh this summer.

Eric Vigoda was the Global Lecture Series speaker at the Korea Advanced Institute of Science and Technology (KAIST) for Spring 2015.

Sasha Boldyreva was general chair of Crypto 2014.

Dana Randall gave the Samuel Conte Distinguished Lecture at Purdue University, was Chair of the Board of Governors of the IMA, concluding a 5 year term on the board, and was selected to chair the next biennial SIAM Conference in Discrete Mathematics, July 2016.

ARC Postdoc **Ruta Mehta** was the recipient of the CoC Outstanding Post-Doctoral Researcher Award.

For teaching, **Greg Blekherman** (Math) received the CETL/BP Junior Faculty Teaching Award and **Dana Randall** (CS), received a Class of 1940 Course Survey Teaching Effectiveness Award.

Finally, SCS Chair **Lance Fortnow** was the recipient of the 2014 SIGACT Distinguished Service Prize.

Graduate Students

Recent graduate **Andreas Galanis** was one of two 2014 recipients of the CoC Dissertation Award and was nominated for the ACM Doctoral Dissertation Award for research with advisor **Eric Vigoda**. Andreas is now a postdoc at the University of Oxford.

Tonghoon Suk, PhD student working with **Ton Dieker**, won 2nd place in the 2014 INFORMS Nicholson student paper competition, for the paper, "Randomized longest-queue-first scheduling for large-scale buffered systems."

PhD student **Sarah Cannon** was awarded a fellowship from the Achievement Rewards for College Scientists (ARCS).

EDUCATION

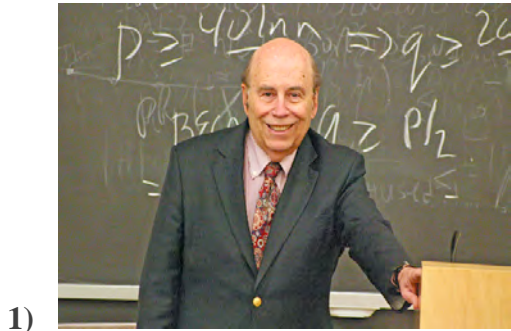
The ACO colloquium meets most Mondays and has hosted prominent researchers. Last year Michael Rabin from Harvard came for an extended visit and gave two lectures: “Practically Efficient ZKPs for Preventing Collusion in Auctions” and “Electronic Voting Using The Split Value Representation.” Umesh Vazirani from U.C. Berkeley delivered a

Joint ARC / ACO colloquium on “How ‘Quantum’ is the D-Wave Machine?” Peter Winkler from Dartmouth also gave a joint talk, on “Pursuit on a Graph.” Machine learning great Geoffrey Hinton from the University of Toronto presented a joint ARC / ML seminar on “Deep Learning.” In most cases the visitors met with many faculty, postdocs and students.

Lectures

Each of the following visitors gave a series of lectures on exciting frontier research topics.

- 1) Michael Rabin (Harvard)
- 2) Peter Winkler (Dartmouth)
- 3) Umesh Vazirani (U.C. Berkeley) Joint ARC Colloquium / ACO Student Seminar
- 4) Geoffrey Hinton (U. Toronto) Joint ARC / Machine Learning Colloquium
- 5) Howard Karloff (Yahoo Labs)
- 6) Brittany Fasy (Tulane U.)
- 7) Dick Lipton (Georgia Tech) Special colloquium in honor of his Knuth Prize Talk



Student Seminars

ACO, ARC and the School of ISyE have been cost sharing in funding the pizza-lunch student seminar series organized and hosted by the ACO Ph.D. students for the past few years. The speakers

include Georgia Tech students, postdocs, faculty, and visiting researchers. The lectures are aimed at non-specialists and have been a very effective tool in the ongoing learning process of the relevant community.

Collaborations Across Campus and Grants Awarded

Last year, three ARC groups were awarded NSF *Early-concept Grants for Exploratory Research* (EAGER) grants to facilitate research across Schools and Colleges. These resulted from a large effort including 10 PIs, with each award lasting two years, starting March 2014. This collaboration has brought together faculty across

campus, in particular from the Schools of CS and Interactive Computing from the College of Computing, and the School of ECE and School of ISYE from the College of Engineering, and the School of Math from the College of Sciences. The titles and the corresponding PIs are listed below:

\$300K, EAGER: “Discrete Optimization Algorithms for 21st Century Challenges”

\$300K, EAGER: “Physical Flow and other Industrial Challenges”

\$300K, EAGER: “Convex Optimization Algorithms for 21st Century Challenges”

PIs (Georgia Tech and Carnegie Mellon University): College of Computing: Nina Balcan and Santosh Vempala from SCS, Henrik Christensen from SIC; **College of Engineering:** Santanu Dey, George Nemhauser, Arkadi Nemirovski, and Sebastian Pokutta from ISyE, and Justin Romberg from ECE; **College of Science:** Vladimir Koltchinskii and Prasad Tetali from Math; **CMU:** Avrim Blum (CS).

G. Nemhauser



S. Vempala



P. Tetali



H. Christensen



S. Dey



A. Nemirovsky



V. Koltchinskii



S. Pokutta



J. Romberg



A. Blum



N. Balcan



One of the major goals is to use societal challenges to motivate the study of the underlying optimization problems. The projects aim to foster interdisciplinary collaboration to develop new approaches. An important goal is also to develop rigorous and systematic approaches to discrete optimization problems by combining insights and state-of-the-art methods from integer programming,

(e.g., cutting planes and branch-and-bound) and algorithmic ideas from computer science (including online algorithms and machine learning). Another goal is the development of continuous optimization methods in statistical inference and machine learning. These grants fostered collaboration and have already resulted in many new publications at the interface of Engineering and Computing.

Additional Grants in 2014:

\$350K, **Sebastian Pokutta** – NSF CAREER: “Semidefinite Programming Extended Formulations.”

\$500K, **David Goldberg** – NSF CAREER: “Embracing Randomness and Uncertainty in Inventory Problems: Algorithms and Insights.”

\$280K, **Sasha Boldyreva** – NSF Small: A Unifying Framework For Theoretical and Empirical Analysis of Secure Communication Protocols

\$30K, **Santosh Vempala** – APHL (Association of Public Health Laboratories): “C4G BLIS: A Basic Laboratory Information System.”

\$20K, **Sasha Boldyreva** – NSF funding for student travel to CRYPTO 2014 as general conference chair.

\$46K, **Chris Peikert** – Google Faculty Award.

Data Science and Engineering

ARC faculty have taken a lead in helping Georgia Tech develop a new Institute of Data Science and Engineering. The Strategic Initiative is co-directed by Dana Randall (ARC Director) and Srinivas Aluru (CSE) who have been leading a Faculty Council of over 40 faculty from more than 14 Schools representing all of the colleges and GTRI.

Most universities today are supporting major initiatives in Data Science, either focusing on the core technologies such as High Performance Computing or the application domains in Industry and across all of the Sciences and Engineering. Part of what makes the Georgia Tech initiative unique is its emphasis also on the mathematical foundations facilitated by ARC, including algorithms, optimization, statistics, machine learning, and analytics.

Brainstorming sessions:

Throughout Spring 2015, members of the Faculty Council, along with other domain specific researchers, met for half-day mini-retreats to brainstorm about grand challenges in Data Science and Engineering.

Cyber-Infrastructure (Chaired by S. Aluru), February 27, 2015. This session explored the best infrastructure to meet the needs of the GT faculty in data science, as well as current research challenges. We explored the benefits of designing cyber-infrastructure through a unified approach integrating hardware, software, middleware, networking, databases, and applications.

Detecting Unexpected Anomalies (Chaired by D. Randall and D. Bader (CSE)), March 27, 2015. This session will bring together researchers from across the campus to consider innovative approaches to strategic forecasting. Topics include computational challenges, algorithmic problems, analytics, and policy issues.



Dana Randall



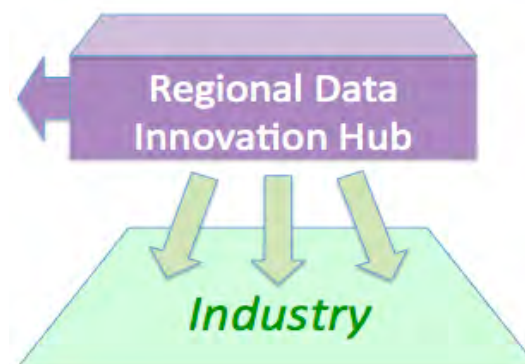
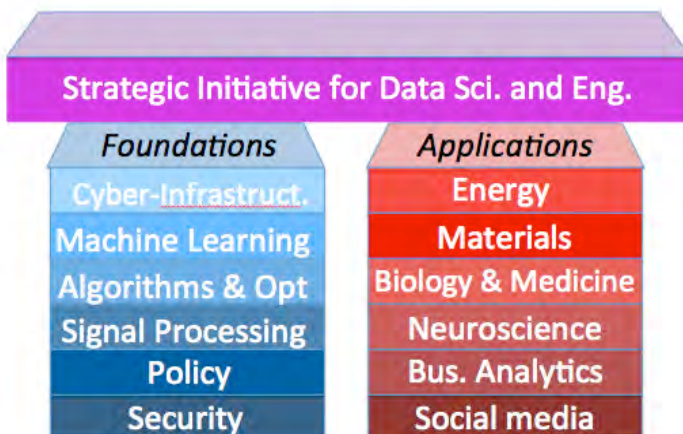
Srinivas Aluru

Data Fusion (Chaired by D. Randall and G. Clifford (BME)), April, 2015. An overarching challenge in many aspects of data science is incomplete, noisy, and disparate sources of data. Is there a way to systematize the extraction of useful information that comes in multiple forms with variable veracity? We aim to bring together GT researchers with challenges and ideas for new solutions.

Precision Medicine (Chaired by S. Aluru), May, 2015. Data driven investigations are fast becoming the foundation of modern research in life sciences and medicine. Personalized and precision medicine is based on sequencing, which generate enormous quantities of data both at individual and population levels. This is an important area due to its vast scope, societal importance, and combination of in-house expertise and valuable partners (Emory and CDC).

Regional Data Innovation Hub:

The Data Innovation Hub will facilitate interactions between industry and academia. Affiliates will have access to faculty and students to help solve current data challenges.



Collaboration with External Research Institutes

IMA Institute for Mathematics
and its Applications



Prasad Tetali led a team of 6 organizers of a year-long program on Discrete Structures: Analysis and Applications at the **IMA** for 2014-15. Many of the workshops were co-organized with Georgia Tech faculty, and one on the *Power of Randomness in Computation* was held at Georgia Tech (co-organized by Dana Randall, Prasad Tetali, Santosh Vempala and Eric Vigoda).

Discrete mathematics has been flourishing in the last couple of decades and many of its subareas (particularly, combinatorics) have become central areas in the mathematics community, attracting the attention of highly respected researchers from other disciplines. Program workshops spanned frontier topics of research in discrete mathematics (including combinatorics and optimization) and probability throughout the year.



Special Year Workshops:

1. 9/8-12/2014 : *Probabilistic and Extremal Combinatorics*
2. 9/29-10/3/2014 : *Additive and Analytic Combinatorics*
3. 11/10-14/2014 : *Geometric and Enumerative Combinatorics*
4. 2/23-27/2015 : *Convex Optimization: Theory and Applications*
5. 3/16-20/2015 : *Workshop on the Power of Randomness in Computation* (hosted at Georgia Tech)
6. 4/13-17/2015 : *Information Theory and Concentration Phenomena*
7. 4/27-5/1/2015 : *Analytical Tools in Probability and Applications*
8. 5/18-22/2015 : *Graphical Models, Statistical Inference, and Algorithms (GRAMSIA)*



Next year, **Eric Vigoda** will chair a workshop on *Approximate Counting: Markov Chains and Phase Transitions* at the Simon's Institute for the Theory of Computing in Berkeley, CA.

High Profile Lectures

SCS Distinguished Lecture: Michael Kearns, U. Penn

The poster features the Georgia Tech School of Computer Science logo at the top left. The title 'Distinguished Lecture' is in large white font, with 'Games, Networks, and People' below it in yellow. A portrait of Michael Kearns is on the left. To the right, text provides his name, title, date and time, location, and a brief bio/abstract.

Georgia Tech School of Computer Science

Distinguished Lecture

Games, Networks, and People

WHO:
Michael Kearns
Professor and National Center Chair
University of Pennsylvania

WHEN & WHERE:
Jan 29, 2015 @ 11 A.M.
Scheller College of Business
Room 100
800 West Peachtree Street NW
Atlanta GA 30308

RECEPTION TO PRECEDE LECTURE
Scheller CoB Atrium @10:30 A.M.

BIO:
Michael Kearns is Professor and National Center Chair in the Computer and Information Science department at the University of Pennsylvania. His research interests include topics in machine learning, algorithmic game theory, social networks, and computational finance. Prior to joining the Penn faculty, he spent a decade at AT&T/Bell Labs, where he was head of AI Research. He is co-director of Penn's Wharton Center for Network and Data Science, and founder of Penn's Networked and Social Systems Engineering (NETS) undergraduate program. Kearns consults extensively in technology and finance, and is a Fellow of the Association for the Advancement of Artificial Intelligence and the American Academy of Arts and Sciences.

ABSTRACT:
Beginning with the introduction of graphical games and related models, there is now a rich body of algorithmic connections between probabilistic inference, game theory and microeconomics. Strategic analogues of belief propagation and other inference techniques have been developed for the computation of Nash, correlated and market equilibria, and have played a significant role in the evolution of algorithmic game theory over the past decade. There are also important points of departure between probabilistic and strategic graphical models – perhaps most notably that in the latter, vertices are not random variables, but self-interested humans or organizations. It is thus natural to wonder how social network structure might influence equilibrium outcomes such as social welfare or the relative wealth and power of individuals. One logical path that such questions lead to is human-subject experiments on strategic interaction in social networks.

Title: "Games, Networks, and People"

Abstract: Beginning with the introduction of graphical games and related models, there is now a rich body of algorithmic connections between probabilistic inference, game theory and microeconomics. Strategic analogues of belief propagation and other inference techniques have been developed for the computation of Nash, correlated and market equilibria, and have played a significant role in the evolution of algorithmic game theory over the past decade. There are also important points of departure between probabilistic and strategic graphical models. One logical path that such questions leads to is human-subject experiments on strategic interaction in social networks.

Bio: Michael Kearns is a professor in the Computer and Information Science Department at the University of Pennsylvania. He serves as the National Center Chair and holds secondary appointments in the Statistics and Operations and Information Management (OPIM) departments of the Wharton School. Kearns' research specializations include machine learning, artificial intelligence, algorithmic game theory, social networks, and computational finance.

ARC 7

The annual half-day ARC event, will be held on the morning of April 17, 2015, featuring a distinguished lecture by Christos Papadimitriou (U.C. Berkeley) and shorter lectures by GT faculty Srinivas Aluru (CSE), Natasha Boland (ISyE) and Santosh Vempala (CS).



Christos Papadimitriou



Srinivas Aluru



Natasha Boland



Santosh Vempala

Christos Papadimitriou is the C. Lester Hogan Professor of EECS, a member of the National Academy of Science, the National Academy of Engineering, and the American Academy of Arts and Sciences.

Blog Capital of Theoretical Computer Science

A recent claim to fame is that Georgia Tech is the Blog Capital for Theoretical Computer Science. Dick Lipton's blog, *Gödel's Lost Letter and P=NP* (joint with Ken Regan), has been heralded as one of the most active sites *in any field!* Indeed, the AJC's recent article on Dick is entitled "Like a Kardashian" for its popularity.

Lance Fortnow's blog, *Computational Complexity* (joint with Bill Gasarch), has been one of the longest blogs in the field and is still the go-to place for all things relevant to TCS.

Congratulations to Dick and Lance for proving that on topics related to theory, the world is definitely asking what Georgia Tech thinks!

Gödel's Lost Letter and P=NP
a personal view of the theory of computation

Home About P=NP and SAT About Us Conventional Wisdom and P=NP The Gödel Letter Cook's Paper Thank You Page

Cynthia Dwork and a Brilliant Idea

FEBRUARY 6, 2015

by Pip


tags: Adam Smith, Bernard Dwork, Cynthia Dwork, definitions, differential privacy, Frank McSherry, Kobbi Nissim, Mosi Naor, privacy, security

Differential Privacy


Cynthia Dwork is a computer scientist who is a Distinguished Scientist at Microsoft Research. She has done great work in many areas of theory, including security and privacy.

Today Ken and I wish to talk about the notion of differential privacy and Dwork's untiring advocacy of it.

This concept is brilliant. It is, in our opinions, one of the greatest definitions of this century. Okay the century is just fifteen years old, but it is a terrific notion. The formulation was introduced in her paper with Frank McSherry, Kobbi Nissim, and Adam Smith at the 2006 Theory of Differential Privacy.

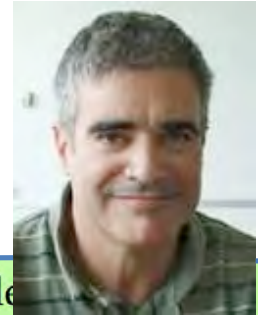


OUR BOOK



RECENT POSTS

- Leprechauns Will Find You
- The Other Pi Day
- Lini For Math



Computational Complexity

Computational Complexity and other fun stuff in math and computer science from Lance Fortnow and Bill Gasarch

Thursday, February 19, 2015

And the Winners Are...

[Shortly after this post went up, STOC announced their accepted papers as well]

I always like that the announcement of accepted papers for the Computational Complexity Conference happens around the time of the Academy Awards. These acceptances are the Oscars for our community that shares its name with this conference and the blog.

The title that interests me is *Identifying an honest EXP^{NP} oracle among many* by Shu Hirahara since it seems closely related to some of my own research. Not only cannot I find the paper online, I can't even find the author's email. Shuichi, if you reading this, please send me a copy of your paper.

Luckily not all papers are so elusive. Murray and Williams show that proving the NP-hardness of computing the circuit complexity would require proving real complexity class separation results. Oliveira and Santhanam give tight lower bounds on how much you can compress majority so that you can compute it with constant-depth circuits. A different Oliveira has two papers in the conference, a solely authored paper showing the polynomials of low individual degree with small low-depth arithmetic circuits have fact sets similarly computable, and a paper with Shpilka and Volk on hitting sets for bounded-degree multilinear formula. A hitting set is a small easily and deterministically computable set that contains, for every such arithmetic circuit, an input with a non-zero output.

Many more interesting papers and you can see them all at the conference in Portland, the year part of the Federated Computing Research Conference which includes STOC, SPAA, EC, which now stands for Economics and Computation. My tip: book your hotels now, they fill up fast.

Posted by Lance Fortnow at 6:06 AM 5 comments

Tweets

- John Dupuis (@jdupuis) 20h NSF unveils plan to make scientific papers free news.sciencemag.org/policy/2015/03... Retweeted by Lance Fortnow Show Summary
- Lance Fortnow (@lfortnow) 19 Mar Feeling your research does not get the love it deserves. You are not alone. blog.computationalcomplexity.org/2015/03/feeli... Expand
- matt blaze (@mattblaze) 18 Mar Here's the full NSF Open Access ("after a year) plan: nsf.gov/open/2015/ra1... Retweeted by Lance Fortnow Expand
- Lance Fortnow (@lfortnow) 16 Mar That's right a similar haad a week ago! RT

The Golden Ticket

In Memoriam

Richard A. Duke 1937-2015



It is with great sadness that we share the passing of a champion of discrete mathematics, our friend and colleague Richard Duke. Richard was well known for contributions to graph theory and combinatorics.

At Georgia Tech, he pioneered and led the Algorithms, Combinatorics and Optimization (ACO) program that has provided a unique education to some of the brightest researchers in these fields today. His contributions to Georgia Tech and the mathematics community live on, and he will be deeply missed by many.