R. Ravi

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Education

Ph. D.	Computer Science (1993), Brown University, Providence, Rhode Island. "Steiner Trees and Beyond: Approximation Algorithms for Network Design." (Philip Klein, Chair, Franco Preparata, Paris Kanellakis).
Sc. M.	Computer Science (1991), Brown University, Providence, Rhode Island.
B. Tech.	(Bachelor of Technology) Computer Science and Engineering (1989). Indian Institute of Technology, Madras, India.

Positions Held

11/21 -	Amazon Scholar
8/21 -	Director, Analytics Strategy, Tepper School of Business, Carnegie Mellon
7/13 -	Andris A. Zoltners Professor of Business, Tepper School of Business
7/14 - 6/18	Rohet Tolani Distinguished Professor of Business, Tepper School of Business
7/12 - 6/15	Chair, Future Educational Delivery Committee, Tepper School of Business, responsible for the creation of the online hybrid MBA program launched in August 2013.
7/06 - 6/13	Carnegie Bosch Professor, Tepper School of Business, Carnegie Mellon
7/05 - 7/08	Associate Dean for Intellectual Strategy, Tepper School of Business, Carnegie Mellon
7/04 - 7/07	Director, Center for Analytical Research in Technology, Tepper School of Business, Carnegie Mellon
7/03 -	Professor, Tepper School of Business, Carnegie Mellon
7/99 - 6/03	Associate Professor without indefinite tenure, Tepper School of Business
9/95 - 6/99	Assistant Professor, Tepper School of Business
9/94 - 8/95	Postdoctoral Fellow, DIMACS: NSF Science and Technology Center for Discrete Mathematics and Theoretical Computer Science, Department of Computer Science, Princeton University
9/93 - 8/94	Postdoctoral Fellow, Department of Computer Science, University of California at Davis

Other Positions

5/97 -	Courtesy Appointment, Computer Science Department, School of Computer Science, Carnegie Mellon
2014- 2016	Member, Analytics Advisory Faculty Panel, A. T. Kearney Inc.
9/10 - 8/15	Courtesy Appointment, Ray and Stephanie Lane Center for Computational Biology, SCS, Carnegie Mellon
2/16, 6/17	Visiting Professor, LAMSADE, Paris Dauphine University
11/15	Visiting Professor, Hausdorf Institute of Mathematics, Bonn
1-5/11	Visiting Professor, Research Institute for Mathematical Sciences, Kyoto University (RIMS)
11/09, 07/13	Academic Visitor, Microsoft Research, Redmond, WA
6/10-8/10	Academic Visitor, Microsoft Research, Cambridge, MA
11-12/08	Fellow of the Japanese Society for the Promotion of Science, RIMS
6/01 - 6/04	Research Scientist, Los Alamos National Laboratories, NM
01-04/02	Academic Visitor, IBM Almaden Research Center, San Jose, CA
01-02/99	Academic Visitor, IBM Solutions Research Center, New Delhi, India
5/96,6/02	Visiting Scholar, Max-Planck Institute for Informatics, Saarbrücken, Germany
6/01 - 6/04	Research Scientist, Sandia National Laboratories, NM

Consulting and Research Projects

2021-	Amazon Scholar
2018-	InMobi
2014-2021	Onera Inc
2015	Data Analytics, Schibsted Media Group
2011	Display Ad Pricing, Microsoft Advertising
2010	Business Forecasting, BASF
2007-2008	Optimization of Customer and Supplier Logistics, Robert Bosch LLC
2001	Center for Interactive Simulations, GSIA, Carnegie Mellon

Awards

2017	Fellow of the INFORMS
2013 & 2020	George Leland Bach Award for Teaching Excellence in the MBA Classroom, Tepper School of Business.
9/97	BP Research Chair 1997-98 (Carnegie Mellon University)
6/96-5/2000	NSF CAREER Award (Theory of Computation)
5/94	Prize for outstanding research, Brown University Chapter of Sigma Xi
9/91-5/93	IBM Graduate Fellowship
6/85-5/89	National Talent Scholarship, Government of India

Program Committee Member

FOCS 2021	62rd Annual IEEE Symposium on Foundations of Computer Science.
SOSA 2020	SIAM Symposium on Simplicity in Algorithms.
STOC 2016	48th ACM Symposium on Theory of Computing.
ICALP 2015	42nd International Colloquium on Automata, Languages, and Programming.
SWAT 2014	**Program Chair**, the 14th Scandinavian Symposium and Workshops on Algorithm Theory.
AdAuctions 2013	9th Ad Auctions Workshop.
APPROX 2011	**Program Chair**, 14th International Workshop on Approximation Algorithms for Combinatorial Optimization Problems.
FST&TCS 2008	28th Foundations of Software Technology and Theoretical Computer Science Conference.
FOCS 2008	**Program Chair**, 49th Annual IEEE Symposium on Foundations of Computer Science.
LATIN 2008	8th Latin American Informatics Conference.
STOC 2006	38th ACM Symposium on Theory of Computing.
COCOON 2005	11th International Computing and Combinatorics Conference.
WADS 2003	8th Workshop on Algorithms and Data Structures.
SODA 2003	14th Annual ACM-SIAM Symposium on Discrete Algorithms.
FST&TCS 2002	22nd Foundations of Software Technology and Theoretical Computer Science Conference.
APPROX 2001	4th International Workshop on Approximation Algorithms for Combinatorial Optimization Problems.
COCOON 2001	7th International Computing and Combinatorics Conference.
FOCS 2000	41st Annual IEEE Symposium on Foundations of Computer Science.
ESA 2000	8th Annual European Symposium on Algorithms.
SWAT 2000	7th Scandinavian Workshop on Algorithm Theory.

Editorial Experience

12 - 17	Area Editor, *Operations Research*, Discrete Optimization Area.
04 - 16	Associate Editor, *ACM Transactions on Algorithms*.
04 - 12	Associate Editor, *Management Science*.
06 - 08	Associate Editor, *Operations Research*.
03 - 05	Associate Editor, *Networks*.
03	Associate Editor, *Journal of Algorithms*.

Grants and Contracts

Approximation algorithms for NP-hard problems in Networks and Biology
National Science Foundation CAREER Award
June 1996 - May 2000 ($ 200,000)
Role: Principal Investigator

Parallel Elimination Orders with Applications in Operations Research and Scientific Computing
National Science Foundation - cNPQ Collaborative Research Grant
July 1999 - June 2002 ($ 199,094)
Role: Senior Personnel
(with Profs. Gary Miller and Bruce Maggs, SCS, Carnegie Mellon)

Combining facility location and network design: models and methods
CMU Carnegie Bosch Institute Faculty Development Grant
Summer 2000 ($ 15,000)
Role: Principal Investigator

Combinatorial Optimization in Biology
Los Alamos National Labs Research Subcontract
Summer 2000 ($ 15,000)
Role: Principal Investigator

Graph-theoretic Approximation Algorithms
National Science Foundation
July 2001 - June 2004 ($ 207,317)
Role: Principal Investigator

ALADDIN: A center for ALgorithm ADaptation Dissemination and INtegration
National Science Foundation Information Technology Research Large Grant
September 2001 - August 2006 ($ 5,655,274)
Role: Co-Principal Investigator
(with Profs. Guy Blelloch, Lenore Blum, John Lafferty, Daniel Sleator, SCS, Carnegie Mellon, and Robert Tarjan, Computer Science Department, Princeton)

New Directions in Approximation Algorithms
National Science Foundation
September 2004 - August 2007 ($ 187,724)
Role: Principal Investigator

Generalizing Haplotype Models for Phylogenetics
National Science Foundation
July 2006 - June 2009 ($ 646,727)
Role: Co-Principal Investigator
(with Prof. Guy Blelloch, Computer Science Department and Prof. Russell Schwartz, Department of Biological Sciences, Carnegie Mellon University)

Approximation Algorithms for Network Optimization
National Science Foundation
September 2007 - August 2011 ($ 255,744)
Role: Principal Investigator

Modeling Sponsored Search Auctions
Google Research Award
September 2009 - August 2010 ($ 75,000)
Role: Co-Principal Investigator
(with Prof. Isaemin Hafalir, Carnegie Mellon University)

New Techniques for Graph-TSP
National Science Foundation
September 2011 - August 2012 ($ 99,277)
Role: Principal Investigator

Approximation Algorithms for Network Design
National Science Foundation
September 2012 - August 2015 ($ 350,000)
Role: Principal Investigator

Provably Near-Optimal Distributed Online Network Optimization
Office of Naval Research
October 2012 - September 2017 ($ 749,999)
Role: Principal Investigator

Information Procuration via Adaptive Algorithms
National Science Foundation
September 2013 - August 2014 ($ 99,714)
Role: Principal Investigator

Preliminary Algorithmic Foundations for Ranking Quizzes and Students from Student-sourced Quizzes
National Science Foundation
September 2016 - August 2018 ($ 148,000)
Role: Principal Investigator

Approximation Algorithms Matching Integrality Gaps for Network Design
National Science Foundation
September 2015 - August 2019 ($ 399,999)
Role: Principal Investigator

Integrality Gaps for Hard Network Optimization Problems
Office of Naval Research
February 2018 - March 2021 ($ 450,000)
Role: Principal Investigator

Designing provably good heuristics for rapid information dissemination problems
Air Force Office of Scientific Research
June 2020 - May 2023 (\$ 536,476)
Role: Principal Investigator

Better Integrality Gaps for Network Optimization
Office of Naval Research
April 2021 - March 2024 (\$ 882,090)
Role: Principal Investigator

Bicriteria Network Design Problems
Air Force Office of Scientific Research
June 2023 - May 2026 (\$ 599,566)
Role: Principal Investigator

Publications

Books

Iterative Methods in Combinatorial Optimization
with Lap Chi Lau and Mohit Singh
Cambridge Texts in Applied Mathematics, Cambridge University Press (May 2011)

Customer-Centric Marketing: A Pragmatic Framework
with Baohong Sun
MIT Press (March 2016)

Articles in refereed journals

(1) Sagnik Das, R. Ravi, and Srinath Sridhar. Order Fulfillment Under Pick Failure in Omnichannel Ship-From-Store Programs. *Manufacturing & Service Operations Management*, 25(5): 508-523 (2023).

(2) Robert Carr, R. Ravi, and Neil Simonetti. A new integer programming formulation of the graphical traveling salesman problem. *Math. Programming*, 197(2): 877-902 (2023).

(3) Hassene Aissi, Da Qi Chen, and R. Ravi. Vertex Downgrading to Minimize Connectivity. *Math. Programming*, 199(1): 215-249 (2023).

(4) Nikhil Chandak, Kenny Chour, Sivakumar Rathinam, and R. Ravi. Informed Steiner Trees: Sampling and Pruning for Multi-Goal Path Finding in High Dimensions. *IEEE Transactions on Automation Science and Engineering* (2023)..

(5) Ojas Parker, R. Ravi, and Michael Zlatin. On small-depth tree augmentations. *Operations Research Letters*, 50(6), 667-673 (2022).

(6) K.T. Bosman, M. Van Ee, Y. Jiao, A. Marchetti-Spaccamela, R. Ravi, andL. Stougie. Approximation algorithms for replenishment problems with fixed turnover times. *Algorithmica* 84, 2597-2621 (2022).

(7) Takuro Fukunaga, R. Ravi, Oleksandr Rudenko, and Ziye Tang. Two Level Hub Steiner Trees. *Information Processing Letters* 174 (2022).

(8) Takuro Fukunaga, R. Ravi, Oleksandr Rudenko, and Ziye Tang. Approximation algorithm for the 2-stage stochastic matroid base problem. *Operations Research Letters* 50(2) 129-132 (2022).

(9) Su Jia, Jeremy Karp, R. Ravi, and Sridhar Tayur. Effective Online Order Acceptance Policies for Omnichannel Fulfillment. *Manufacturing & Service Operations Management*, 24(3), 1650-1663 (2022).

(10) Stelios Despotakis, R. Ravi, and Amin Sayedi. First-Price Auctions in Online Display Advertising . *Journal of Marketing Research*, 58(5) 887-907 (2021).

(11) Ziye Tang, Yang Jiao, and R. Ravi. Combinatorial Heuristics for Inventory Routing Problems. *INFORMS Journal on Computing*, 34(1): 370-384 (2021).

(12) Joseph Cheriyan, R. Ravi, and Martin Skutella. A simple proof of the Moore-Hodgson Algorithm for minimizing the number of late jobs. *Operations Research Letters*, 49(6), 842-843 (2021).

(13) Koen M. J. De Bontridder, Bjarni V. Halldórsson, Magnús M. Halldórsson, Cor A. J. Hurkens, Jan Karel Lenstra, R. Ravi, and Leen Stougie. Local improvement algorithms for a path packing problem: A performance analysis based on linear programming. *Operations Research Letters*, 49(1), 62-68 (2021).

(14) D. Ellis Hershkowitz, Gregory Kehne, and R. Ravi. An optimal rounding for half-integral weighted minimum strongly connected spanning subgraph. *Information Processing Letters*, 167: 106067 (2021).

(15) Arash Haddadan, Alantha Newman, and R. Ravi. Shorter tours and longer detours: uniform covers and a bit beyond. *Math. Programming A*, 185(1-2): 245-273, (2021).

(16) Stylianos Despotakis, R. Ravi, Kannan Srinivasan. The Beneficial Effects of Ad-Blockers. *Management Science*, 67(4) 2096-2125 (2021).

(17) Rafael Hassin, R. Ravi, F. Sibel Salman and Danny Segev. The Approximability of Multiple Facility Location on Directed Networks with Random Arc Failures. *Algorithmica*: 82(9): 2474-2501 (2020).

(18) Arda Antikacioglu, Tanvi Bajpai, and R. Ravi. A New System-Wide Diversity Measure for Recommendations with Efficient Algorithms. *SIAM J. Mathematics of Data Science* 1-4, 759-779 (2019).

(19) Anastasios Sidiropoulos, Mihai Badoiu, Kedar Dhamdhere, Anupam Gupta, Piotr Indyk, Yuri Rabinovich, Harald Raecke and R. Ravi. Approximation Algorithms for Low-Distortion Embeddings into Low-Dimensional Spaces. *SIAM J. Discrete Math.* **33(1)**: 454-473 (2019).

(20) Yang Jiao, R. Ravi and Wolfgang Gatterbauer. Algorithms for automatic ranking of participants and tasks in an anonymized contest. *Theor. Comput. Sci.* **789**: 64-76 (2019).

(21) A. Gupta, V. Nagarajan and R. Ravi. Approximation Algorithms for Optimal Decision Trees and Adaptive TSP Problems. *Math. Oper. Res.* **42(3)**: 876-896 (2017).

(22) Refael Hassin, R. Ravi and Fatma Sibel Salman. Multiple facility location on a network with linear reliability order of edges. *J. Comb. Optim.* **34(3)**: 931-955 (2017).

(23) S. Despotakis, I. Hafalir, R. Ravi and A. Sayedi. Expertise in Online Markets. *Management Science*, **63(11)**: 3895-3910 (2017).

(24) Jeremy Karp and R. Ravi. A 9/7-Approximation Algorithm for Graphic TSP in Cubic Bipartite Graphs. *Discrete Applied Mathematics*, 164-216 (2016).

(25) Inge Li Gørtz, Marco Molinaro, Viswanath Nagarajan and R Ravi. Capacitated Vehicle Routing with Non-uniform Speeds. *Math. Oper. Res.*, **41(1)**: 318-331, (2016).

(26) A. Gupta, V. Nagarajan and R. Ravi. Robust and MaxMin Optimization under Matroid and Knapsack Uncertainty Sets. *ACM Trans. Algorithms* 12(1), 10 (2016).

(27) T. Fukunaga, Z. Nutov and R. Ravi. Iterative rounding approximation algorithms for degree-bounded node-connectivity network design. *SIAM J. Comput.*, **44(5):** 1202-1229 (2015).

(28) A. Gupta, R. Krishnaswamy, V. Nagarajan and R. Ravi. Running Errands in Time: Approximation Algorithms for Stochastic Orienteering. *Math. Oper. Res.* **40(1):** 56-79 (2015).

(29) Daniel Golovin, Vineet Goyal, Valentin Polishchuk, R. Ravi and Mikko Sysikaski. Improved approximations for two-stage min-cut and shortest path problems under uncertainty. *Math. Programming* **149(1-2):** 167–194 (2015).

(30) Inge Li Gørtz, Viswanath Nagarajan and R. Ravi. Minimum Makespan Multi-Vehicle Dial-a-Ride. *ACM Transactions on Algorithms*, **11(3)**, (2015).

(31) A. Gupta, J. Konemann, S. Leonardi, R. Ravi and G. Schaefer. Efficient Cost-Sharing Mechanisms for Prize-Collecting Problems. *Mathematical Programming A*, **152(1-2):** 147-188, (2015).

(32) A. Gupta, V. Nagarajan and R. Ravi. Thresholded Covering Algorithms for Robust and Max-Min Optimization. *Math. Programming*, **146(1-2):** 583-615 (2014).

(33) Marco Molinaro and R. Ravi. The Geometry of Online Packing Linear Programs. *Math. Oper. Res.*, **39(1):** 46-59 (2014).

(34) Fabrizio Grandoni, R. Ravi, Mohit Singh and Rico Zenklusen. New approaches to multi-objective optimization. *Mathematical Programming A*, **146(1-2):** 525-554, (2014).

(35) David Oertel and R. Ravi. Complexity of Transmission Network Expansion Planning. *Energy Systems* **5(1)** (2014).

(36) Satoru Iwata and R. Ravi. Approximating max-min weighted T-joins. *Operations Research Letters* 41(4): 321-324 (2013).

(37) V. Goyal and R. Ravi. An FPTAS for minimizing a class of low-rank quasi-concave functions over a convex set. *Operations Research Letters* **41(2):** 191-196 (2013).

(38) M-C. Tsai, G. E. Blelloch, R. Ravi and R. Schwartz. Coalescent-based method for learning parameters of admixture events from large-scale genetic variation data. *IEEE/ACM Trans. Comput. Biology Bioinform.* **10(5):** 1137-1149 (2013).

(39) D. Catanzaro, R. Ravi and R. Schwartz. A mixed integer linear programming model to reconstruct phylogenies from single nucleotide polymorphism haplotypes under the maximum parsimony criterion. *Algorithms for Molecular Biology* **8(3)** (2013).

(40) A. Gupta, V. Nagarajan and R. Ravi. Technical Note - Approximation Algorithms for VRP with Stochastic Demands. *Operations Research* **60(1):** 123-127 (2012).

(41) A. Gupta, R. Krishnaswamy and R. Ravi. Online and Stochastic Survivable Network Design. *SIAM J. Comput.* **41(6):** 1649-1672 (2012).

(42) I. Hafalir, R. Ravi and A. Sayedi. A near Pareto optimal auction with budget constraints. *Games and Economic Behavior* **74(2):** 699-708 (2012).

(43) V. Nagarajan and R. Ravi. Approximation Algorithms for Distance Constrained Vehicle Routing. *Networks* **59(2):** 209-214 (2012).

(44) M-C. Tsai, G. E. Blelloch, R. Ravi and R. Schwartz. A Consensus Tree Approach For Reconstructing Human Evolutionary History and Detecting Population Substructure. *IEEE/ACM Trans. Comput. Biology Bioinform.*, **8(4):** 918-928 (2011).

(45) A. Gupta, M. Pal, R. Ravi and A. Sinha. Sampling and Cost-Sharing: Approximation Algorithms for Stochastic Optimization Problems. *SIAM Journal on Computing*, **40(5):** 1361-1401 (2011).

(46) N. Misra, G. E. Blelloch, R. Ravi and R. Schwartz. An Optimization-Based Sampling Scheme for Phylogenetic Trees. *Journal of Computational Biology*, 18(11) 1599-1609 (2011).

(47) V. Nagarajan and R. Ravi. The Directed Orienteering Problem. *Algorithmica*, **60(4)**, 1017-1030 (2011).

(48) L. Genc-Kaya, V. Goyal and R. Ravi. An FPTAS for Minimizing the Product of Two Non-negative Linear Cost Functions. *Mathematical Programming A*, **126(2)**, 401-405 (2011).

(49) N. Misra, G. E. Blelloch, R. Ravi and R. Schwartz. Generalized Buneman pruning for inferring the most parsimonious multi-state phylogeny. *Journal of Computational Biology*, 18(3), 445-457 (2011).

(50) R. Ravi and A. Sinha. Approximation Algorithms for Multicommodity Facility Location Problems. *SIAM J. on Disc. Math*, **24(2)**, 538-551 (2010).

(51) A. Gupta, M. Hajiyaghayi, V. Nagarajan and R. Ravi. Dial a Ride from k-forest. *ACM Transactions on Algorithms*, **6(2)**, (2010).

(52) H. Yildiz, W. Fairey and R. Ravi. Integrated optimization of customer and supplier logistics at Robert Bosch LLC. *European Journal of Operational Research*, **207(1)**, 456-464 (2010).

(53) V. Nagarajan, R. Ravi and M. Singh. Simpler Analysis of Extreme Points for Traveling Salesman and Survivable Network Design Problems. *Operations Research Letters*, **38(3)**, 156-160, (2010).

(54) A. Gupta, V. Nagarajan and R. Ravi. An Improved Approximation Algorithm for Requirement Cut. *Operations Research Letters*, **38(4)**, 322-325, (2010).

(55) Vineet Goyal and R. Ravi. A PTAS for Chance-Constrained Knapsack Problem with Random Item Sizes. *Operations Research Letters*, **38(3)**, 161-164, (2010).

(56) V. Nagarajan and R. Ravi. Approximation Algorithms for Requirement Cut on Graphs. *Algorithmica*, **56(2)**, 198-213 (2010).

(57) Alan M. Frieze, Jon M. Kleinberg, R. Ravi and Warren Debany. Line-of-Sight Networks. *Combinatorics, Probability & Computing* **18(1-2)**: 145-163 (2009).

(58) S. Sridhar, F. Lam, G. E. Blelloch, R. Ravi and R. Schwartz. Mixed Integer Programming for Maximum-Parsimony Phylogeny Inference. *IEEE/ACM Transactions on Computational Biology and Bioinformatics*, **5:3**, 323-331, 2008.

(59) Giuseppe Lancia, R. Ravi and Romeo Rizzi. Haplotyping for Disease Association: A Combinatorial Approach. *IEEE/ACM Transactions on Computational Biology and Bioinformatics*, **5:2**, 245-251, 2008.

(60) F. Sibel Salman, R. Ravi and John N. Hooker. Solving the Capacitated Local Access Network Design Problem. *INFORMS Journal on Computing*, **20:2**, 243-254, 2008.

(61) R. Ravi and A. Sinha. Approximating k-cuts using network strength as a Lagrangean relaxation. *European Journal of Operations Research*, **186:1**, 77-90, (2008).

(62) S. Sridhar, F. Lam, G. E. Blelloch, R. Ravi and R. Schwartz. Direct maximum parsimony phylogeny reconstruction from genotype data. *BMC Bioinformatics* **8:472**, 2007.

(63) Srinath Sridhar, Kedar Dhamdhere, Guy E. Blelloch, Eran Halperin, R. Ravi and Russell Schwartz. Algorithms for Efficient Near-Perfect Phylogenetic Tree Reconstruction in Theory and Practice. *IEEE/ACM Transactions on Computational Biology and Bioinformatics (TCBB)* **4(4)**, 2007.

(64) A. Gupta, R. Ravi and A. Sinha. LP Rounding Approximation Algorithms for Stochastic Network Design. *Mathematics of Operations Research* **32 (2)**,(2007).

(65) K. Dhamdhere, A. Gupta and R. Ravi. Approximation algorithms for minimizing average distortion. *Theory of Computing Systems*, Special issue dedicated to papers invited from the STACS 2004 conference, **39 (1)**, 2006: 93-111.

(66) R. Ravi and A. Sinha. Hedging Uncertainty: Approximation Algorithms for Stochastic Optimization Problems. *Mathematical Programming A*, **108(1)**, 2006: 97-114.

(67) Shuchi Chawla, Uday Rajan, R. Ravi and Amitabh Sinha. Min-max Payoffs in a Two-Person Location Game. *Operations Research Letters*, **34(5)**, 2006: 499-507.

(68) R. Ravi and A. Sinha. Approximation Algorithms for Problems Combining Facility Location and Network Design. *Operation Research*, **54 (1)**, 73-81 (2006).

(69) J. Könemann and R. Ravi. Primal-dual meets local search: approximating MST's with nonuniform degree bounds. *SIAM J. on Comp.*, **34 (3)**, 763-773 (2005).

(70) Philip N. Klein, Radha Krishnan, Balaji Raghavachari and R. Ravi. Approximation Algorithms for Finding Low-Degree Subgraphs. *Networks*, 203-215 (2004).

(71) Guy Even, Naveen Garg, Jochen Könemann, R. Ravi and Amitabh Sinha. Min-max Tree Covers of Graphs. *Operations Research Letters*, **32(4)**, 309, 315 (2004).

(72) E. Dahlhaus, P. Dankelmann and R. Ravi. A linear-time algorithms to compute a MAD tree of an interval graph. *Information Processing Letters*, **89(5)**, 255-259 (March 2004).

(73) Koen M.J. De Bontridder, Bjarni V. Halldórsson, Magnus M. Halldórsson, Cor A.J. Hurkens, Jan K. Lenstra, R. Ravi, and Leen Stougie. Approximation algorithms for the minimum test set problem. *Mathematical Programming*, **98**, 477-491 (2003).

(74) R. Hassin, R. Ravi and F. S. Salman. Approximation algorithms for a capacitated network design problem. *Algorithmica*, **38(3)**, 417-431 (2003).

(75) M. Conforti, R. Hassin and R. Ravi. Reconstructing edge-disjoint paths. *Operations Research Letters*, **31(4)**, 273-276 (2003).

(76) Jochen Könemann and R. Ravi. A Matter of Degree: Improved Approximation Algorithms for Degree-Bounded Minimum Spanning Trees. *SIAM Journal on Computing*, **31(6)**, 1783-1793 (2002).

(77) G. Konjevod, R. Ravi and A. Srinivasan. Approximation algorithms for the covering Steiner problem. *Random Structures and Algorithms*, **20:3**, 465-482, (2002).

(78) G. Konjevod, R. Ravi and F. S. Salman. On approximating planar metrics by tree metrics. *Information Processing Letters* **80(4)**, 213-219 (2001).

(79) R. Ravi, M. V. Marathe, S. S. Ravi, D. J. Rosenkrantz, and H. B. Hunt. Approximation Algorithms for Degree-Constrained Minimum-Cost Network-Design Problems. *Algorithmica*, **31:1**, 58-78 (2001).

(80) P. Keskinocak, R. Ravi and S. Tayur. Scheduling and Reliable Lead Time Quotation for Orders with Availability Intervals and Lead Time Sensitive Revenues. *Management Science*, **47:2**, 264-279, (February 2001).

(81) F. S. Salman, J. Cheriyan, R. Ravi, and S. Subramanian. Approximating the single-sink edge installation problem in network design. *SIAM Journal on Optimization*, **11:3**, 595-610 (2001).

(82) M. Dawande, J. Kalagnanam, P. Keskinocak, R. Ravi, F.S. Salman. Approximation Algorithms for the Multiple Knapsack Problem with Assignment Restrictions. *Journal of Combinatorial Optimization*, **4 (2)**, 171-186, (2000).

(83) N. Garg, G. Konjevod and R. Ravi. A polylogarithmic approximation algorithm for the group Steiner problem. *Journal of Algorithms*, **37**, 66-84 (2000).

(84) A. Blum, G. Konjevod, R. Ravi and S. Vempala. Semi-Definite Relaxations for Minimum Bandwidth and other Vertex-Ordering problems. *Theoretical Computer Science*, **235**, pp. 25-42 (2000). A preliminary version appeared in *Proceedings of the ACM Symposium on the Theory of Computing (STOC)*, 100-105 (1998).

(85) S. O. Krumke, M. V. Marathe, H. Noltemeier, R. Ravi, S. S. Ravi, R. Sundaram, H. C. Wirth. Improving minimum-cost spanning trees by upgrading nodes. *Journal of Algorithms*, **33:1**, 92-111 (1999). A preliminary version appeared in *Proceedings of the International Colloquium on Automata, Languages and Processing (ICALP)*, Springer-Verlag Lecture Notes in Computer Science 1256, 281-291 (1997).

(86) S. O. Krumke, H. Noltemeier, M. V. Marathe, R. Ravi, S. S. Ravi, R. Sundaram, H. C. Wirth. Improving spanning trees by upgrading nodes. *Theoretical Computer Science*, **221 (1-2)**, 139-155 (1999).

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(90) R. Ravi and J. D. Kececioglu. Approximation algorithms for multiple sequence alignment under a fixed evolutionary tree. *Discrete Applied Mathematics* **88**, Special issue on Computational Molecular Biology, 355-366 (1998).

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(101) P. Klein, S. Rao, A. Agrawal, and R. Ravi. An approximate max-flow min-cut relation for multicommodity flow, with applications. *Combinatorica*, **15(2)** 187-202 (1995).

(102) R. Ravi. A primal-dual approximation algorithm for the Steiner forest problem. *Information Processing Letters* **50**, 185-190 (1994).

(103) R. Ravi, M. V. Marathe and C. Pandu Rangan. An optimal algorithm to solve the all-pair shortest path problem on interval graphs. *Networks*, **22**, 21-35 (1992).

(104) M. V. Marathe, R. Ravi and C. Pandu Rangan. Generalized vertex covering in interval graphs. *Discrete Applied Mathematics* **39**, 87-93 (1992).

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(105) Su Jia, Nishant Oli, Ian Anderson, Paul Duff, Andrew A. Li, and R. Ravi. Short-lived High-volume Bandits. *Proceedings of ICML*: 14902-14929 (2023).

(106) Da Qi Chen, Lin An, Aidin Niaparast, R. Ravi, and Oleksandr Rudenko. Timeliness Through Telephones: Approximating Information Freshness in Vector Clock Models. *SODA* Proceedings of the Symposium on Discrete Algorithms, (2023).

(107) R. Ravi, Weighing Zhang, and Michael Zlatin. Approximation Algorithms for Steiner Tree Augmentation Problems. *SODA* Proceedings of the Symposium on Discrete Algorithms, (2023).

(108) Jingyan Wang, Carmel Baharav, Nihar B Shah, Anita Williams Woolley, and R. Ravi. Allocation Schemes in Analytic Evaluation: Applicant-Centric Holistic or Attribute-Centric Segmented?. *HCOMP* (Proceedings of the AAAI Conference on Human Computation and Crowdsourcing) 10(1), 207-219 (2022).

(109) Su Jia, Andrew A. Li, and R. Ravi. Dynamic Pricing with Monotonicity Constraint Under Unknown Parametric Demand Model. *Advances in Neural Information Processing Systems 35*: 19179-19188 (2022).

(110) Thomas Lavastida, Benjamin Moseley, R. Ravi, and Chenyang Xu. Using Predicted Weights for Ad Delivery. *ACDA* (SIAM Conference on Applied and Computational Discrete Algorithms), 21-31 (2021).

(111) Thomas Lavastida, Benjamin Moseley, R. Ravi, and Chenyang Xu. Learnable and instance-robust predictions for online matching, flows and load balancing. *ESA* (29th Annual European Symposium on Algorithms), 59:1-59:17 (2021).

(112) Komal Dhull, Jingyan Wang, Nihar Shah, Yuanzhi Li, and R. Ravi. A Heuristic for Statistical Seriation. *UAI* (37th Conference on Uncertainty in Artificial Intelligence), 621-631 (2021).

(113) Kenny Chour, Sivakumar Rathinam, and R. Ravi. S*: A Heuristic Information-Based Approximation Framework for Multi-Goal Path Finding . *ICAPS* (Proceedings International Conference on Automated Planning and Scheduling), 85-93 (2021).

(114) Sivakumar Rathinam, R. Ravi, J. Bae, and Kaarthik Sundar. Primal-Dual 2-Approximation Algorithm for the Monotonic Multiple Depot Heterogeneous Traveling Salesman Problem. *SWAT* (Scandinavian Workshop on Algorithm Theory), 33:1-33:13 (2020).

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(116) David Ellis Hershkowitz, R. Ravi and Sahil Singla. Prepare for the Expected Worst: Algorithms for Reconfigurable Resources Under Uncertainty. *Proceedings of APPROX-RANDOM*, (2019), 4:1-4:19.

(117) R. Ravi and Oleksandr Rudenko. Multicommodity Multicast, Wireless and Fast. *Proceedings of ESA*, (2019), 78:1-78:20.

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(119) Yang Jiao and R. Ravi. Inventory Routing Problem with Facility Location. *Proceedings of WADS*, (2019), 452-465.

(120) Jennifer Iglesias, Rajmohan Rajaraman, R. Ravi and Ravi Sundaram. Plane Gossip: Approximating Rumor Spread in Planar Graphs. *Proceedings of LATIN*, 611-624 (2018).

(121) Jochen Könemann, Neil Olver, Kanstantsin Pashkovich, R. Ravi, Chaitanya Swamy and Jens Vygen. On the Integrality Gap of the Prize-Collecting Steiner Forest LP. *Proceedings of APPROX-RANDOM*, 17:1-13 (2017).

(122) Hassene Aissi, Ali Ridha Mahjoub and R. Ravi. Randomized Contractions for Multi-objective Minimum Cuts. *Proceedings of ESA*, 6:1-13 (2017).

(123) Guru Guruganesh, Jennifer Iglesias, R. Ravi and Laura Sanità. Single-Sink Fractionally Subadditive Network Design. *Proceedings of ESA*, 46:1-13 (2017).

(124) Arda Antikacioglu and R. Ravi. Post Processing Recommender Systems for Diversity. *Proceedings of KDD*, 707-716 (2017).

(125) Y. Jiao, R. Ravi and W. Gatterbauer. Algorithms for Automatic Ranking of Participants and Tasks in an Anonymized Contest. *Proceedings of WALCOM* (2017).

(126) Anupam Gupta, R. Ravi, Kunal Talwar and Seeun William Umboh. LAST but not Least: Online Spanners for Buy-at-Bulk. *Proceedings of SODA*, 589-599 (2017).

(127) Jennifer Iglesias, Rajmohan Rajaraman, R. Ravi and Ravi Sundaram. Balls and Funnels: Energy Efficient Group-to-Group Anycasts. *Proceedings of COCOON*, 235-24 (2016).

(128) Jennifer Iglesias, Rajmohan Rajaraman, R. Ravi and Ravi Sundaram. Rumors across Radio, Wireless, Telephone. *Proceedings of FSTTCS*, 517-528 (2015).

(129) Jennifer Iglesias, Rajmohan Rajaraman, R. Ravi and Ravi Sundaram. Designing Overlapping Networks for Publish-Subscribe Systems. *Proceedings of APPROX-RANDOM*, 381-395 (2015).

(130) Arda Antikacioglu, R. Ravi and Srinath Sridhar. Recommendation Subgraphs for Web Discovery. *WWW 2015: 77-87 (2015).*

(131) Takuro Fukunaga, Afshin Nikzad and R. Ravi. Deliver or hold: Approximation Algorithms for the Periodic Inventory Routing Problem. *Proceedings of APPROX-RANDOM*, 209-225 (2014).

(132) Afshin Nikzad and R Ravi. Sending Secrets Swiftly: Approximation Algorithms for Generalized Multicast Problems. *Proceedings of the 41st International Colloquium on Automata, Languages and Programming*, 568-687 (ICALP 2014).

(133) Satoru Iwata, Alantha Newman and R. Ravi. Graph TSP from Steiner Cycles. *Proceedings of the 40th International Workshop on Graph-Theoretic Concepts in Computer Science, 312-323 (WG 2014).*

(134) Uriel Feige, R. Ravi and Mohit Singh. Short tours through large linear forests. *Proceedings of the 17th Conference on Integer Programming and Combinatorial Optimization (IPCO)*, 273-284 (2014).

(135) Niv Buchbinder, Joseph (Seffi) Naor, R. Ravi and Mohit Singh. Approximation Algorithms for Online Weighted Rank Function Maximization under Matroid Constraints. *Proceedings of the 39th International Colloquium on Automata, Languages and Programming*, 145-156, (ICALP 2012).

(136) A. Gupta, R. Krishnaswamy, M. Molinaro and R. Ravi. Approximation Algorithms for Correlated Knapsacks and Non-Martingale Bandits. *Proceedings of the 52nd Annual IEEE Symposium on Foundations of Computer Science (FOCS)*, 827-836 (2011).

(137) B. Meeder, B. Karrer, A. Sayedi, R. Ravi, C. Borgs and J. T. Chayes. We Know Who You Followed Last Summer: Inferring Social Link Creation Times in Twitter. *Proc. of 20th International Conference on World Wide Web*, (WWW 2011).

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(139) A. Gupta, R. Krishnaswamy and R. Ravi. Tree Embeddings for Two-Edge-Connected Network Design. *Proceedings of the ACM-SIAM Symposium on Discrete Algorithms (SODA)*, (2010).

(140) R. Ravi. Iterative Methods in Combinatorial Optimization (Invited Presentation). *Procedings of Conference on Foundations of Software Technology and Theoretical Computer Science (FST&TCS)*, 453-469 (2009).

(141) V. Nagarajan and R. Ravi. The Directed Minimum Latency Problem. *Proceedings of the 11th International Workshop on Approximation Algorithms for Combinatorial Optimization Problems (APPROX)*, 193-206 (2008).

(142) V. Goyal, A. Gupta, S. Leonardi and R Ravi. Pricing Tree Access Networks with Connected Backbones. *Proceedings of the 15th Annual European Symposium on Algorithms (ESA)*, (2007).

(143) Shuchi Chawla, Jason Hartline, Uday Rajan and R. Ravi. Bayesian Optimal No-Deficit Mechanism Design. *Proceedings of the Workshop on Internet and Network Economics (WINE)*, 2006: 136-148.

(144) R. Ravi and Mohit Singh. Delegate and Conquer: An LP-based approximation algorithm for Minimum Degree MSTs. *Proc. of 33rd International Colloquium on Automata, Languages and Programming*, (ICALP 2006).

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(146) K. Dhamdhere, V. Goyal, R. Ravi and M. Singh. How to Pay, Come What May: Approximation Algorithms for Demand-Robust Covering Problems. *Proceedings of the 46th Annual IEEE Symposium on Foundations of Computer Science (FOCS)*, (2005).

(147) Kedar Dhamdhere, R. Ravi and Mohit Singh. On Stochastic Minimum Spanning Trees. *Proceedings of the Conference on Integer Programming and Combinatorial Optimization (IPCO)*, (2005).

(148) Bruce M. Maggs, Gary L. Miller, Ojas Parekh, R. Ravi and Shan Leung Maverick Woo. Finding effective support-tree preconditioners. *Proceedings of the 17th Annual ACM Symposium on Parallel Algorithms (SPAA)*, (2005).

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(151) S. Chawla, D. Kitchin, U. Rajan, R. Ravi and A. Sinha. Profit guaranteeing mechanisms for multicast networks. *Proceedings of the ACM Conference on Electronic Commerce*, 190-191, (2003).

(152) Eduardo Laber, Ojas Parekh, and R. Ravi. Randomized Results for Query Optimization Problems on Two Processors. *Proceedings of the 10th Annual European Symposium on Algorithms (ESA)*, 646-661, (2002).

(153) Bjarni Halldórsson, J. S. Minden and R. Ravi. PIER: Protein Identification by Epitope Recognition. *Currents in Computational Molecular Biology 2001*, (N. El-Mabrouk and T. Lengauer and D. Sankoff, Eds.) 109-110 (2001).

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(155) G. Lancia and R. Ravi. GESTALT: Genomic Steiner Alignments. *Proceedings of the 10th Annual Symposium on Combinatorial Pattern Matching (CPM)*, LNCS 1645, 101-114 (1999).

(156) R. Ravi and F. S. Salman. Approximation Algorithms for the Traveling Purchaser Problem and its variants in network design. *Proceedings of the 7th Annual European Symposium on Algorithms (ESA)*, Springer-Verlag Lecture Notes in Computer Science 1643, 29-40 (1999).

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(158) C. Bornstein, B. Maggs, G. Miller and R. Ravi. Redeeming Nested Dissection: Parallelism Implies Fill. *Proceedings of the Ninth SIAM Conference on Parallel Processing for Scientific Computing*, San Antonio, Texas, USA, March 22-24, 1999. SIAM, 1999, CDROM.

(159) R. Carr and R. Ravi. A New Bound for the 2-Edge Connected Subgraph Problem. *Proceedings of IPCO*, Springer-Verlag Lecture Notes in Computer Science 1412, 112-125 (1998).

(160) C. Bornstein, B. Maggs, G. Miller and R. Ravi. Parallel Gaussian elimination with linear fill. *Proceedings of IEEE Symposium on Foundations of Computer Science (FOCS)*, 274-283 (1997). A full version appears as technical report CMU-CS-97-133.

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(162) R. Ravi and M. X. Goemans. The constrained minimum spanning tree problem. *Proceedings of the 5th Scandinavian Workshop on Algorithms Theory (SWAT)*, Springer-Verlag Lecture Notes in Computer Science 1097, 66-75 (1996).

(163) V. Bafna, S. Muthukrishnan and R. Ravi. Computing similarity between RNA strings. *Proceedings of the 6th Annual Combinatorial Pattern Matching Conference (CPM)*, Springer-Verlag Lecture Notes in Computer Science 937, 1-16 (1995).

(164) J. D. Kececioglu and R. Ravi. Of mice and men: Evolutionary distances between genomes under translocations. *Proceedings of the ACM-SIAM Symposium on Discrete Algorithms (SODA)*, 604-613 (1995).

(165) R. Ravi, M. V. Marathe, S. S. Ravi, D. J. Rosenkrantz, and H. B. Hunt. Many birds with one stone: Multi-objective approximation algorithms. *Proceedings of the ACM Symposium on the Theory of Computing*, 438-447 (STOC 1993).

(166) P. Klein and R. Ravi. When cycles collapse: A general approximation technique for constrained two-connectivity problems. *Proceedings of the Conference on Integer Programming and Combinatorial Optimization (IPCO)*, 39-56 (1993).

(167) H.-I. Lu and R. Ravi. The power of local optimization: Approximation algorithms for maximum-leaf spanning tree. *30th Allerton Conference on Communications, Control and Computing*, 533-542 (1992).

(168) R. Ravi, A. Agrawal, and P. Klein. Ordering problems approximated: single-processor scheduling and interval graph completion. *International Colloquium on Automata,*

Languages and Processing (ICALP), Springer-Verlag Lecture Notes in Computer Science 510, 751-762 (1991).

Articles in edited books/volumes

(169) M. V. Marathe, R. Ravi and R. Sundaram. Improved results on service-constrained network design problems. *Network Design: Connectivity and Facilities Location*, edited by D. Z. Du and P. M. Pardalos, Vol. 40 in the DIMACS Series in Discrete Mathematics and Theoretical Computer Science, 269-276 (1998).

(170) S. O. Krumke, M. V. Marathe, H. Noltemeier, R. Ravi and S. S. Ravi. Network Improvement Problems. *Network Design: Connectivity and Facilities Location*, edited by D. Z. Du and P. M. Pardalos, Vol. 40 in the DIMACS Series in Discrete Mathematics and Theoretical Computer Science, 247-268 (1998).

(171) A. Agrawal, P. Klein, and R. Ravi. Cutting down on fill using nested dissection: provably good elimination orderings. Invited chapter, *Graph Theory and Sparse Matrix Computation*, edited by A. George, J. Gilbert, and J. W. H. Liu, Vol. 56 in the *IMA Volumes in Mathematics and its Applications*, Springer-Verlag (1993).

Professional Activities

Workshop (Co-)chair

2013- Steering Committee Member, Cargese Workshops on Combinatorial Optimization, Cargese, Corsica.

05/18 Ninth Workshop on Flexible Network Design, University of Maryland, College Park.

07/16 Eighth Workshop on Flexible Network Design, Amsterdam.

04/16 NII Shonan Meeting on Current Trends in Combinatorial Optimization, Shonan, Japan.

07/13 Sixth Workshop on Flexible Network Design, Toronto, Canada.

07/12 Fifth Workshop on Flexible Network Design, Warsaw, Poland.

05/12 ISI-IMSc Summer School On Network Optimization and Security, Chennai, India.

10/09 Network Science, Carnegie Bosch Institute Conference, CMU.

06/08 Third Workshop on Flexible Network Design, University of Warwick, UK.

10/07 Hurdles to e-Business, Carnegie Bosch Institute Conference, CMU.

10/06 Second Workshop on Flexible Network Design, University of Bologna Residential Center at Bertinoro, Italy.

11/05 Workshop on Flexible Network Design, ALADDIN Center, Princeton University.

10/05 FriezeFest, Workshop honoring Prof. Alan Frieze on his 60th birthday, CMU.

05/05 Lamps of ALADDIN Annual Project Review, CMU.

10/04 Market Design Workshop, ALADDIN Center, CMU.

05/04 Lamps of ALADDIN Annual Project Review, CMU.

03/04 Integrated Logistics Workshop II, ALADDIN Center, Princeton University.

11/03 Workshop on Auction Theory and Practice, ALADDIN Center, CMU.

10/03 Integrated Logistics Workshop, ALADDIN Center, CMU.

5/98 DIMACS Workshop on Robust Communication Networks: Interconnection and Survivability, DIMACS Center, Rutgers University.

5/98 Joint DIMACS-CMU-Georgia Tech. Workshop on Large Scale Discrete Optimization, DIMACS Center, Rutgers University.

6/98 International School-Workshop on Computational Biology, International Center for Mechanical Sciences (CISM), Udine, Italy.

Plenary Talks/Tutorials at Conferences/Symposia

9/19 Invited talk on "Minimum Cuts via Breadth First Search" at **Tenth Cargese Workshop on Combinatorial Optimization**, Cargese, France.

6/17 Invited talk on "Plane Gossip: Approximating rumor spread in planar graphs" at **Journées Polyèdres et Optimisation Combinatoire JPOC10**, Paris, France.

5/16 Invited talk on "Improved Approximations for Graph-TSP in Regular Graphs" at **ISCO 2016, the International Symposium on Combinatorial Optimization**, Vietri Sul Mare, Italy.

1/16 Invited talk on "Iterative Methods in Combinatorial Optimization" at **the 20th Combinatorial Optimization Workshop**, Aussois, France.

8/15 Invited talk on "Improved Approximations for Graph-TSP in Regular Graphs" at **APPROX 2015, the 18th International Workshop on Approximation Algorithms for Combinatorial Optimization Problems**, Princeton.

6/14 Invited talk on "Improved Approximations for Graph-TSP in Regular Graphs" at **ICGT 2014, the 9th International colloquium on graph theory and combinatorics**, Grenoble, France.

5/13 Invited talk on "The Geometry of Online Linear Programs" at the **RK60 Workshop celebrating Ravindran Kannan's 60th birthday**, Carnegie Mellon University.

12/12 Five invited lectures on "How to Approximate It?" at the **MSR India Winter School**, Hyderabad, India.

06/12 Lecture on "Adapting Approximation Algorithms" at the **Algorithmic Frontiers Workshop**, EPFL-Lausanne, Switzerland.

05/12 Lectures on "Network Design: Exact and Approximate Solution Approaches" at the **ISI-IMSc Summer School On Network Optimization and Security**, Chennai, India.

02/12 Tutorial on "Iterative Methods in Combinatorial Optimization", **Symposium on Theoretical Aspects of Computer Science (STACS)** 2012, Paris, France.

07/11 Invited lectures on "Iterative Methods in Combinatorial Optimization", Second Cargese Workshop in Combinatorial Optimization, Corsica.

06/11 Workshop on "Design and Analysis of Randomized and Approximation Algorithms," **Schloss Dagstuhl**, Germany.

02/11 First NII-Shonan Meeting on "Graph Algorithms and Combinatorial Optimization," **Shonan Village Center**, Japan.

01/11 Invited lecturer, **2011 MSR-IMPECS School on Approximability** January 2011, IISc, Bengaluru, India.

01/10 Invited speaker on "Iterative Methods in Combinatorial Optimization", **Third Annual Microsoft Research Theory Day** 2010, IIT-Madras, Chennai, India.

12/09 Invited speaker on "Iterative Methods in Combinatorial Optimization", **IARCS Annual Conference on Foundations of Software Technology & Theoretical Computer Science** 2009, IIT-Kanpur, India.

11/08 Invited Lecture Series on "Iterative Methods in Combinatorial Optimization", **RIMS, Kyoto Univeristy**, Japan.

07/06 Semi-Plenary lecture on "Approximation Algorithms for Stochastic Combinatorial Optimization", **International Symposium on Mathematical Programming** 2006, Rio de Janeiro, Brazil.

06/06 Primary Lecturer, "Graph Metric and Embeddings," **DYNAMO Training School** 2006, Lisbon, Portugal.

03/06 Plenary Lecture, "Matching Based Augmentations for Approximating Connectivity Problems," **Latin American Theoretical Informatics Symposium** (LATIN '06), Valdivia, Chile.

05/05 Workshop on "Design and Analysis of Randomized and Approximation Algorithms," **Schloss Dagstuhl**, Germany.

02/05 Plenary lecture on "Approximation Algorithms for Stochastic Combinatorial Optimization", **Workshop on New Horizons in Computing**, Kyoto, Japan.

08/04 Principle Lecturer on "Integrating Information from Sequence and Evolution: An Introduction to Computational Biology", **DIMACS Summer Reconnect Conference** for faculty teaching undergraduates.

06/04 Workshop on "Approximation Algorithms for NP-hard problems", MFO, **Oberwolfach**, Germany.

08/03 Tutorial, "Metrics and Approximation Algorithms," **Second Workshop on Discrete Metric Spaces and their Algorithmic Applications**, Princeton University

09/02 Plenary Talk, "Bicriteria Approximations via Lagrangean Relaxations," **33rd Annual Conference of the Operational Research Society of Italy**, L'Aquila, Italy

09/02 Plenary Talk, "Bicriteria Spanning Trees," **ALGO 2002**, Joint European Algorithms Meetings, Rome, Italy

03/02 Invited Tutorial, "Metrics and Approximation Algorithms," **Workshop on Discrete Metric Spaces and their Algorithmic Applications**, Haifa, Israel

01/02 Invited Tutorial, "Applications of Graph Theory to Molecular Biology," **AMS-MAA Joint Mathematics Meeting**, San Diego, CA

12/99 Tutorial on Approximation Algorithms, post-conference event, **Tenth Annual International Symposium on Algorithms and Computation (ISAAC '99)**, Chennai, India

12/98 Plenary Talk, "Computational Challenges in Molecular Biology," **First Latin American School on Parallelism and High-performance Computing**, Merida, Venezuela

7/98 Invited Tutorial on Computational Biology, **DIMACS Reconnect Conference** Rutgers University, NJ

7/97   Invited Tutorial on Computational Biology, **Joint DIMACS/University of Buenos Aires Workshop**, Argentina

6/96   Invited Tutorial on Multiple Sequence Alignments, **Bat Sheva de Rothschild Workshop on Computational Aspects of the Human Genome Project**, Nahsholim, Israel

3/96   Plenary Talk, "Approximation Algorithms in Computational Biology," **Second Annual Workshop on Computational Biology**, Sandia National Laboratories, Albuquerque, NM

7/94   Week-long Invited Tutorial on Computational Biology, **DIMACS Summer Leadership Program for high-school teachers**, Rutgers University, NJ

Educational Activities

Teaching

(All courses at Carnegie Mellon unless otherwise noted.)

Since Spring'21	**End-to-End Business Analytics** (New MBA elective).
Since Fall'20	**End-to-End Business Analytics** (New elective course in the Bachelor of Science in Business Administration (BSBA) program).
Since Summer '19	**Business Value through Integrative Analytics** (New core course in the Master of Science in Business Analytics (MSBA) program).
Since Spring '10	**Business Networks.** (New MBA elective).
Since Spring '07	**Optimization for Interactive Marketing.** (New MBA elective co-taught with Prof. Baohong Sun for the first three times and independently afterwards).
Spring '16, '18	**Special Topics: Combinatorial Optimization** (New graduate course).
Since 1995	**Graph Theory.**
Since 1995	**Networks and Matchings.** Renamed **Advanced Graph Theory.**
Fall '13	**Probability and Statistics.** (Required MBA course - Designed and taught the first class in the FlexMBA blended MBA format).
Fall '10, '11	**Optimization and Decision Making.** (Required course for MBA students).
Spring '10	**Social, Economic and Information Networks.** (New doctoral course).
Spring '09, Spring '10	**Network Science.** (New undergraduate course); **Social, Economic and Information Networks.** (Revised version).
Fall '07	**Iterative Relaxation and Rounding.** (New graduate course, co-taught with Mohit Singh).
Fall '06	**Mining Data for Decision Making.** (MBA elective)
Fall '05 - Spring '06	**Approximation Algorithms** (Year-long graduate course co-taught with Prof. Anupam Gupta). Lecture notes available on the web.
Fall 2003	**Metric Embeddings** (New graduate course, co-taught with Prof. Anupam Gupta). Lecture notes available on the web.
2003 - 2008	**Probability and Decision Making** (New required course for MBA students).
Spring 2003	**Planarity** (New doctoral course).
Spring 2001	**Computational Biology** (New graduate course).
1999 - 2003	**Decision Models.** (Revamped required course for MBA students).
Spring 1999	**Advanced Integer Programming.**
Spring 1997	**Network Design Algorithms** (New doctoral course).

Fall 1996, '97, '98	**Introduction to Operations Research.** (Required course for MBA students).
Spring 1996	**Analysis of Heuristics** (New graduate course).
Spring 1996	**Modeling for Management Science Applications.** (MBA elective).
Fall 1995	**Convex Analysis.**
Spring 1995	**Advanced topics in Computer Science: Computational Biology.** (Co-instructor with Prof. Andrew Yao); Department of Computer Science, Princeton University.

Doctoral Student Advising (at Carnegie Mellon)

Giuseppe Lancia (Co-Chair, Thesis Committee)
(ACO/Operations Research, GSIA, CMU, 1997)
Thesis Title: Optimization Problems in Computational Molecular Biology
(Currently Professor of Operations Research, University of Udine, Italy)

Fatma Sibel Salman (Chair, Thesis Committee)
(Operations Research, GSIA, CMU, 2000)
Thesis Title: Selected Problems in Network Design: Exact and Approximate Solution Methods
(Currently Professor, College of Engineering, Koç University, Istanbul, Turkey)

Goran Konjevod (Chair, Thesis Committee)
(ACO/Math Department, CMU, 2000)
Thesis Title: Generalizing Set Cover: Approximation Algorithms for Group Steiner Trees and Related Problems
(Currently Research Staff Member at Lawrence Livermore National Laboratories)

Bjarni Halldórsson (Chair, Thesis Committee)
(ACO/Math Department, CMU, 2001)
Thesis Title: Algorithms for Biological Sequence Problems
(Currently Associate Professor of Biomedical Engineering, Reykjavik University, Iceland)

Ojas Parekh (Chair, Thesis Committee)
(ACO/Math Department, CMU, 2002)
Thesis Title: Polyhedral Techniques for Approximation Algorithms
(Currently Research Staff Member at Sandia National Laboratories)

Jochen Könemann (Chair, Thesis Committee)
ACO/Operations Research, GSIA, CMU, 2003
Thesis Title: Approximation Algorithms for Minimum-Cost Low-Degree Subgraphs.
(Currently Professor of Combinatorics and Optimization at University of Waterloo)

Amitabh Sinha (Chair, Thesis Committee)
(ACO/Operations Research, Tepper School of Business, CMU, 2004)

Thesis Title: Location, location, location and location: Facility location incorporating demand uncertainty, logistic network design, product heterogeneity and competition.
(Currently Principal Scientist at Amazon)

Kedar Dhamdhere (Chair, Thesis Committee)
(Computer Science, SCS, CMU, 2005)
Thesis Title: Approximation Algorithms for Metric Embedding Problems.
(Currently Software Engineer at Google)

Mohit Singh (Chair, Thesis Committee)
ACO/Operations Research, Tepper School of Business, CMU, 2008
Thesis Title: Iterative Methods in Combinatorial Optimization.
Winner of the Tucker Prize at the 2009 International Symposium on Mathematical Programming.
(Currently Associate Professor at Georgia Tech)

Vineet Goyal (Chair, Thesis Committee)
ACO/Operations Research, Tepper School of Business, CMU, 2008
Thesis Title: Combinatorial Optimization Under Uncertainty.
(Currently Associate Professor of Industrial Engineering and Operations Research at Columbia University)

Viswanath Nagarajan (Chair, Thesis Committee)
ACO/Operations Research, Tepper School of Business, CMU, 2009
Thesis Title: Approximation Algorithms for Sequencing Problems.
(Currently Associate Professor of Industrial and Operations Engineering, University of Michigan, Ann Arbor)

David Abraham (Chair, Thesis Committee)
Computer Science, SCS, CMU, 2009
Thesis Title: Matching Markets: Design and Analysis.
(Initial Placement: Software Engineer at Google)

Seyed Amin Sayedi Roshkar (Co-Chair, Thesis Committee)
ACO/Operations Research, Tepper School of Business, CMU, 2012
Thesis Title: Essays on Sponsored Search Advertising.
(Current Placement: Associate professor of Marketing at Foster School of Business at University of Washington)

Arda Antikacioglu (Chair, Thesis Committee)
ACO/Math Department, CMU, 2017
Thesis Title: Quantifying and Improving Sales Diversity in Recommender Systems.
(Initial Placement: VP at WorldQuant LLC)

Jennifer Iglesias (Chair, Thesis Committee)
ACO/Math Department, CMU, 2017
Thesis Title:Approximation Algorithms for Faster Communication and Cheaper Networks

Using Linear Programming.
(Initial Placement: Waymo)

Jeremy Karp (Chair, Thesis Committee)
ACO/Operations Research, Tepper School of Business, CMU, 2017
Thesis Title: Models and Methods for Omni-channel Fulfillment.
(Initial Placement: Lyft)

Stylianos Despotakis (Chair, Thesis Committee)
ACO/Operations Research, Tepper School of Business, CMU, 2018
Thesis Title: Expertise, Attribution, and Ad Blocking in the World of Online Marketing.
(Initial Placement: Assistant Professor of Marketing, City University of Hong Kong)

Yang Jiao (Chair, Thesis Committee)
ACO/Operations Research, Tepper School of Business, CMU, 2018
Thesis Title: Algorithms for Ranking and Routing Problems.
(Initial Placement: Research Scientist, Boeing Corporation)

Arash Haddadan (Chair, Thesis Committee)
ACO/Operations Research, Tepper School of Business, CMU, 2020
Thesis Title: New Bounds On Integrality Gaps By Constructing Convex Combinations.
(Initial Placement: Post-doctoral Fellow, University of Virginia)

Da Qi Chen (Chair, Thesis Committee)
ACO/Math Department CMU, 2021
Thesis Title: Topics in Information Dissemination, Network Fortification and Extremal
Structures.
(Initial Placement: Post-doctoral Fellow, University of Virginia)

Oleksandr Rudenko (Chair, Thesis Committee)
ACO/Math Department CMU, 2022
Thesis Title: Topics in Network and Market Optimization.
(Initial Placement: Jane Street)

Su Jia (Chair, Thesis Committee)
ACO/Operations Research, Tepper School of Business, CMU, 2022
Thesis Title: Learning and Earning Under Noise and Uncertainty.
Winner of the Dantzig Dissertation Award at the 2022 INFORMS.
(Initial Placement: Assistant Research Professor, Cornell University)

D. Ellis Hershkowitz (Co-Chair, Thesis Committee)
Computer Science Department CMU, 2022
Thesis Title: Compact Representations of Graphs and Their Metrics.
(Initial Placement: Post-doctoral Fellow, ETH Zurich)

Doctoral Student Supervision (at Carnegie Mellon)

Hui Chen (1996) (Member, Thesis Committee, ACO/Math,CMU)
George Christopher (1997) (Member, Thesis Committee, ACO/Math, CMU)
Pinar Keskinocak (1997) (Member, Thesis Committee, ACO/Operations Research, CMU)
Neil Simonetti (1998) (Member, Thesis Committee, ACO/Math, CMU)
Andrea Richa (1998) (Member, Thesis Committee, ACO/Computer Science, CMU)
Claudson Bornstein (1998) (Member, Thesis Committee, Computer Science, CMU)
Lei Zhao (1999) (Member, Thesis Committee, ACO/Math, CMU)
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Hak-Jin Kim (2002) (Member, Thesis Committee, Operations Research, CMU)
Nikhil Bansal (2003) (Member, Thesis Committee, Computer Science, CMU)
Giacomo Zambelli (2004) (Member, Thesis Committee, Operations Research, CMU)
Xinming Liu (2004) (Member, Thesis Committee, Operations Research, CMU)
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Kelley Burgin (2006) (Member, Thesis Committee, ACO/Math, CMU)
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Chen Xiang (2008) (Outside Reader) (Production and Operations Management, CMU)
Daniel Golovin (2008) (Member, Thesis Committee, Computer Science, CMU)
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Katrina Liggett (2009) (Member, Thesis Committee, Computer Science, CMU)
Navodit Misra (2011) (Member, Thesis Committee, Computational Biology, CMU)
Afshin Nikzad (2012), (Thesis Advisor, Moved to Department of Management Science and Engineering, Stanford University after a Masters degree)
Ravishankar Krishnaswamy (2012) (Member, Thesis Committee, Computer Science, CMU)
Marco Molinaro (2013) (Member, Thesis Committee, ACO/Operations Research, CMU)
David Bergman (2013) (Member, Thesis Committee, ACO/Operations Research, CMU)
Tinglong Dai (2013) (Member, Thesis Committee, Operations Management, CMU)
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Yuan Zhou (2014) (Member, Thesis Committee, Computer Science, CMU)
Vince Slaugh (2015) (Member, Thesis Committee, Operations Management, CMU)
Carlos Ramirez (2016) (Member, Thesis Committee, Financial Economics, CMU)
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Sahil Singla (2018) (Member, Thesis Committee, Computer Science, CMU)
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Ziye Tang (2021) (Member, Thesis Committee, ACO/Operations Research, CMU)
Roie Levin (2022) (Member, Thesis Committee, Computer Science, CMU)

Supervision (outside Carnegie Mellon)

Jennifer Perone (1995), Undergraduate Thesis Advisor, Princeton University.

Dr. Guido Scheafer (2008), Member of Habilitation Committee, TU-Berlin.

David Oertel (2012), Advisor of Diploma-thesis, Karlsruhe Institute of Technology, Germany.