Michael Mitzenmacher
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617-496-7172

Research Interests

Design and Analysis of Algorithms; Networks and Data Transmission; Information Theory.

Education

UNIVERSITY OF CALIFORNIA AT BERKELEY, Berkeley, CA
Ph.D. in Computer Science awarded December, 1996.
Dissertation: **The Power of Two Choices in Randomized Load Balancing.**
Advisor: Alistair Sinclair. GPA: 4.0/4.0

CAMBRIDGE UNIVERSITY, Cambridge, England
Attended as one of ten recipients of the Churchill Fellowship.
Cambridge C.A.S. in Mathematics with highest distinction awarded June 1992.

HARVARD COLLEGE, Cambridge, MA
B.A. in Mathematics with Computer Science, summa cum laude, awarded June 1991.

Employment

HARVARD UNIVERSITY, Cambridge, MA *Spring 1999-present*
Assistant professor (from Jan. 1999 -July 2002), **Associate professor** (from July 2002-January 2005), **Professor** (from Jan. 2005-present), **Area Dean for Computer Science** (from July 2010-June 2013), **Area Co-Chair for Computer Science** (from July 2018-June 2019).

Teach the undergraduate course "Introduction to algorithms and data structures" and graduate courses covering topics in randomized algorithms, algorithms for networks, compression, coding, cryptography, and information retrieval.

DIGITAL SYSTEMS RESEARCH CENTER, Palo Alto, CA *Fall 1996-Winter 1998*
Research scientist. Projects included work on information retrieval on the Web, erasure codes, error-correcting codes, on-line algorithms, and load balancing. Co-inventor for twelve submitted patents.

SANTA CLARA UNIVERSITY, Santa Clara, CA *Spring 1997*
Guest professor for the undergraduate class "Introduction to Algorithms."

Consultant: I consult on intellectual property issues as an expert witness and in other capacities. As an expert witness, I have testified in multiple trials. I have also consulted for several technology companies and research laboratories, including Adverplex (Cogolabs), Akamai, AT&T, Digital Fountain, eHarmony, Fluent Mobile (Fiksu), Google, Huawei, ITA Software, JobSync, Microsoft, Mitsubishi Research Laboratories, and Yahoo.

Funding

NSF CCF-1563710: CIF: NeTS: Medium: Collaborative Research: Unifying Data Synchronization. co-PIs: David Starobinksi, Ari Trachtenberg. Total grant: $400,000. 7/16-6/20.

NSF CCF-1535705: AitF: FULL: Collaborative Research: Better Hashing for Applications: From Nuts & Bolts to Asymptotics. co-PIs: David Andersen. Total grant: $250,000. 9/15-8/19.

NSF CCF-1320231: AF: Small: Data Synchronization : Theory, Algorithms, and Practice PI: Michael Mitzenmacher. Total grant: $399,370. 9/13-8/16.

NSF CNS-1228598: TWC: Medium: Collaborative: Privacy-Preserving Distributed Storage and Computation. PI: Michael Goodrich. co-PIs: Michael Mitzenmacher, Roberto Tamassia. Total grant: $400,000. 8/12-8/16.

NSF IIS-0964473: HCC: Medium: Collaborative Research: Data-Parallel Hash Tables: Theory, Practice and Applications. PI: Michael Mitzenmacher, co-PI: Nina Amenta. Total grant: $171,095. 8/10-7/13.

NSF CCF-0915922: AF : Small : The Theory and Practice of Hash-Based Algorithms and Data Structures. PI: Michael Mitzenmacher. Total grant: $441,956. 8/09-7/12.

NSF CNS-0721491: NeTS FIND: A Network-Wide Hashing Infrastructure for Monitoring and Measurement. PI: Michael Mitzenmacher. Total grant: $330,000. 9/07-8/10.

NSF CCF-0634923: Towards a Basic Understanding of Channels with Synchronization Errors. PI: Michael Mitzenmacher. Total grant: $200,000. 9/06-8/09.

NSF CCR-0121154: ITR/SY Algorithmic Issues in Large Scale Dynamic Networks. PI: Eli Upfal, Brown. Subcontract to Harvard. Total grant: $502,000. 9/01-8/06.

NSF CCR-0118701: Low Density Parity Check Codes for Channels with Memory. PI: Michael Mitzenmacher, co-PI: Alek Kavcic. Total grant: $510,000. 9/01-8/04.

NSF CCR-9983832: Dynamic Processes and Network Algorithms (CAREER). $200,000. 7/00-6/04.

Deans Competitive Fund for Promising Scholarship. 2018. $49,333.

Google University Research Program. 8/13-8/14. PIs: Eddie Kohler and Michael Mitzenmacher $56,000.

Google University Research Program. 12/11-12/12. $25,000.

Yahoo! University Research Program. 7/11-6/12. $10,000.

Google University Research Program. 12/09-12/10. $60,000.

Yahoo! University Research Program. 9/09-8/10. $10,000.

Google University Research Program. 8/08-7/09. $75,000.

Yahoo! University Research Program. 9/07-8/08. $25,000.

Yahoo! University Research Program. 9/06-8/07. $50,000.

Cisco University Research Program. 8/08-7/09. $80,000.

Cisco University Research Program. 8/07-7/08. $83,000.

Cisco University Research Program. 8/06-7/07. $80,000.

Cisco University Research Program. 8/05-7/06. $72,000.

Alfred P. Sloan Research Fellowship. $40,000. Awarded in 2000.

IBM Faculty Research Grant. $10,000 Awarded in 2005.

IBM Faculty Research Grant. $10,000 Awarded in 2003.

Mitsubishi Electronic Research Laboratory. $10,000 for undergraduate research projects. Awarded in 2002.

Honors

IEEE Senior Member (2018)
ACM Fellow (2014)
ACM Symposium on Parallelism in Algorithms and Architectures Best Paper Award (2014)
World Wide Web Conference Best Paper Award (2014)
Royal Academy of Engineering Distinguished Visiting Fellowship (2010)
ACM SIGCOMM Test of Time Paper Award (2009)
IEEE Information Theory Society Best Paper Award (2002)
Alfred P. Sloan Research Fellowship (2000)
Sakrison Award (for Ph.D. thesis at Berkeley) (1997)
NDSEG Graduate Fellowship (1992-95)
NSF Graduate Fellowship Winner (1991)
Churchill Fellowship (1991-92)
Hoopes Prize (for senior thesis at Harvard) (1991)
Phi Beta Kappa (1990)
Harvard Distinction in Teaching Award (1990)
Goldwater Fellowship (1989-91)

Professional Activities

Editorships:
Editorial Board, Leibniz International Proceedings in Informatics (2009-present)
Editorial Board, Communications of the ACM (2013-present)
Science Board, Santa Fe Institute (2013-present)
Guest Editor, SIAM Journal of Computing special issue for STOC 2009
SIAM Journal on Computing, Editor (2006-2010)
Internet Mathematics, Managing Editor
Guest Editor, Theory of Computing System special issue for SPAA 2002
Journal of Interconnection Networks, Editor

Organizing Committees:
SIGACT Chair (2015-2018)
EADS Summer School on Hashing: Theory and Applications (2014)
ICERM Workshop on Stochastic Graph Models (2014)
WAW 2013 Organizing Committee
SIGACT Vice-Chair (2009-2012)
General Chair, STOC (2010)
Workshop on Randomized Algorithms and Random Graphs (2010)
DARPA Information Science and Technology Study Groups (2007-2008)
SIGACT Committee for the Advancement of Theoretical Computer Science (2005-2008)
MSRI Workshop on Models of Real-World Random Networks (2005)
FOCS 2003 Local Arrangements Chair
Second Workshop on Randomized Algorithms and Random Graphs (2003)
Workshop on Algorithms and Models for the Web Graph (2002)
First Workshop on Randomized Algorithms and Random Graphs (2002)
DIMACS Workshop on Quality of Service Issues in the Internet (2001)

BU/NSF Workshop on Internet Measurement, Instrumentation, and Characterization (1999)
FOCS 1998 Local Arrangements Chair

Program Committees:
SOSA 2019 Program Committee (Co-Chair)
ACM CoNEXT 2018 Program Committee
ANALCO 2018 Program Committee
SIGCOMM 2017 Program Committee
NSDI 2017 Program Committee
ACM CoNEXT 2016 Program Committee
SIGCOMM 2016 Program Committee
ALENEX 2016 Program Committee (Co-Chair)
ICALP 2016 Program Committee (Track C PC Chair)
ACM CoNEXT 2015 Program Committee
ICALP 2015 Program Committee
ITCS 2015 Program Committee
SIGCOMM 2014 Program Committee
ACM CoNEXT 2014 Program Committee
WSDM 2014 Senior Program Committee
WAW 2013 Program Committee (Co-Chair)
STOC 2013 Executive Committee
WSDM 2013 Senior Program Committee
SIGCOMM 2012 Program Committee
ISIT 2012 Program Committee
NSDI 2012 Program Committee
WAW 2011 Program Committee
ACM CoNEXT 2010 Program Committee
SIGCOMM 2010 Program Committee
NSDI 2010 Program Committee
FUN 2010 Program Committee
LATIN 2010 Program Committee
NetSciCom 2009 Program Committee
SIGCOMM 2009 Program Committee
STOC 2009 Program Committee (PC Chair)
NSDI 2009 Program Committee
ICALP 2008 Program Committee
SPAA 2008 Program Committee
WAW 2007 Program Committee
Analysis of Algorithms 2007 Program Committee
ANALCO 2007 Program Committee
ICALP 2007 Program Committee
RANDOM 2007 Program Committee
NCA 2006 Program Committee
STOC 2006 Program Committee
PODC 2005 Program Committee
ANALCO 2005 Program Committee
PODC 2004 Program Committee
SIGCOMM 2004 Program Committee
IPTPS 2004 Program Committee
Data Compression Conference 2004 Program Committee
ESA 2004 Program Committee

WAW 2003 Program Committee
FOCS 2003 Program Committee
Data Compression Conference 2003 Program Committee
ESA 2002 Program Committee
PODC 2002 Program Committee
SPAA 2002 Program Committee
STOC 2002 Program Committee
Data Compression Conference 2002 Program Committee
ALENEX 2002 Program Committee
HiPC 2001 Program Committee
ISAAC 2000 Program Committee
RANDOM 2000 Program Committee
STACS 2000 Program Committee
FOCS 99 Program Committee
RANDOM 98 Program Committee

Reviewer for several conferences, journals, and grant panels.

Books *Probability and Computing: Randomized Algorithms and Probabilistic Analysis,* by Michael Mitzenmacher and Eli Upfal. Published by Cambridge University Press in 2005. (2nd edition available in 2017.) This is a textbook meant for an advanced undergraduate or beginning graduate class. The textbook has been used in courses at Brown, Harvard, U. C. Berkeley, Univ. of Victoria, Tufts, Univ. of Mass. at Amherst, Purdue, U. Penn., and several other universities.

Conference and Journal Publications "A Bayesian Nonparametric View on Count-Min Sketch," with R. Adams and D. Cai. To appear in *Proceedings of the Thirty-second Conference on Neural Information Processing Systems*, 2018

"A Model for Learned Bloom Filters and Optimizing by Sandwiching." To appear in *Proceedings of the Thirty-second Conference on Neural Information Processing Systems*, 2018

"Metric Sublinear Algorithms via Linear Sampling," with H. Esfandiari. To appear in *Proceedings of the 59th Annual IEEE Symposium on Foundations of Computer Science*, 2018.

"Weightless: Lossy Weight Encoding for Deep Neural Network Compression," with B. Reagen, U. Gupta, R. Adolf, A. Rush, G. Wei, and D. Brooks. To appear in *Proceedings of the 35th International Conference on Machine Learning*, 2018.

"Load Thresholds for Cuckoo Hashing with Double Hashing," with K. Panagiotou and S. Walzer. To appear in *Proceedings of the 16th Scandinavian Symposium and Workshops on Algorithm Theory*, 2018.

"Joint Alignment From Pairwise Differences with a Noisy Oracle," with C. Tsourakakis. To appear in *Proceedings of the 15th Workshop on Algorithms and Models for the Web Graph*, 2018.

"Reconciling Graphs and Sets of Sets," with T. Morgan. To appear in *Proceedings of the 37th Symposium on Principles of Database Systems*, 2018.

"Simulated Annealing for JPEG Quantization," with M. Hopkins and S. Wagner-Carena. In *Proceedings of the 2018 IEEE Data Compression Conference*, p. 414.

"Adaptive Cuckoo Filters," with S. Pontarelli and P. Reviriego. In *Proceedings of the ALENEX Conference*, pp. 36-47, 2018.

"An Empirical Comparison of the Maximal and Total Information Coefficients to Leading Measures of Dependendence," with D. Reshef, Y. Reshef, and P. Sabeti. To appear in *Annals of Applied Statistics*.

"Simple Multi-Party Set Reconciliation," with R. Pagh. To appear in *Distributed Computing*.

"Technical Perspective: Building a Better Hash Function." *Communications of the ACM*, 60(7), p. 93, 2017.

"Compresso: Efficient Compression of Segmentation Data For Connectomics," with D. Haehn, F. Lekschas, B. Matejek, and H. Pfister. In *Proceedings of the 20th International Conference on Medical Image Computing and Computer Assisted Intervention*, pp. 781-788, 2017.

"Auditable Data Structures," with M. Goodrich, E. Kornaropoulos, and R. Tamassia. In *Proceedings of the European Symposium on Security and Privacy*, pp. 285-300, 2017.

"2-3 Cuckoo Filters for Faster Triangle Listing and Set Intersection," with D. Eppstein, M. Goodrich, and M. Torres. In *Proceedings of the 36th Symposium on Principles of Database Systems*, pp. 247-260, 2017.

"Scalable motif-aware graph clustering," with C. Tsourakakis and J. Pachocki. In *Proceedings of the 26th International Conference on the World Wide Web*, pp. 1451-1460, 2017.

"Measuring Dependence Powerfully and Equitably," with Y. Reshef, D. Reshef, H. Finucane, and P. Sabeti. *Journal of Machine Learning Research*, 17(212):163, 2016.

"Quantized Random Projections and Non-Linear Estimation of Cosine Similarity," with P. Li and M. Slawski. To appear in *Advances In Neural Information Processing Systems 29*, pp.2748-2756, 2016.

"Analyzing Distributed Join-Idle-Queue: A Fluid Limit Approach." In *Proceedings of the 54th Annual Allerton Conference on Communication, Control, and Computing*, pp. 312-318, 2016.

"Hardness of Peeling with Stashes," with V. Nathan. *Information Processing Letters*, 116(11), pp. 682-688, 2016.

"More Practical and Secure History-Independent Hash Tables," with M. Goodrich, E. Kornaropoulos, and R. Tamassia. In *European Symposium on Research in Computer Security*, pp. 20-38, 2016.

"Models and Algorithms for Graph Watermarking," with D. Eppstein, M. Goodrich, J. Lam, N. Mamano, and M. Torres. In *Proceedings of the Information Security Conference*, pp. 283-301, 2016.

"Better Bounds for Coalescing-Branching Random Walks on Graphs," with R. Rajaraman and S. Roche. In *Proceedings of the 28th ACM Symposium on Parallel Algorithms and Architectures (SPAA)*, pp. 313-323, 2016.

"OMASS: One Memory Access Set Separation," with S. Pontarelli and P. Reviriego. *IEEE Transactions on Knowledge and Data Engineering*, 28(7):1940-1943, 2016.

"Voronoi Choice Games", with M. Boppana, R. Hod, and T. Morgan. In *Proceedings of 43rd International Colloquium on Automata, Languages, and Programming*, 23:1-23:13, 2016.

"Space Lower Bounds for Itemset Frequency Sketches," with E. Liberty, J. Thaler, and J. Ullman. In *Proceedings of the 35th Symposium on Principles of Database Systems*, pp. 441-454, 2016.

"Technical Perspective: Catching Lies (and Mistakes) in Offloaded Computation," with J. Thaler. *Communications of the ACM*, 59(2), p. 102, 2016.

"A New Approach to Analyzing Robin Hood Hashing." In *Proceedings of ANALCO*, pp. 10-24, 2016.

"More Analysis of Double Hashing for Balanced Allocations." In *Proceedings of ANALCO*, pp. 1-9, 2016.

"Theory Without Experiments: Have We Gone Too Far?" *Communications of the ACM*, 58(9), pp. 40-42, 2015.

"Scaling Up Clustered Network Appliances with XBricks," with D. Zhou, B. Fan, H. Lim, R. Wang, M. Kaminsky, D. Andersen, and A. Singh. In *Proceedings of ACM SIGCOMM*, 2015.

"Scalable Large Near-Clique Detection in Large-Scale Networks via Sampling," with J. Pachocki, R. Peng, C. Tsourakakis, and S. Chen Xu. In *Proceedings of the 21st ACM SIGKDD Conference on Knowledge Discovery and Data Mining*, 2015.

"Repeated Deletion Channels," with B. Haeupler. In *Proceedings of the IEEE Information Theory Workshop*, pp. 152-156, 2014.

"Multi-Party Set Reconciliation Using Characteristic Polynomials," with A. Boral. In *Proceedings of the 52nd Annual Allerton Conference on Communication, Control, and Computing*, pp. 1182-1187, 2014.

"Cleaning Up the Record on the Maximal Information Coefficent and Equitability," with D. Reshef, Y. Reshef, and P. Sabeti. *Proceedings of the National Academy of Sciences* 111(33):E3362-3, 2014.

"Cuckoo Filter: Practically Better than Bloom," with B. Fan, D.G. Andersen, and M. Kaminsky. In *Proceedings of the 10th International Conference on Emerging Networks Experiments and Technologies (CoNEXT)*, pp. 75-88, 2014.

"Coding for Random Projections," with P. Li and A. Shrivastava. In *Proceedings of the 31st International Conference on Machine Learning (ICML)*, pp. 676684, 2014.

"Balanced Allocations and Double Hashing." In *Proceedings of the 26th ACM Symposium on Parallel Algorithms and Architectures (SPAA)*, pp. 331-342, 2014.

"Parallel Peeling Algorithms," with J. Jiang and J. Thaler. In *Proceedings of the 26th ACM Symposium on Parallel Algorithms and Architectures (SPAA)*, pp. 319-330, 2014. Journal version: *ACM Transactions on Parallel Computing*, 3(1), 7, 2016.

"Wear Minimization for Cuckoo Hashing: How Not to Throw a Lot of Eggs into One Basket", with D. Eppstein, M. Goodrich, and P. Pszona. In *Proceedings of the 13th International Symposium on Experimental Algorithms*, pp. 162-173, 2014.

"Efficient Estimation for High Similarities using Odd Sketches," with R. Pagh and N. Pham. In *Proceedings of the 23rd International Conference on the World Wide Web*, pp. 109-118, 2014.

"Improving the Performance of Invertible Bloom Lookup Tables," with S. Pontarelli and P. Reviriego. *Information Processing Letters*, 114(4), pp. 185-191, 2014.

"Special Section on the Forty-First Annual ACM Symposium on Theory of Computing (STOC 2009)," with N. Immorlica, J. Katz, R. Servedio, and C. Umans. *SIAM Journal on Computing*, 41(6):1591-1592, 2012.

"The Daily Deals Marketplace: Empirical Observations and Managerial Implications," with J. Byers and G. Zervas. *AC SIGecom Exchanges*, 11(2):29-31, 2012.

"Peeling Arguments and Double Hashing," with J. Thaler. In *Proceedings of the 50th Annual Allerton Conference on Communication, Control, and Computing*, pp. 1118-1125, 2012.

"The Complexity of Object Reconciliation, and Open Problems Related to Set Difference and Coding," with G. Varghese. In *Proceedings of the 50th Annual Allerton Conference on Communication, Control, and Computing*, pp. 1126-1132, 2012.

"Cache-Oblivious Dictionaries and Multimaps with Negligible Failure Probability," with M. Goodrich, D. Hirschberg, and J. Thaler. In *Proceedings of the First Mediterranean Conference on Algorithms*, pp. 203-218, 2012.

"An Economic Analysis of User-Privacy Options in Ad-Supported Services," with J. Feigenbaum and G. Zervas. In *Proceedings of the 8th Workshop on Internet and Network Economics*, pp. 30-43, 2012.

"Verifiable Computation with Massively Parallel Interactive Proofs," with H. Pfister, M. Roberts, and J. Thaler. In *Proceedings of the USENIX HotCloud Workshop, 2012.*

"Biff (Bloom Filter) Codes: Fast Error Correction for Large Data Sets," with G. Varghese. In *Proceedings of the International Symposium on Information Theory*, pp. 483-487, 2012.

"Continuous Time Channels with Interference," with I. Ivan, J. Thaler, and H. Yuen. In *Proceedings of the International Symposium on Information Theory*, pp. 860-864, 2012.

"The Groupon Effect on Yelp Ratings: a Root Cause Analysis," with J. Byers and G. Zervas. In *Proceedings of the ACM Conference on Electronic Commerce*, pp. 248-265, 2012.

"Anonymous Card Shuffling and Its Applications to Parallel Mixnets," with M. Goodrich. In *Proceedings of 39th International Colloquium on Automata, Languages, and Programming*, pp. 549-560, 2012.

"Chernoff-Hoeffding Bounds for Markov Chains: Generalized and Simplified," with K. Chung, H. Lam, and Z. Liu. In *Proceedings of the 29th International Symposium on Theoretical Aspects of Computer Science*, pp. 124-135, 2012.

"Practical oblivious storage," with M. Goodrich, O. Ohrimenko and R. Tamassia. In *Proceedings of the Second ACM Conference on Data and Application Security and Privacy*, pp. 13-24, 2012.

"Hierarchical Heavy Hitters with the Space Saving Algorithm," T. Steinke and J. Thaler. In *Proceedings of 2012 Meeting on Algorithm Engineering and Experiments*, pp. 160-174.

"Daily Deals: Prediction, Social Diffusion, and Reputational Ramifications," with J. Byers and G. Zervas. In *Proceedings of the 5th International Conference on Web Search and Web Data Mining*, pp. 543-552, 2012.

"Practical Verified Computation with Streaming Interactive Proofs," with G. Cormode and J. Thaler. In *Proceedings of Innovations in Theoretical Computer Science*, pp. 90-112, 2012.

"Information Dissemination via Random Walks in d-Dimensional Space," with H. Lam, Z. Liu, X. Sun, and Y. Wang. In *Proceedings of the 23rd Annual ACM-SIAM Symposium on Discrete Algorithms*, pp. 1612-1622, 2012.

"Privacy-Preserving Group Data Access via Stateless Oblivious RAM Simulation," with M.Goodrich, M. Mitzenmacher, and R. Tamassia. In *Proceedings of the 23rd Annual ACM-SIAM Symposium on Discrete Algorithms*, pp. 157-167, 2012.

"An Efficient Rigorous Approach for Identifying Statistically Significant Frequent Itemsets," with A. Kirsch, A. Pietracaprina, G. Pucci, E. Upfal, and F. Vandin. *Journal of the ACM*, 59(3), 2012.

"Detecting Novel Associations in Large Datasets," with D. Reshef, Y. Reshef, H. Finucane, S. Grossman, G. McVean, P. Turnbaugh, E. Lander, and P. Sabeti. *Science*, Vol. 3004, No. 6602, pp. 1518-1524, December 2011.

"External-Memory Multimaps," with E. Angelino, M. Goodrich, and J. Thaler. In *Proceedings of the 22nd International Symposium on Algorithms and Computation*, pp. 384-394, 2011. Journal version: *Algorithmica*, 67(1), pp. 23-48, 2013.

"Brief announcement: large-scale multimaps," with M. Goodrich. In *Proceedings of the 23rd ACM Symposium on Parallel Algorithms and Architectures (SPAA)*, pp. 259-260, 2011.

"Oblivious RAM Simulation with Efficient Worst-Case Access Overhead," with M. Goodrich, O. Ohrimenko, and R. Tamassia. In *Proceedings of 3rd ACM Cloud Computing Workshop*, pp. 95-100.

"Invertible Bloom Lookup Tables," with M. Goodrich. In *Proceedings of the 49th Annual Allerton Conference on Communication, Control, and Computing*, pp. 792-799, 2011.

"Cuckoo Hashing with Pages," with M. Dietzfelbinger and M. Rink. In *Proceedings of the 19th Annual Europeans Symposium on Algorithms*, pp. 615-627, 2011.

"Network Coding Meets TCP: Theory and Implementation," with J.K. Sundararajan, D. Shah, M. Medard, S. Jakubczak, and J. Barros. *Proceedings of the IEEE*, 99(3), pp. 490-510, 2011.

"Privacy-Preserving Access of Outsourced Data via Oblivious RAM Simulation," with M. Goodrich. In *Proceedings of 38th International Colloquium on Automata, Languages, and Programming*, pp. 576-587, 2011.

"Graption: A Graph-based P2P Traffic Classification Framework for the Internet Backbone," with M. Iliofotou, H. Kim, M. Faloutsos, P. Pappu, and G. Varghese. *Computer Networks*, 55(8), pp. 1909-1920, 2011.

"On the Zero-Error Capacity Threshold for Deletion Channels," with I. Kash, J. Thaler, J. Ullman. In *Proceedings of the Information Theory and Applications Workshop*, pp. 1-5, 2011.

"Heapable Sequences and Subsequences," with J. Byers, B. Heeringa, and G. Zervas. In *Proceedings of ANALCO, pp. 33-44, 2011.*

"An Introduction to Human Guided Search." *ACM Crossroads*, 17(2):34-35, 2010.

"Popularity is Everything: A New Approach to Protecting Passwords from Statistical Guessing Attacks," with S. Schechter and C. Herley. In *Proceedings of the 5th Usenix Workshop on Hot Topics in Security*, pp. 1-8, 2010.

"Streaming Graph Computations with a Helpful Advisor," with G. Cormode and J. Thaler. In *Proceedings of the European Symposium on Algorithms*, pp. 231-242, 2010. Journal version: *Algorithmica*, 65(2), pp. 409-442, 2013.

"Tight Thresholds for Cuckoo Hashing via XORSAT," with M. Dietzfelbinger, A. Goerdt, A. Montanari, R. Pagh, and M. Rink. In *Proceedings of 37th International Colloquium on Automata, Languages, and Programming*, pp. 213-225, 2010.

"Local cluster aggregation models of explosive percolation," with R.M. D'Souza. *Physical Review Letters*, 14(19), p. 104-107, 2010.

"Tight Asymptotic Bounds for the Deletion Channel with Small Deletion Probabilities," with A. Kalai and M. Sudan. In *Proceedings of the International Symposium on Information Theory*, pp. 997-1001, 2010.

"An Improved Analysis of the Lossy Difference Aggregator," with H. Finucane. *Computer Communication Review*, 40(2), pp. 4-11, 2010.

"Information Asymmetries in Pay-Per-Bid Auctions: How Swoopo Makes Bank," with J. Byers and G. Zervas. In *Proceedings of the ACM Conference on Electronic Commerce*, pp. 1-12, 2010.

"Carousel: Scalable Logging for Intrusion Prevention Systems", with T. Lam and G. Varghese. In *Proceedings of NSDI 2010*, pp. 361-376.

"AMS Without 4-Wise Independence on Product Domains," with V. Braverman, K. Chung, Z. Liu, and R. Ostrovsky. In *Proceedings of the 27th International Symposium on Theoretical Aspects of Computer Science*, pp. 119-130, 2010.

"Adaptive Weighing Designs for Keyword Value Computation," with J. Byers and G. Zervas. In *Proceedings of the Third International Conference on Web Search and Web Data Mining* pp. 331-340, 2010.

"Human-guided search," with G. Klau, N. Lesh, and J. Marks. *Journal of Heuristics*, 16(3), pp. 289-310, 2010.

"Real-Time Parallel Hashing on the GPU," with D. Alcantara, A. Sharf, F. Abbasinejad, S. Sengupta, J. Owens, and N. Amenta. *ACM Transactions on Graphics*, 28(5), p. 154, 2009.

"Exploiting Dynamicity in Graph-based Traffic Analysis: Techniques and Applications," with M. Iliofotou and M. Faloutsos. In *Proceedings of ACM Co-NEXT*, pp. 241-252, 2009.

"An Analysis of Random-Walk Cuckoo Hashing," with A. Frieze and P. Mellsted. In *Proceedings of 2009 APPROX-RANDOM*, pp. 490-503, 2009. Journal version: *SIAM Journal on Computing*, 40(2), pp. 291-308, 2011.

"Some Open Questions Related to Cuckoo Hashing." In *Proceedings of the 17th Annual European Symposium on Algorithms*, pp. 1-10, 2009.

"On Compressing Social Networks,", with F. Chierichetti, R. Kumar, S. Lattanzi, A. Panconesi, and P. Raghavan. In *Proceedings of the 15th ACM SIGKDD Int'l Conference on Knowledge Discovery and Data Mining*, pp. 219-228, 2009.

"An Efficient Rigorous Approach for Identifying Statistically Significant Frequent Itemsets," with A. Kirsch, A. Pietracaprina, G. Pucci, E. Upfal, and F. Vandin. In *Proceedings of the 28th Symposium on Principles of Database Systems*, pp. 117-126, 2009.

"Using the Power of Two Choices to Improve Bloom Filters," with Steven Lumetta. *Internet Mathematics*, vol. 4. no. 1, pp. 17-33, 2009.

"Network coding meets TCP," with J. Sundararajan, D. Shah, M. Medard, and J. Barros. In *Proceedings of IEEE INFOCOM*, pp. 280-288, 2009.

"An Economically Principled Generative Model of AS Graph Connectivity," with J. Corbo, S. Jain, and D. Parkes. In *Proceedings of IEEE INFOCOM (Mini-conference), pp. 2941-2945, 2009.*

"Designing floating codes for expected performance," with H. Finucane and Z. Liu. In *Proceedings of the 46th Annual Allerton Conference on Communication, Control, and Computing*, 2008. Journal version (with F. Chierichetti, H. Finucane, and Z. Liu): *IEEE Transactions on Information Theory*, vol 56, Issue 3, pp. 968-978, 2010.

"On the performance of multiple choice hash tables with moves on deletions and inserts," with A. Kirsch. In *Proceedings of the 46th Annual Allerton Conference on Communication, Control, and Computing*, pp. 1284-1290, 2008.

"More Robust Hashing: Cuckoo Hashing with a Stash," with A. Kirsch and U. Wieder. In *Proceedings of the 16th Annual European Symposium on Algorithms*, pp. 611-622, 2008. Journal version: *SIAM Journal on Computing*, 39(4), pp. 1543-1561, 2009.

"A survey of results for deletion channels and related synchronization channels." In *Proceedings of the 2008 Scandinavian Workshop on Algorithm Theory*, pp. 1-3, 2008. Journal version: "New Results and Open Problem for Channels with Synchronization." *Probability Surveys*, 2009.

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"The Complexity of Object Reconciliation and Open Problems Related to Set Difference and Coding." Presented at the 2012 Allerton conference, October 2012.

"The Ecology of Communication, Control, and Computing Research and Education (Panel)." Presented at the 2012 Allerton conference, October 2012.

"Peeling Arguments: Invertible Bloom Lookup Tables and Biff Codes." Presented at the 2012 Workshop on Algorithms for Modern Massive Data Sets (MMDS), July 2012.

"Invertible Bloom Lookup Tables." Presented at the 2011 Allerton conference, September 2011.

"Brief Announcement: Large-Scale Multimaps." Presented at the 2011 Symposium on Parallel Algorithms and Architectures, June 2011.

"On the Zero-Error Capacity Threshold for Deletion Channels." Presented at the 2011 ITA Workshop, February 2011.

"Some Recent Uses of Hashing for Network Applications." Presented at the 2010 Workshop on Research and Analysis of Tail Phenomena, August 2010.

"Some Recent Uses of Hashing for Network Applications." Presented at the 2010 Workshop on Random Graphs and Algorithms, June 2010.

"Tight Asymptotic Bounds for the Deletion Channel with Small Deletion Probabilities." Presented at the 2010 International Symposium on Information Theory, June 2010.

"Some Open Questions on Cuckoo Hashing." Presented at the 2009 European Symposium on Algorithms, August 2009.

"On the Performance of Multiple Choice Hash Tables with Moves on Deletions and Inserts." Presented at the 2008 Allerton conference, September 2008.

"Designing Floating Codes for Expected Performance." Presented at the 2008 Allerton conference, September 2008.

"A Survey of Results for Deletion Channels and Related Synchronization Channels.' Presented at the 11th Scandinavian Workshop on Algorithm Theory, July 2008.

"Why Simple Hash Functions Work: Exploiting the Entropy in a Data Stream." Presented at the 19th Annual ACM-SIAM Symposium on Discrete Algorithms, January 2008.

"Using a Queue to De-amortize Cuckoo Hashing in Hardware." Presented at the 2007 Allerton conference, September 2007.

"Capacity Upper Bounds for Deletion Channels." Presented at the 2007 Int'l Symposium on Information Theory (ISIT), June 2007.

"Codes for Deletion and Insertion Channels with Segmented Errors." Presented at the 2007 Int'l Symposium on Information Theory (ISIT), June 2007.

"Digital Fountains: Applications and Related Issues." Presented at the INFORMS Annual Meeting, November 2006.

"New Directions for Power Law Research." Presented at the Radcliffe Exploratory Seminar on Dynamic Networks, October 2006.

"Bloom Filters via d-left Hashing and Dynamic Bit Reassignment." Presented at the 2006 Allerton conference, September 2006.

"Beyond Bloom Filters: From Approximate Membership Checks to Approximate State Machines." Presented at the 2006 SIGCOMM conference, September 2006.

"An Improved Construction for Counting Bloom Filters." Presented at the European Symposium on Algorithms, September 2006.

"Building a Better Bloom Filter." Presented at the European Symposium on Algorithms, September 2006.

"On the Theory and Practice of Data Recovery with Multiple Versions." Presented at the 2006 International Symposium on Information Theory, July 2006.

"New Results for an Old Data Structure: Bloom Filters and Beyond." Presented at the 2006 Stochastic Networks conference, June 2006.

"New Results and Open Problems for Deletion Channels." Presented at ANALCO 2006, January 2006 (plenary talk).

"Digital Fountains and their Application to Informed Content Delivery over Adaptive Overlay Networks." Presented at 19th International Symposium on Distributed Computing, September 2005 (plenary talk).

"Simple Summaries for Multiple Choice Hashing." Presented at the 2005 Allerton Conference.

"New Directions in Power Law Research." MSRI Workshop on Models of Real-World Random Networks, April 2005.

"Multi-dimensional Balanced Allocations." Presented at the 16th Annual ACM-SIAM Symposium on Discrete Algorithms, January 2005.

"Digital Fountains: A Survey and Look Forward." Presented at the 2004 Information Theory Workshop. October 2004.

"Improved Lower Bounds on the Capacity of I.I.D. Deletion Channels." Presented at the 2004 Allerton Conference.

"Geometric Generalizations of the Power of Two Choices." Presented at the 16th ACM Symposium on Parallel Algorithms and Architectures, June 2004.

"New Models and Methods for File Size Distributions." Presented at the 40th Annual Allerton Conference on Communication, Control, and Computing, October 2003.

"Verification Codes for Deletion Channels." Presented at the International Symposium on Information Theory, July 2003.

"New Exhaustive, Heuristic, and Interactive Algorithms for 2-Dimensional Bin-Packing." Presented at the 2nd Annual Workshop on Random Graphs and Algorithms, June 2003.

"Network Applications of Bloom Filters: A Survey." Presented at the 40th Annual Allerton Conference on Communication, Control, and Computing, October 2002.

"Verification Codes." Presented at the 40th Annual Allerton Conference on Communication, Control, and Computing, October 2002.

"New Directions in Balls and Bins Problems." Invited talk for the 6th International Workshop on Randomization and Approximation Methods in Computer Science. September 2002.

"Optimal Plans for Aggregation." Presented at the 21st Annual ACM Symposium on Principles of Distributed Computing, July 2002.

"How to Get Across Town by Bus." Presented at the INFORMS Annual Meeting, November 2001.

"A Brief History of Lognormal and Power Law Distributions." Presented at the 39th Annual Allerton Conference on Communication, Control, and Computing, October 2001.

"Compressed Bloom Filters." Presented at the 20th Annual ACM Symposium on Principles of Distributed Computing, August 2001.

"How Useful Is Old Information?" Presented at the INFORMS Applied Probability Conference, July 2001.

"Using Multiple Hash Functions to Improve IP Lookups." Presented at the INFOCOM, April 2001.

"On the Hardness of Finding Multiple Preset Dictionaries." Presented at the 2001 Data Compression Conference, March 2001.

"Improved Results for Route Planning in Stochastic Transportation Networks." Presented at the 12th Annual ACM-SIAM Symposium on Discrete Algorithms, January 2001.

"Estimating Resemblance of MIDI Documents." Presented at the 3rd Workshop on Algorithm Engineering and Experiments, January 2001.

"Linear Waste of Best Fit Bin Packing on Skewed Distributions." Presented at the 41st Annual IEEE Symposium on Foundations of Computer Science, November 2000.

"Improved Classification via Connectivity Information." Presented at the 11th Annual ACM Symposium on Discrete Algorithms, January 2000.

"The Asymptotics of Selecting the Shortest of Two, Improved." Presented at the 37th Annual Allerton Conference on Communication, Control, and Computing, August 1999.

"Analysis of Timing Based Mutual Exclusion with Random Times." Presented at the 18th Annual ACM Symposium on Principles of Distributed Computing, May 1999.

"Accessing Multiple Mirror Sites in Parallel: Using Tornado Codes to Speed Up Downloads." Presented at INFOCOM '99, March 1999.

"Delayed Information and Action in On-Line Algorithms." Presented at the 39th Annual IEEE Symposium on Foundations of Computer Science, November 1998.

"A Derandomization Using Min-Wise Independent Permutations." Presented at Random '98, October 1998.

"On Balls and Bins with Deletions." Presented at Random '98, October 1998.

"The Power of Two Choices and Other Examples of Using Differential Equations to Analyze Algorithms." Invited presentation at the Warwick Randomized Algorithms and Stochastic Simulation Tutorial and Workshop. July 1988.

"Analysis of Low Density Codes and Improved Designs Using Irregular Graphs." Presented at the 30th Annual ACM Symposium on Theory of Computing, May 1998.

"Average Case Analyses of First Fit and Random Fit Bin Packing." Presented at the 9th Annual ACM Symposium on Discrete Algorithms, January 1998.

"How Useful Is Old Information?" Presented at the 16th Annual ACM Symposium on Principle of Distributed Computing, August 1997.

"On the Analysis of Randomized Load Balancing Schemes." Presented at the 9th ACM Symposium on Parallel Algorithms and Architectures, Newport, Rhode Island, June 1997.

"Load Balancing and Density Dependent Jump Markov Processes." Presented at the 37th Annual Symposium on Foundations of Computer Science, Burlington, Vermont, October 1996.

"Constant Time per Edge is Optimal in Rooted Tree Networks." Presented at the 8th ACM Symposium on Parallel Algorithms and Architectures, Padua, Italy, June 1996.

"GRID: Pattern-based Compression of Text Images." Presented at the 1996 Data Compression Conference, Snowbird, Utah, April 1996.

"Parallel Randomized Load Balancing." Presented at the 27th ACM Symposium on the Theory of Computing, Las Vegas, Nevada, May 1995. Extended version presented at the Bay Area Theory Seminar, July 1995.

"Bounds on the Greedy Routing Algorithm on Array Networks." Presented at the 6th ACM Symposium on Parallel Algorithms and Architectures, Cape May, New Jersey, June 1994.

Other Presentations

"Metric Sublinear Algorithms via Linear Sampling." Sublinear Algorithms Workshop (MIT), Baidu Research. 2018.

"Bloom Filters, Cuckoo Hashing, Cuckoo Filters, and Adaptive Cuckoo Filters." Northeastern University, Univ. of Illinois at Urbana-Champagne, Georgetown Univeristy, University of California Irvine, Baidu Research. 2018.

"Hashing Lecture Series." Swedish Summer School in Computer Science. 2016.

"More Analysis of Double Hashing for Balanced Allocations." U.C. Irvine. 2016.

"Algorithm Engineering with Hashing," U.C. Irvine, AMD. 2016.

"Bloom Filters and Such," EADS Summer School on Hashing: Theory and Applications, July 2014.

"Cuckoo Hashing, Balanced Allocations, and Such," EADS Summer School on Hashing: Theory and Applications, July 2014.

"Peeling Arguments: Invertible Bloom Lookup Tables and Biff Codes," ICERM Workshop on Stochastic Graph Models, March 2014.

"Peeling Arguments: Invertible Bloom Lookup Tables and Biff Codes," University of Copenhagen. 2013.

"Some Hash-Based Data Structures and. Algorithms Everyone Should Know." UC Davis, 2013.

"Peeling Algorithms," Simons Institute. 2013.

"Verifying Computations in the Cloud (and Elsewhere)," TTI/Vanguard : Ginormous Systems. Microsoft Faculty Summit. 2013.

"The Groupon Effect on Yelp Ratings: a Root Cause Analysis," Cornell, 2012.

"Peeling Arguments: Invertible Bloom Lookup Tables and Biff Codes," Google. 2012.

"Detecting Novel Associations in Large Data Sets." eHarmony (LA Machine Learning). 2012.

"Cuckoo Hashing: New Results and Open Questions." University of Madison-Wisconsin. 2011.

'Practical Verified Computation with Streaming Interactive Proofs." University of Madison-Wisconsin. 2011.

"The Power of Choice: Simple Hash-Based Data Structures Everyone Should Know." Santa Fe Institute. 2011.

"Information Asymmetries in Pay-Per-Bid Auctions: How Swoopo Makes Bank." Liverpool University, Microsoft UK. 2010.

"Some Open Questions on Cuckoo Hashing." Stanford, Microsoft Research, Yale, Dartmouth, Princeton, Cambridge University, University College London . 2009-2010.

"An Efficient, Rigorous Approach for Identifying Statistically Significant Frequent Itemsets." Google. 2009.

"Some Recent Results on Cuckoo Hashing." AT&T. 2009.

"Some Results on Coding for Flash Memory." University College London. 2009.

"Network Coding Meets TCP." University College London. 2009.

"A Survey of Results for Deletion Channels and Related Synchronization Channels." Cambridge, Georgia Tech, Microsoft Research, UCLA, 2009-2010.

"Bloom Filters, Related Data Structures, and their Applications." Cambridge (Kuwait Lecture). 2009.

"A History of and New Directions for Power Law Research." SUNY Buffalo. 2009.

"Why Simple Hash Functions Work." Cisco. 2008.

"Cuckoo Hashing and CAMs." Cisco, Google. 2008.

"New Results in Hash-Based Data Structures." Cisco. 2007.

"The Hiring Problem and Lake Wobegon Strategies." Microsoft, U.C. Berkeley, Princeton, Google, Yahoo. 2007-2008.

"A Brief History of Lognormal and Power Law Distributions." Harvard Statistics. 2006.

"New Results and Open Problems for Deletion Channels and Related Synchronization Problems." CMU, Brown, Harvard. 2006.

"Some New Results on an Old Data Structure, Bloom Filters ." Stanford, Cisco, Microsoft. 2005.

"Improved Lower Bounds for Deletion Channels." MIT, EPFL (Lausanne). 2005.

"Building a Better Bloom Filter." Google, Tufts, EPFL (Lausanne), MIT. 2004-05.

"Geometric Generalizations of the Power of Two Choices." Columbia, Brown, MIT, Georgia Tech. 2004-05.

"New Lower Bounds on the Capacity of the Binary Deletion Channel." MIT, 2004.

"Digital Fountains, and their Use for Informed Content Delivery across Overlay Networks." Cornell, 2003.

"Verification Codes for Error and Deletion Channels." U.C. Berkeley, 2003.

"New Exhaustive, Heuristic, and Interactive Algorithms for 2D Strip Packing." U.C. Berkeley, 2003.

"Dynamic Models for File Sizes and Double Pareto Distributions." IBM Research, Microsoft Silicon Valley, Stanford, Tufts, Boston University, Random Graphs and Algorithms Workshop. 2002.

"Verification Codes." DIMACS workshop. 2001.

"Getting Across Town by Bus, Aggregation, and Reliability." MIT (LIDS), Mitsubishi Electronic Research Labs. 2001.

"New Ideas for Layered Multicast Congestion Control." International Computer Science Institute. 2001.

"Compressed Bloom Filters, and Towards Compressing Web Graphs." U. of Washington, AT&T Labs, U. C. Berkeley, MIT, Brandeis, Carnegie Mellon University, Stanford, DIMACS workshop on compression, U.C. San Diego. 2001.

"Toward Compressing Web Graphs." Compaq Systems Research Center, Altavista Corporation. 2000.

"Improved Results for Route Planning in Stochastic Transportation Networks." Compaq Systems Research Center. 2000.

"Choosing the Shortest of Two, Improved, with Applications to IP Routing." U. Washington, Princeton, Yale, U.C. Berkeley, Boston University, Stanford, M.I.T., Northeastern, Compaq Systems Research Center. 2000.

"Tornado Codes, with Applications to Reliable Multicast." Harvard, CMU, Duke, AT&T Labs, Univ. of Illinois at Urbana-Champagne, University of Rhode Island, Boston University. 1998-2000.

"How Useful Is Old Information?" MIT, U.C. Berkeley, Stanford, Microsoft. 1997.

"Practical Loss-Resilient Codes." U.C. Berkeley, Harvard. 1997.

"An Average Case Analysis for First-Fit Bin Packing." Stanford, DIMACS workshop. 1997.

"The Power of Two Choices." U.C. Berkeley, Brown, Harvard, Boston University, IBM Almaden, Digital Systems Research Center. 1997.

"The Power of Two Choices and Other Examples of Using Differential Equations to Analyze Algorithms." U. Mass.