

Vipin Kumar

Regents Professor

William Norris Chair in Large Scale Computing
Department of Computer Science and Engineering

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Vipin Kumar is a Regents Professor at the University of Minnesota, where he holds the William Norris Endowed Chair in the Department of Computer Science and Engineering. Kumar received the B.E. degree in Electronics & Communication Engineering from Indian Institute of Technology Roorkee (formerly, University of Roorkee), India, in 1977, the M.E. degree in Electronics Engineering from Philips International Institute, Eindhoven, Netherlands, in 1979, and the Ph.D. degree in Computer Science from University of Maryland, College Park, in 1982. He also served as the Head of the Computer Science and Engineering Department from 2005 to 2015 and the Director of Army High Performance Computing Research Center (AHPARC) from 1998 to 2005.

Kumar's research spans data mining, high-performance computing, and their applications in Climate/Ecosystems and health care. His research has resulted in the development of the concept of isoefficiency metric for evaluating the scalability of parallel algorithms, as well as highly efficient parallel algorithms and software for sparse matrix factorization (PSPASES) and graph partitioning (METIS, ParMetis, hMetis). He has authored over 300 research articles, and has coedited or coauthored 10 books including two text books "Introduction to Parallel Computing" and "Introduction to Data Mining", that are used world-wide and have been translated into many languages. Kumar's current major research focus is on bringing the power of big data and machine learning to understand the impact of human induced changes on the Earth and its environment. Kumar served as the Lead PI of a 5-year, \$10 Million project, "Understanding Climate Change - A Data Driven Approach", funded by the NSF's Expeditions in Computing program that is aimed at pushing the boundaries of computer science research.

Kumar has served as chair/co-chair for many international conferences in the area of data mining, big data, and high performance computing, including 25th SIGKDD Conference on Knowledge Discovery and Data Mining (KDD 2019), 2015 IEEE International Conference on Big Data, IEEE International Conference on Data Mining (2002), and International Parallel and Distributed Processing Symposium (2001). Kumar co-founded SIAM International Conference on Data Mining and served as a founding co-editor-in-chief of Journal of Statistical Analysis and Data Mining (an official journal of the American Statistical Association). Currently, Kumar serves on the steering committees of the SIAM International Conference on Data Mining and the IEEE International Conference on Data Mining, and is series editor for the Data Mining and Knowledge Discovery Book Series published by CRC Press/Chapman Hall.

Kumar has been elected a Fellow of the American Association for Advancement for Science (AAAS), Association for Computing Machinery (ACM), Institute of Electrical and Electronics Engineers (IEEE), and Society for Industrial and Applied Mathematics (SIAM). He received the Distinguished Alumnus Award from the Indian Institute of Technology (IIT) Roorkee (2013), the Distinguished Alumnus Award from the Computer Science Department, University of Maryland College Park (2009), and IEEE Computer Society's Technical Achievement Award (2005). Kumar's foundational research in data mining and high performance computing has been honored by the ACM SIGKDD 2012 Innovation Award, which is the highest award for technical excellence in the field of Knowledge Discovery and Data Mining (KDD), and the 2016 IEEE Computer Society Sidney Fernbach Award, one of IEEE Computer Society's highest awards in high-performance computing.

Curriculum Vitae

Education

Ph.D. in Computer Science	University of Maryland, College Park	1982
M.E. in Electronics Engineering	Philips International Institute, Eindhoven, Netherlands	1979
B.E. in Computer Science	Indian Institute of Technology, Roorkee	1977

Professional Experience

Professor	University of Minnesota	1995-
Regents Professor		2015-
William Norris Chair		2005-
Department Head		2005-2015
Director, Army High Performance Computing Research Center		1998-2005
Director, Graduate Program in Scientific Computation		1998-1999
Associate Professor	University of Minnesota	1989-1995
Assistant Professor	University of Texas at Austin	1983-1989

Research Interests

High-Performance Computing, Data Mining, machine learning, and their applications in Climate/ Ecosystems and health care.

Awards & Honors

Professional Awards

- Elected Fellow of Society for Industrial and Applied Mathematics (SIAM), 2017.
- The IEEE Computer Society's Sidney Fernbach Award, 2016.
- Regents Professorship, University of Minnesota, June 2015.
- Council of Graduate Students (COGS) Outstanding Faculty Award, 2015.
- Distinguished Alumnus Award from the Indian Institute of Technology (IIT) Roorkee (2013).
- Appointed to World Economic Forum (WEF), Global Agenda Council on Measuring Sustainability, 2013, and invited to the 2013 annual meeting of WEF's Summit on the Global Agenda, which is world's largest brainstorming event, bringing together the most relevant thought leaders of the World to collaboratively explore important issues shaping the global, industry and regional agendas.
- ACM SIGKDD 2012 Innovation Award, the highest award for technical excellence in the field of Knowledge Discovery and Data Mining (KDD).
- Distinguished Alumnus Award, Computer Science Department, University of Maryland, College Park, 2009.
- IEEE ICDM 2008 Outstanding Service Award, December 2008.
- Elected Fellow of AAAS (American Association of Advancement of Science), 2006.
- Named to the Alumni Hall of Fame, Computer Science Department, University of Maryland, College Park, 2006.
- Elected Fellow of the ACM, 2005.
- The 2005 IEEE Computer Society's Technical Achievement Award for contributions to the design and analysis of parallel algorithms, graph-partitioning, and data mining.
- IBM Partnership Awards, 1995 & 1996.
- Elected Fellow of the IEEE, 2000.
- Appointed Fellow, Minnesota Supercomputer Institute, 1996.
- Honorable Mention in the 1989 Gordon Bell Competition for practical parallel processing research.
- Graduate Student Research Excellence Award from the Maryland chapter of Sigma-Xi, the Scientific Research Society, 1982.
- ACM Samuel Alexander Fellowship Award from the Washington D.C. chapter of the Association of Computing Machinery, 1981.
- Gold medal for first rank in the merit list of over 350,000 students for the 12th grade state-wide examination (US equivalent: High School) in the state of Uttar Pradesh, India, 1973.
- Ramanujan Gold Medal for first place in district level Math Olympiad, Muzaffarnagar, India, 1972.

Rewards related to Students and Alumni

- *Hopper-Dean Scholarship Honoring Dr. Vipin Kumar*, a \$500,000 endowment to support undergraduate scholarships at the University of Minnesota established by Jeff Dean (Google Senior Fellow) and his wife, Heidi Hopper, 2014.
- *Outstanding Dissertation Award from University of Minnesota*: James Faghmous (2014).
- *Outstanding Dissertation Award from University of Minnesota*: Gang Fang (2013).

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- *Best Student Paper Award*: J. Faghmous, V. Mithal, L. Styles for “EddyScan: A Physically Consistent Global Ocean Eddy Monitoring Application”. **2012 IEEE Conference on Intelligent Data Understanding (CIDU 2012)**, November 2012.
- *Best Graduate Student Research Award*: Jaya Kawale, ACM Student Research Competition (SRC) at the **2012 Grace Hopper Conference**, October 2012.
- *Best Graduate Student Poster Award*: Jaya Kawale, “A Graph Based Approach to Find Teleconnections in Climate Data,” **Midwest Women in Computing Celebration**, February 2012.
- *Best Student Paper award*: Jaya Kawale, “Data Guided Discovery of Dynamic Climate Dipoles” at the **NASA Conference on Intelligent Data Understanding (CIDU 2011)**, October 2011.
- *2011 Explorations in Science through Computation Student Award*: Jaya Kawale, for her work on Discovering Teleconnections in Climate Data through Data Mining, presented at the **2011 Supercomputing Conference (SC11)**, August 2011.
- *Winner of the Best Contributed Paper Award in Applications Development Section*: PN. Tan, V. Kumar, and H. Kuno, Using SAS for Mining Indirect Associations in DATA **Proceedings of the Ninth Annual Conference of the Western Users of SAS Software**, September 2001.
- *Selected as Best Student paper Nominee for Supercomputing 96*. A. Grama, V. Kumar, and A. Sameh, Parallel Hierarchical Solvers and Preconditioners for BoundaryElement Methods, **Proceedings of Supercomputing’96**, Pittsburgh, November 1996.
- *Finalist in the ACM Doctoral Dissertation Award competition*: Anshul Gupta (1995) for his work on highly scalable sparse Cholesky factorization.
- *Finalist in the ACM Doctoral Dissertation Award competition*: Yow-Jian Lin (1988) for his work on automatic parallel execution of logic programs.
- *Outstanding Dissertation Award from University of Texas*: Yow-Jian Lin (1988).

Interdisciplinary Affiliations

Institute for Health Informatics (IHI)
 Bioinformatics and Computational Biology (BICB)
 Institute on the Environment (IonE)

Research Grants

- “Parsing early emerging heterogeneity related to autism spectrum disorder”, **NIH**, \$1,585,596, 03/2018-12/2023. (Co-Investigator)
- “University of Minnesota Clinical and Translational Science Institute”, **NIH**, \$8,249,907, 03/2018-02/2023. (Co-Investigator)
- “MINT: Model Integration through Knowledge Rich Data and Process Composition”, **DARPA** (sub-contract via USC), \$1 Million, January 1, 2018 - December 31, 2022. (Principal Investigator) (USCaward W911NF-18-1-0027).
- “Process guided machine learning for water temperature prediction”, **US Geological Survey (USGS)**, \$185,000, 09/2020-09/2022. (Co-Investigator)
- “Advancing Deep Learning to Monitor Global Change”, **NSF BIGDATA** program, \$1,430,398, November 2018 - 2021. (Principal Investigator) Award #1838159.
- “INFEWS/T3: Innovations for Sustainable Food, Energy, And Water Supplies In Intensively Cultivated Regions: Integrating Technologies, Data, And Human Behavior,” **NSF**, \$2.498 Million, October 1, 2017 - September 30, 2021. (Co-PI with Jeffrey M. Peterson (PI), Jason D. Hill, Axel G. Garcia, Amit K. Pradhananga). Award #1739191.
- “Collaborative Research: Knowledge Guided Machine Learning: A Framework for Accelerating Scientific Discovery”, **NSF HDR** program, \$1.8 Million, 09/01/2019-08/31/2021. (Principal Investigator) Award # 1934721.
- “AccrueGeo - Geospatial Analytics”, **NSF I-Corps** program, \$50,000, 9/15/2018 - 2/29/2020.
- “SCH: EXP: Collaborative Research: Group-Specific Learning to Personalize Evidence-Based Medicine”, **NSF**, \$545K, 9/1/2016-8/31/2019. (co-PI, with PI: Michael Steinbach)
- “Understanding Climate Change: A Data Driven Approach”, **NSF Expeditions in Computing Program**, \$10 Million, August 2010-2018. (Principal Investigator) Award #1029711.
- “Scalable Analysis of Earth System Data Using Parallelized Graph-Based Approaches”, **NASA**, \$499K, October 1, 2015 - September 30, 2017. (Principal Investigator).
- “Big Data Coursework for Computational Medicine”, **NIH**, \$400K, 9/29/2014 - 7/31/2017. (Co-PI on a joint grant with Mayo Clinic)
- “Discovering Patterns to Improve Health to Overcome Health Disparities”, **NSF**, \$479,207, 2013-2016. (co-PI, with PI: Michael Steinbach)
- “EAGER: Building and analyzing dynamic brain functional network”, **NSF**, \$100,000, 10/01/2013-09/30/2016. (Principal Investigator)
- “Automated Detection of precursors to Human-Automation Interaction based Aviation Safety Incidents”, **NASA**, \$447,090, October 1, 2012 - September 30, 2015. Co-PI with PI: Arindam Banerjee.

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- “Integrating Parallel and Distributed Data Mining Algorithms into the NASA Earth Exchange(NEX)”, **NASA**, \$96,000, October 1, 2012 - September 30, 2014. (Principal Investigator)
- “ELLF: Extensible Language and Library Frameworks for Scalable and Efficient Data-Intensive Applications”, **NSF**, 07/01/09 - 08/31/14; \$730K. Co-PI with PI Eric Van Wyk. Part of \$1.12 Million collaborative project joint with Northwestern University.
- “Global Land Use Change”, **Planetary Skin Institute**, \$2.2 Million, November 20, 2009 - April 30, 2013. (Principal Investigator)
- “Generalization of the Association Analysis Framework,” **NSF**, \$499,996, August 1, 2009 - November 30, 2012 (Principal Investigator)
- “EMT/NANO: Computing with Protein-Based Associative Memory Processors”, **NSF**, 09/01/09 - 08/31/11; \$75K (subcontract from University of Connecticut).
- “NOAA Interdisciplinary Scientific Environmental Technology (ISET) Cooperative Research and Education Center”, **NOAA**, \$12,000,000, 09/01/2006 - 08/31/2011. Prime: North Carolina A&T State University. (Principal Investigator on Minnesota subaward \$440K, with co-PI: Michael Steinbach)
- “Collaborative Research: Spatio-Temporal Data Mining For Global Scale Eco-Climatic Data,” **NSF**, August 1, 2007 - July 31, 2011, \$269,982. (Principal Investigator, with co-PI: Michael Steinbach)
- “Automated Assessment of Forest Cover Change”, **University of Minnesota - Future Grants Program**, \$250K, July 1, 2009- June 30, 2011. (Principal Investigator, with co-PIs Joe Knight and Sudipto Banerjee).
- “Detecting Anomalies from Numeric and Textual Data Using Data Mining”, **NASA**, 01/01/08-12/31/10 \$960K. (Co-PI, with PI: Jaideep Srivastava and co-PIs: Arindam Banerjee and William Schuler).
- “Algorithms for Forest cover change detection using MODIS data”, **NASA AMES Research Center/NNX09AL60G**, 06/04/09 - 06/03/10; \$80,000. (Principal Investigator)
- “Collaborative Research: CRI - Scalable Benchmarks, Software and Data for Data Mining, Analytics and Scientific Discoveries,” **NSF**, \$180K, 3/15/2006 - 2/28/2010. (Principal Investigator, with co-PI: Michael Steinbach) Part of \$400K collaborative project joint with Northwestern University.
- “NIH-NSF BBSI. The University of Minnesota Summer Bioinformatics Institute”, **NIH-NSF**, \$422,872, 01/01/2007-12/31/2009 (Co-PI, with PI: Yiannis Kaznessis)
- “Mining Mayo Clinic Database for Cases of Drug Induced Liver Injuries”, **Pfizer Corporation**, 5/26/2008 - 7/01/2009. (Joint project with Mayo Clinic; U of M portion \$86,902.) (Principal Investigator)
- “Using Data mining to Improve Clinical Support”, **Medtronic Inc**, 02/10/09 - 06/30/09, \$40,000. (Principal Investigator)
- “Data Mining Tools for the CQWEST Decision Support System”, **NASA**, \$150,000, March 1, 2005 -August 31, 2008. (Principal Investigator)
- “ITR Collaborative Research: A Data Mining and Exploration Middleware for Grid and Distributed Computing”, **NSF**, \$611,000, September 1, 2003 - October 31, 2007. (Principal Investigator with co-PI: J. Weissman) Part of a \$1.6 Million ITR grant jointly with University of Florida and University of Illinois.
- “Cross Domain Intrusion Detection Using Privacy Preserving Distributed Data Mining”, **DHS SBIRPhase 2 project** (subcontract from Agnik Corporation) \$80K, 12/01/2005 - 10/31/2007 (Principal Investigator)
- “Data Mining for Rare Class Analysis”, **NSF**, \$299,979, November 1, 2003 -October 31, 2007. (Principal Investigator with co-PI: J. Srivastava)
- “NIH-NSF BBSI: The University of Minnesota Summer Bioinformatics Institute.” **NSF**; \$657K, January 1, 2003 - December 2006. (Principal Investigator - transferred to Yiannis Kaznessis in 2004)
- “Army High Performance Computing Research Center”, Cooperative Agreement \$22.5 Million, August 2001 - August 2006. (Principal Investigator - transferred to Shashi Shekhar on September1, 2005)
- “Situational Awareness Analysis Tool for Aiding Discovery of Security Events and Patterns”, **ARDA**, \$800,000, 9/24/03-5/31/05. (Principal Investigator with co-PIs: J. Srivastava, Z. Zhang, Y. Kim)
- “Data Mining for Scientific and Engineering Applications”, **Department of Energy** (Lawrence Livermore Laboratory), \$500K; 5/1/2001 - 4/31/2004. (Principal Investigator with co-PI: K. Tamma)
- “Discovery of Patterns from the Global Carbon Cycle and Climate System Using Data Mining”, **NASA**, \$550K, April 15, 2001 - April 14, 2004. (Principal Investigator with co-PIs: G. Karypis and S. Shekhar)
- “Dynamic Feature Extraction and Data Mining for the Analysis of Turbulent Flows”, **NSF**, \$1,462,500; 10/15/99- 9/30/03 (Co-PI with Candler, Garrick, Interrante, Karypis, Longmire, Marusic (PI)).
- “Multi-Constraint, Multi-Objective Graph Partitioning”, **NSF**, \$286,544; 09/01/99-08/31/03. (Co-PI with George Karypis (PI)).
- “Army High Performance Computing Research Center”, Cooperative Agreement \$2.2 Million, January 1999 - January 2001. (Principal Investigator)
- “Army High Performance Computing Research Center”, Infrastructure Support Contract, \$32 Million, January 1999 - January 2001. (Principal Investigator)
- “CISE Research Instrumentation: Research in Networked Information Systems”, (co-PI with A. Tripathi (PI), S. Shekhar, J. Srivastava, Z. L. Zhang), **NSF**, \$97,000 (with matching funds of \$67,356 from U. of Minnesota), January 1, 1999 - December 31, 2001.

- “Scalable Parallel Algorithms for Irregular & Adaptive Computations”, **Department of Energy** (The ASCI Initiative Level II), \$576,000, October 1998 - September 2001. (Principal Investigator)
- “Scalable Parallel Algorithms for Solving Sparse Linear Systems”, **Army Research Office**, \$330,000, September 1998 - August 2001; (Principal Investigator)
- “Scalable Parallel Algorithms for Data Mining”, **Army Research Office**, \$75,000, June 1997 - May 2001; (Principal Investigator)
- “Scientific Data Mining”, **Department of Energy** (Lawrence Livermore Laboratory), \$128,000; 1/1/2000 - 12/31/2000. (Principal Investigator)
- “Applications over High-Speed Networks: A Pilot Project for the NII”, **NSF**, 1.5 Million (with matching funds of \$700,000 by the University of Minnesota), 1995-2000. (Co-PI with David Du (PI), Woodward, Yew)
- “Graph Partitioning for Dynamic, Adaptive and Multi-Phase Computations”, **SGI/Cray**, \$55,000, January 1998 - December 1999; (Principal Investigator)
- “Scheduling Algorithms and Applications Development”, **NASA**, \$40,000; April 1999 - September 1999. (Principal Investigator)
- “Highly Parallel Direct Solvers for Sparse Linear Systems” **NSF**, July 1, 1995 - March 30, 1999, \$191,471. (Principal Investigator)
- “U.S.-France Cooperative Research: Highly Parallel Branch-and-Bound Algorithms for Solving Optimization Problems”, **NSF**, March 1996 - February 1999, \$27,000.00, (co-PI with S. Dutt).
- “Enabling Technology Research for the AHPCRC”, \$515,000, January 1997 - January 1999. (Principal Investigator)
- “Load Balancing on the Information Power Grid”, **NASA**, \$40,000; May 1998 - September 1998. (Principal Investigator)
- “Scalable Parallel Algorithms”, **Army Research Office**, \$265,046, August 1995 - July 1998. (Principal Investigator)
- “Benchmarks for Real-Time Embedded HPC Systems”, ARPA and Rome Laboratories, \$1 Million, January 1996- August 31, 1998, funded jointly with Honeywell technology Center (Prime), **Alphatech** and University of Minnesota. Subcontract to U of M - \$92,087.
- “Parallel Sparse Systems Solvers and Applications”, **Army Research Office**, \$100,000, May 1995 -April 1998. (Principal Investigator)
- “Acquisition of A Workstation Cluster for Research in High-Performance Computing.” **NSF**, \$550,260 (with matching funds of \$484,064 by the University of Minnesota) June 1994 - September 1997. (co-PI with Kaveh, Li, Lilja, O’Keefe, Park, Riedl, Saad, Sameh (PI), Tewfik, Tripathi).
- “Architectures, Algorithms and Applications for Future generation Parallel Computers”, **NSF**, September 1, 1996 - August 30, 1997, \$100,000, Principal Investigator with Co-PI: Sameh)
- “A Technology and Architecture Integration Study for Product System Design”, \$800,000, **NASA**, January 1995 - July 1997, funded jointly with JPL, Caltech (Prime), University of Colorado, and University of Minnesota. Subcontract to U of M - \$105,000.
- “C3I Parallel Benchmark Suite”, **Rome Laboratories**, \$1.1 Million, October 1994- December 1996, funded jointly with Honeywell technology Center (Prime), Alphatech, and University of Minnesota. Subcontract to U of M - \$119,000.
- “Highly Parallel Direct Solvers and Graph Partitioning for Sparse Linear Systems” **Cray Research Inc.**, August 15, 1995 - August 15, 1996, \$24,000. (Principal Investigator)
- IBM Partnership Award, July 1, 1995 - June 30, 1996, \$72,000. (Principal Investigator)
- “Scalable Parallel Algorithms for Finite Element Problems”, **Army Research Office**, \$75,000, April 1993 - April 1996. (Principal Investigator)
- “Scalable Parallel Algorithms”, **IST/SDIO and Army Research Office**, \$130,000, April 1993 – July 1995. (Principal Investigator)
- “Army High Performance Computing Research Center” (one of the 30+ founding co-investigators; PI:George Sell), **Army Research Office**, \$66,900,000, October 1989 - September 1994.
- “Design and Analysis of Scalable Parallel Algorithms”, **IST/SDIO and Army Research Office**, \$158,851, August 1990 - August 1993. (Principal Investigator)
- “Parallel Multiagent Planning”, **NSF**, \$48,264 (July 1992-1993). (Principal Investigator)
- “CISE Research Instrumentation”, (co-PI with Maria Gini and Daniel Boley), **NSF**, \$22,777.00 (with matching funds of \$11,388 from U. of Minnesota), April 1991.
- “Artificial Intelligence Project at The University of Texas at Austin” (co-PI with Gordan Novak (PI), Robert Simmons, Bruce Porter) from the **Army Research Office**, \$6.5 million, 1984-1989.
- “Modernization Grant for the Parallel Processing Lab” (co-PI with Al Dale, Jim Browne (PI), Roy Jenevein, Dan Miranker), **Shell Development Foundation**, \$180,000, April 1988.
- “Formulation and Programming of Distributed and Parallel Computation”, (one of the twelve founding co-investigators; PI: Jim Browne), **Office of Naval Research**, \$2.5 million, 1986-88.
- “Computer Research into Multiprocessing Systems via Hypercube Architecture” (co-PI with J. K. Aggarwal (PI), A. Bovik, R. Boyer, C. L. Wu, F. Bostick). **NSF**, Division of Computer and Communications Research, \$78,245, 1985-88.
- “A Design and Execution Environment for Parallel Computations” (co-PI with Jim Browne (PI), Don Fussell, Al Mok, Vincent Hwang, Clement Leung), **Office of Naval Research**, \$600,000, April 1986.

Courses Taught

Research Problems in Spatio-Temporal Data Mining Introduction to Data Mining; Introduction to Parallel Computing; Parallel and High Performance Computing; Research Problems in Data Mining for Bioinformatics; Discrete Structures of Computer Science; Introduction to Data Structures and Algorithms; Introduction to Artificial Intelligence; Parallel Architectures for Artificial Intelligence; Topics in Parallel Symbolic Computing; Computer Systems Architecture Online

PhD Students Graduated

1. Yow-Jian Lin, April 1988. (Winner of the Outstanding Dissertation Award from the University of Texas at Austin. Lin's dissertation was selected as one of the five finalists in the 1988 ACM Doctoral Dissertation Award Competition.) First job: Research Scientist at AT&T Bell Laboratories, NJ.
2. Eric Hartman, December 1989. First job: Research Scientist at MCC, Austin, Texas.
3. V. N. Rao, July 1990. First job: Assistant Professor, University of Central Florida.
4. Tim Mikula, June 1994. First job: Research Scientist at 3M Corporation, Minneapolis.
5. Dan Challou, August 1994. First job: Project Leader, United Defense, Minneapolis, MN.
6. Anshul Gupta, July 1995. Gupta's dissertation was selected as one of the five finalists in the 1995 ACM Doctoral Dissertation Award Competition.) Currently employed at IBM T.J. Watson Research Center.
7. Ananth Grama, May 1996. Currently Full Professor, Department of Computer Science, Purdue University.
8. George Karypis, May 1996. Currently Full Professor, and ADC Telecom Endowed Chair, Department of Computer Science, University of Minnesota.
9. Minesh Amin, 1996.
10. Tom Nurkkala, June 1996. Currently Associate Professor, Taylor University.
11. Venkat G. Ajjanagadde, December 1997.
12. Sam Han, October 1999. Currently at Washington Post, Washington DC.
13. Kirk Schloegel, November 1999. First job: Research Scientist, Honeywell Technology Corp, MN.
14. Bill Leinberger, November 2001, Currently Research Scientist, General Dynamics, Bloomington, MN.
15. Pang Tan, July 2002, Currently Full Professor, Department of Computer Science, Michigan State University.
16. Mahesh Joshi, November 2002, Currently Research Scientist at SAS, Inc. Cary North Carolina.
17. Hui Xiong, June 2005, Currently Full Professor, Department of Management Science and Information Systems, Rutgers University, NJ.
18. Pusheng Zhang, June 2005, First job: Research Scientist at Microsoft Inc. Seattle.
19. Bilgehan Uygur Oztekin, July 2005, First job: Research Scientist at Google, Inc. Mountain View, CA.
20. Michael Steinbach, October 2005, Currently Research Scientist at University of Minnesota.
21. Mark Shaneck, July 2007. Associate Professor of Computer Science, Liberty University.
22. Eric Eliertson, October 2007. First job: Research Scientist at Institute for Defense Analysis.
23. Gyorgy Simon, February 2008. Currently Associate Professor, Department of Internal medicine and Institute of Health Informatics, University of Minnesota.
24. Varun Chandola, September 2009, Associate Professor, Computer Science Department, University at Buffalo (SUNY Buffalo).
25. Shyam Boriah, April 2010. Currently Principal Data Scientist at Cibo Technologies.
26. Gaurav Pandey, May 2010. Currently, Assistant Professor at Mt. Sinai School of Medicine.
27. Rohit Gupta, August 2010. First job: Research Scientist at Genentech.
28. Gang Fang, August 2012. (recipient of Outstanding Dissertation Award from University of Minnesota - 2013) Currently, Associate Professor at Mt. Sinai School of Medicine.
29. Jaya Kawale, January 2013. First job: Research Scientist at Adobe Research.
30. James Faghmous, May 2013. (recipient of Outstanding Dissertation Award from University of Minnesota - 2014) First job: Assistant Professor at Mt. Sinai School of Medicine.
31. Vanja Paunic, March 2014. First job: Research Scientist at National Marrow Donor Program (NMDP).
32. Gowtham Atluri, May 2014. Currently Assistant Professor at University of Cincinnati.
33. Loren Gragert, November 2014. Currently Assistant Professor at Tulane Cancer Center, Tulane University.
34. Sanjoy Dey, August 2015. First job: Research Scientist at IBM T.J. Watson Research Center.
35. Sean Landman, June 2016. First job: Senior Scientist at Medtronic.
36. Xi Chen, November 2016. First job: Research Scientist at Apple Inc.
37. Pranjul Yadav, March 2017. First job: Research Scientist at Criteo.com.
38. Anuj Karpatne, September 2017. Assistant Professor at Virginia Tech.
39. Kashif Riaz, January 2018. First job: Director of Data Engineering, Securian Financial.
40. Varun Mithal, April 2018. First job: Research Scientist at LinkedIn, Inc.
41. Saurabh Agrawal, December 2018. First job: Research Scientist at Amazon Inc.
42. Ankush Khandelwal. PhD: May 2019. Currently Research Associate at University of Minnesota.
43. Guruprasad Nayak. PhD: December 2019. First job: Research Scientist at Amazon.
44. Xiaowei Jia. PhD: July 2020. Currently Assistant Professor at University of Pittsburgh, Pittsburgh, PA.

Professional Activities

Professional Memberships

Fellow of the American Association for Advancement for Science (AAAS), Association for Computing Machinery (ACM), Institute of Electrical and Electronics Engineers (IEEE), and Society for Industrial and Applied Mathematics (SIAM). Lifetime member of the Association for the Advancement of Artificial Intelligence (AAAI) and member of the American Geophysical Union (AGU).

Advisory Boards and Site Visit/Review Panels

Advisory Board, Environmental Data Science, Cambridge University Press, 2021 - current
Technical Advisory Council, PLANET TEXAS 2050 (Grand Challenge project), University of Texas at Austin, 2018-
Scientific Advisory Panel on AI/ML for the Global Development Lab at USAID, 2018-2019. Review panel for Digital Technology Center, University of Minnesota, April 2019.
Leadership Council and Advisory Board, Institute for Research in Statistics and its Applications (IRSA), University of Minnesota, 2018-2019.
External Visiting Review Committee for Computational Science and Engineering graduate programs at College of Computing, Georgia Tech, 2017.
Member, National Academies Panel on Information Science at the Army Research Laboratory, 2015-2017.
Chair, Board of Visitors, Computer Science Division, the Army Research Office (ARO), 2012.
Member, Board of Visitors, Computer Science Division, the Army Research Office (ARO), 2010.
Chair, Board of Visitors, Mathematics Division, the Army Research Office (ARO), 2003.
Member, Modeling and Simulation Panel for the Department of Homeland Security's Science Based Threat Analysis and Countermeasures (STAC) Program Office Annual Program Review, Washington, DC, June 17, 2005.
Served on numerous advisory panels and site visit panels for NSF and Department of Energy.

Editor-in-Chief

Founding Co-Editor-in-Chief, Journal of Statistical Analysis and Data Mining (Wiley), 2006 - 2009.
Editor-in-Chief, IEEE Intelligent Informatics Bulletin, 2006 - 2009.
Series Editor, Data Mining and Knowledge Discovery Series, Chapman and Hall/CRC Press, 2006 - current.

Editorial Boards

Data Mining and Knowledge Discovery, 2005 - current.
Knowledge and Information Systems, 2000 - current.
Journal of Parallel and Distributed Computing (JPDC), 1994- current.
IEEE Transactions on Knowledge and Data Engineering (TKDE), 2008 - 2012.
International Journal of Data Mining and Bioinformatics (IJDMB), 2006-2011.
IEEE Computational Intelligence Bulletin, 2003 -2005.
Annual Review of Intelligent Informatics, 2002 - 2006. Parallel Computing, 1996 - 2006.
International Journal of Computational Science and Engineering, 2006 - 2010.
International Journal of High Performance Computing and Networking (IJHPCN), 2004 - current.
IEEE Concurrency, 1997 - 2000.
IEEE Parallel and Distributed Technology, 1995 - 1997.
IEEE Transactions on Knowledge and Data Engineering (TKDE), 1993- 1997.
Guest Editor, Parallel Computing, special issue on Numerical Optimization, 2003.
Guest Editor, Journal of Parallel and Distributed Computing, special issue on High Performance Data Mining, 1999.
Guest Editor, Journal of Parallel and Distributed Computing, special issue on scalability, September 1994.

Conference Advisory Boards/Steering Committees

Co-founder and steering committee chair, SIAM International Conference on Data Mining, 2001-2007; Steering Committee member, 2001- current.
Member of Board of Directors, ACM Special Interest Group on Bioinformatics (ACM SigBioinformatics) 2010- current.
Steering Committee Member, IEEE International Conference on Data Mining, 2002- current.
Member, Selection Committee for Editor-in-Chief of ACM Computing Surveys, 2012-13.
Steering Committee Member, IEEE International Conference on Bioinformatics and Biomedicine, 2007-2012.
Steering Committee Member, IEEE International Conference on Data Science and Advanced Analytics, 2014 - current.
Steering Committee Member, The International Conference on Computational Science and Its Applications, 2003 - 2007.
Advisory Committee member, IEEE Symposium on Foundations and Practice of Data Mining, 2010.
Executive Committee Member, IEEE Computer Society Technical Committee on Computational Intelligence, 2002 - 2009.
Advisory Board, Euro-Par (Annual European Conference on Parallel Computing), 2000.
Steering Committee of The International Conference on Communications in Computing (CIC'2000), 2000.
IEEE Technical Committee on Parallel Processing (TCPP), 1994-2001.

Conference and Workshop Chair/ Co-chair

Co-Chair, 2019 SIGKDD Conference on Knowledge Discovery and Data Mining, Anchorage, Alaska, USA, August 3-8, 2019.
Co-Chair, 2015 IEEE International Conference on Big Data (IEEE Big Data 2015), Santa Clara, CA, USA, October 29 - November 1, 2015.
Panel Chair, ACM SIGKDD-2007, the Thirteenth ACM SIGKDD International Conference on Knowledge Discovery and Data Mining, San Jose, August 12-15, 2007.
Honorary Chair, The International Conference on Computational Science and Its Applications, Singapore, May 9 - May 12, 2005.
Honorary Chair, The International Conference on Computational Science and Its Applications, Perugia, Italy, May 14 - May 17, 2004.
Co-Chair, ICDM Workshop on Data Mining for Computer Security (DMSEC), Melbourne, Florida, Nov 19-22, 2003.
Co-Chair, Workshop on Data Mining Middleware for the Grids, University of Minnesota Supercomputing Institute, September 18-19, 2003.
Honorary Chair, The International Conference on Computational Science and Its Applications, Montreal, Quebec, Canada, May 18 - May 21, 2003.
Program Chair, The 2002 IEEE International Conference on Data Mining, November, 2002.
Global Chair, Euro-Par 2002 Track on Applications of High Performance Computers, August 2002.
Program Chair, First SIAM International Conference on Data Mining, April 2001.
Keynote Chair, Seventh International Conference on High Performance Computing (HiPC01) (sponsored by the IEEE Computer Society), December 2001.
Program Chair, International Parallel and Distributed Processing Symposium, April 2001.
Co-Chair, KDD 2000 Workshop on Distributed and Parallel Knowledge Discovery, August 2000.
Co-Chair, IPDPS Workshop on High Performance Data Mining, May 1, 2000.
Keynote Chair, Seventh International Conference on High Performance Computing (HiPC00) (sponsored by the IEEE Computer Society), December 2000.
Co-Chair, Joint IMA/AHPCRC/MSI Workshop on Text Mining, April 2000.
Vice-Chair, Sixth International Conference on High Performance Computing (HiPC99) (sponsored by the IEEE Computer Society), December 1999.
Co-Chair, Workshop on Graph Partitioning and Applications, AHPCRC, University of Minnesota, October 14-15, 1999.
Co-Chair, Workshop on Mining Scientific Datasets, AHPCRC, University of Minnesota, September 9-10, 1999.
Vice-Chair, EuroPar 1999, Track on High Performance Data Mining, Toulouse, France, August 1999.
Co-chair, IMA Workshop on Challenges and Opportunities in Genomics Production, Storage, Mining and Use, University of Minnesota, April 26-28 1999.
Co-chair, Workshop on High Performance Data Mining, Tuesday April 16, 1999.
Vice-Chair, Fifth International Conference on High Performance Computing (HiPC98) (sponsored by the IEEE Computer Society), December 1998.
Co-Chair, IPPS Workshop on High Performance Data Mining, Tuesday March 31, 1998.
Co-Chair, AHPCRC Workshop on Unstructured Mesh Generation and Partitioning, October 6-7, 1997.
Global Chair, Euro-Par'97 Workshop on Scheduling and Load Balancing, August 1997.
Co-Chair, Symposium on Intelligent Technologies and Systems, October 1996.
Vice-Chair, the Ninth International Parallel Processing Symposium (IPPS) (sponsored by the IEEE Computer Society), April 1995.
Co-chair, The International Workshop on Parallel Processing for Artificial Intelligence, Chambéry, France (in conjunction with IJCAI-93), 1993.
Chair, Supercomputing 1992 Workshop on Analyzing Scalability of Parallel Algorithms and Architectures, Minneapolis, November 1992.
Vice-Chair, Third International Conference on Tools for Artificial Intelligence, 1991.
Co-Chair, Workshop on Parallel Computing of Discrete Optimization Problems, AHPCRC, University of Minnesota, 1991.
Co-chair, Workshop on Parallel Algorithms for Machine Intelligence and Pattern Recognition, St. Paul, Minnesota (sponsored by American Association for Artificial Intelligence), August 1988.
Co-chair, IJCAI-89 Workshop on Parallel Algorithms for Machine Intelligence, Detroit, Michigan (sponsored by American Association for Artificial Intelligence), August 1989.
Member, IEEE Technical Committee on Parallel Processing, 1992-.

Program Committees (incomplete)

AAAI Conference on Artificial Intelligence, 2011-2019.
IJCAI (International Joint Conference on Artificial Intelligence) 2013.
SIAM International Conference on Data Mining (SDM), 2001-2012.
ACM SIGKDD, the ACM SIGKDD International Conference on Knowledge Discovery and Data Mining, 2001-2013.
IEEE International Conference on Data Mining (ICDM) 2001-2011.
IEEE International Conference on Data Engineering (ICDE 2007), 2007.
The Eleventh Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD-07), 2007. International Conference on High Performance Computing (HiPC06) (sponsored by the IEEE Computer Society), December 2006.
AI Nectar track, AAAI 2006, Boston, July 16-20, 2006.

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The 35th International Conference on Parallel Processing (ICPP 2006), August 14-16, 2006.
 The Tenth Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD-06), Singapore, April 9-12, 2006.
 Supercomputing'2005, Seattle, WA, November 2005.
 International Conference on Parallel and Distributed Computing Systems (PDCS-2005), Phoenix, AZ, November 14-16, 2005.
 WebKDD'2005, August 2005.
 ICDM-2005, the Fifth IEEE International Conference on Data Mining, Houston, 27 - 30 November 2005.
 The Ninth Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD-05), Hanoi, Vietnam, April 2005.
 The First International Workshop on Autonomous Intelligent Systems - Agents and Data Mining, St. Petersburg, Russia, June 6-8, 2005.
 IEEE International Conference on Data Engineering (ICDE 2005), Boston, April 2005.
 IEEE International Conference on Data Mining, November 2004.
 2004 IEEE/WIC/ACM International Conference on Web Intelligence (WI 2004). WebKDD'2004, August 22, 2004.
 International Conference on Parallel Processing, August 2004.
 SIGMOD Workshop on Research Issues in Data Mining and Knowledge Discovery (DMKD 2004), June 2004.
 ACM SIGKDD-2004 (The Tenth ACM SIGKDD International Conference on Knowledge Discovery and Data Mining), Seattle, WA, August 22-25, 2004.
 The Eighth Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD-04), 26-28 May, 2004, Sydney, Australia.
 IEEE International Conference on Data Mining, November 2003.
 International Conference on machine Learning (ICML'03), Washington D.C. August 21-24, 2003.
 ACM SIGKDD-2003 (The Ninth ACM SIGKDD International Conference on Knowledge Discovery and Data Mining), Washington DC, August 24-27, 2003.
 WebKDD'2003, August 24, 2003.
 Workshop on Research Issues in Data Mining and Knowledge Discovery (DMKD 2003), June 2003.
 Proceedings of Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD)-2003, Seoul, Korea, May 2003.
 ACM SIGKDD-2002 (The Eighth ACM SIGKDD International Conference on Knowledge Discovery and Data Mining), Edmonton, Alberta, Canada, July 23-26th, 2002.
 WebKDD'2002, August 2002.
 ACM SIGKDD 2002 Workshop on Temporal Data Mining, August 2002.
 2nd IEEE International Symposium on Cluster Computing and the Grid (CCGrid2002), May 2002.
 Supercomputing'2001, November 2001.
 IEEE International Conference on Data Mining, November 2001.
 Workshop on Ubiquitous Data Mining (held at PKDD-2001), September 2001.
 IEEE Cluster 2001 conference, Newport Beach, October 2001.
 ACM SIGKDD-2001 Best Paper Award Evaluation Committee, August 2001.
 ACM SIGKDD-2001, August 2001.
 ACM SIGKDD Workshop on Temporal Data Mining, August 2001.
 WebKDD'2001, August 2001.
 KDD Workshop on Mining Scientific Data, August 2001.
 SIGMOD DMKD Workshop, 2001.
 SIAM Conference on Parallel Processing, March 2001.
 WebKDD-2000, August 2000.
 VECPAR 2000.
 PAREO '00 (Parallel Processing in Operations Research) Versailles, France, 2000.
 Heterogeneous Computing Workshop, May 2000.
 Workshop on Large-Scale Parallel KDD Systems, August 1999.
 Petaflops II, 1999.
 Supercomputing, 1999.
 SIGMOD DMKD Workshop, 1999.
 International Conference on Parallel Computing, 1999.
 International Parallel Processing Symposium, 1999.
 Symposium on Parallel Algorithms for Irregular Problems (Irregular'99), 1999.
 PAREO '98 (Parallel Processing in Operations Research) Versailles, France, 1998.
 Workshop on Advances in Parallel and Distributed Systems, October 20-23, 1998.
 IEEE Knowledge and Data Engineering Exchange Workshop (KDEX'98), Nov 98.
 2nd CANPC (Workshop on Communication and Architectural Support for Network-based Parallel Computing), February 1998.
 VECPAR'98, July 1998.
 International Parallel Processing Symposium, 1998.
 Petaflops Algorithms Workshop (PAL'97), April 1997.
 SIAM Conference on Parallel Processing, 1997.
 International Parallel Processing Symposium, 1996.
 International Conference on High Performance Computing, 1996.
 International Conference on Parallel Processing, 1996.
 International Parallel Processing Symposium, 1995.
 International Conference on High Performance Computing, 1995.
 International Conference on Parallel Processing, 1995.

International Parallel Processing Symposium, 1994.
International Conference on Parallel Processing, 1994.
National Conference on Artificial Intelligence (AAAI-93, AAAI-91, AAAI-90, AAAI-88, AAAI-87).
First International Workshop on Parallel Processing and AI, Sydney, Australia, 1991.
11th International Conference on Distributed Computing Systems, 1991.
National Conference on Logic Programming (NCLP-90, NCLP-89), 1989, 1990.
1989 AAAI Symposium on Search and Planning (sponsored by American Association for Artificial Intelligence), 1989.

Conference Panels

Machine Vision Panelist: USAID Advisory Panel, Big Data and Machine Learning for Development workshop, Washington DC, May 17, 2019.
Invited panelist, "Climate Change & AI: Present and potential role of AI in assessment and response.", 99th Annual meeting of the American Meteorological Society, Phoenix, January 9, 2019.
Invited panelist, "Physics guided ML: Emerging AI opportunities for weather and climate", 99th Annual meeting of the American Meteorological Society, Phoenix, January 9, 2019.
Invited panelist, "EnviroNet: ImageNet analog for environment & global AI challenge", 99th Annual meeting of the American Meteorological Society, Phoenix, January 9, 2019.
Invited Panelist, "Common Big Data Challenges in Bio, Geo, Climate, and Social Sciences", SC17 (The International Conference for High Performance Computing, Networking, Storage and Analysis), Denver, CO, November 16, 2017.
Invited Panelist, White House/OSTP workshop on Open Data Ecosystem for Neuroscience, July 2016.
Invited Panelist, "Climate Change and Big Data", American Association for Advancement of Science (AAAS) 2015 Annual Meeting, February 13, 2015.
Invited Panelist, "How can industry and academia collaborate on big data science challenges?", International Conference on Data Mining (ICDM), Shenzhen, China, December 17, 2014.
Invited Panelist, "Data Mining with Big Data", International Conference on Data Mining (ICDM), Dallas, TX, December 9, 2013.
Invited Panelist, "Big Data in 10 Years", International Parallel and Distributed Processing Symposium (IPDPS 2013), Boston, May 22, 2013.
Invited Panelist, "25th anniversary Panel: What's ahead for Parallel Computing", the IEEE International Parallel & Distributed Processing (IPDPS), Anchorage, Alaska, May 16-20, 2011.
Chair, Panel on Personalized medicine - Challenges and Opportunities for Informatics Research, ACM International Conference on Bioinformatics and Computational Biology, Niagara Falls, August 2-4, 2010.
Invited Panelist, "SDM@10 Anniversary Panel: Data Mining: A Decade of Progress and Future Outlook", The 2010 SIAM International Conference on Data Mining, Columbus, April 29-30, 2010.
Chair, Panel on "Perspectives on Research Directions and Trends for the Data Mining Research Community", The 2008 SIAM International Conference on Data Mining, Atlanta, April 24-26, 2008.
Co-Chair, Panel on Advanced Computing, The Army Science Conference, Orlando, Florida, December 5, 2002.
Panel Chair, Data Mining for Cyberthreat Analysis, Second SIAM International Conference on Data Mining, April 2002.
Panel Chair, "Data Mining: The new Frontier for Supercomputing" Supercomputing'99, Portland, Oregon, November 1999.
Panel Chair, "Information Power Grid: The New Frontier in Parallel Computing", International Parallel Processing Symposium, April 1999.
Panel Chair, "Data Intensive vs. Scientific Computing" at International Parallel Processing Symposium, April 1998.
Invited panelist at the 1997 International Conference on Parallel Processing (ICPP 97), on the panel on "Wide-spread acceptance of general-purpose large-scale parallel machines: fact, future, or fantasy?", 1997.
Invited panelist in the 7th SIAM Conference on Parallel Programming for Scientific Computing on the panel on "Is Scalable Parallel Computing a Myth?", San Francisco, February 1995.
Panel Chair, Future Directions in High Performance Computing, International Conference on High performance Computing, New Delhi, December 1995.
Invited panelist in the Fourth International Conference on Foundations of Data Organization and Algorithms, Evanston, Illinois, USA, October 1993.
Invited panelist on the panel "Scalability Analysis of Large Parallel Systems", 10th Army Math Conference, West Point, New York, June 1992.
Invited panelist on the panel "Applications of Parallel Symbolic Computing" at InfoJapan'90, Tokyo, October 1990.

Invited Plenary, Keynote and Distinguished Lectures

1. Keynote Speaker: Fragile Earth 2021, Virtual Conference via KDD2021, August 15, 2021.
2. Distinguished Speaker: New Jersey Institute of Technology, Newark NJ. March 3, 2021.
3. Keynote Speaker: 36th IEEE International Conference on Data Engineering, University of Texas, Dallas, TX. April 23, 2020.
4. Keynote at the First international conference of big data and machine learning in geosciences, The Federal Institute for Geosciences and Natural Resources (Germany), February 20, 2020.
5. InfoTech Distinguished Speaker Series, University of Florida, January 30, 2020.
6. Keynote Speaker: AI and Environment workshop, University of Illinois at Chicago, Chicago, IL, December 2, 2019.
7. Lecturer: PRAIRIE AI Summer School, Paris, France, October 2019.

8. Keynote Speaker, UF Informatics Institute Symposium, University of Florida, Gainesville, FL, October 11, 2019.
9. Keynote Speaker, International Conference on Information Management and Big Data (SIMBig). Lima, Peru, August 21, 2019.
10. Distinguished Lecture, Oak Ridge National Lab, Oak Ridge, TN. June 5, 2019.
11. Distinguished Speaker, Computer Science Department, UC Riverside, February 23, 2019.
12. Keynote Talk, Symposium on AI for Conservation, University of Southern California, February 8, 2019.
13. Distinguished Speaker, Integrative Data Science Initiative, Purdue University, December 3, 2018.
14. Keynote Talk, Data Science Leadership Summit, Park City, Utah, October 12, 2018.
15. Distinguished Lecture, (Information Science and Technology Center (ISTeC), Colorado State University, Fort Collins, September 19, 2018.
16. Distinguished Speaker, School of Computational Science and Engineering, Georgia Tech, March 2, 2018.
17. Distinguished Speaker, Computer Science Department, UCLA, January 25, 2018.
18. Distinguished Speaker: Inaugural Headwaters Lecture at the Water Resources Assembly and Research Symposium, University of Minnesota, January 19, 2018.
19. Keynote Talk, Workshop on Advanced Computing for Earth Sciences, Porto, Portugal, December 18-20, 2017.
20. Keynote talk, NASA Ames Machine Learning Workshop, 29-31 August 2017, Mountain View, CA.
21. Lead Speaker, Opening Workshop of the year long program at the Statistical and Applied Mathematical Sciences Institute (SAMSI) on Mathematical and Statistical Methods for Climate and the Earth System (CLIM) , Research Triangle Park, North Carolina, August 21-25, 2017.
22. Invited Speaker, Applied Data Science Track of KDD-2017: The 23rd ACM SIGKDD Conference on Knowledge Discovery and Data Mining, Halifax, Canada, August 14-17, 2017.
23. Grand Challenge Lecture at the 2017 Workshop on Big Data and the Earth Sciences, Scripps Institution of Oceanography, and the Pacific Research Platform (PRP), UC San Diego, May 31 - June 2, 2017.
24. Keynote Talk, xSIG: “Cross-disciplinary Workshop on Computing Systems, Infrastructures, and Programming”, Tokyo, Japan, April 24-26, 2017.
25. Distinguished Speaker, Computer Science Department, Michigan State University, April 14, 2017.
26. Distinguished Speaker, Computer Science Department, Texas A&M, January 30, 2017.
27. Thomson Reuters distinguished speaker series, November 28, 2017.
28. Distinguished Speaker Series, Computer Science Department, Arizona State University, October 2017.
29. Keynote Talk, SIGIR 2016 (39th ACM International Conference on Research and Development in Information Retrieval), Pisa, Italy, July 17-21, 2016.
30. Keynote Talk, CoDS: Conference on Data Science, Pune, India, March 14, 2016.
31. Keynote Talk, 5th FANNCO (Fuzzy and Neuro Computing) 2015, Hyderabad, December 19, 2015.
32. Distinguished Speaker Series, Computer Science Department, University of Toronto, November 5, 2015.
33. Plenary Talk, International Workshop on Machine learning, Optimization & big Data (MOD 2015), Taormina (Sicily), July 21 - 24, 2015.
34. Keynote Talk, SDM Workshop on Heterogeneous Learning, Vancouver, CA, May 2, 2015.
35. Keynote Talk, International Conference on Data Mining (ICDM), Shenzhen, China, December 13, 2014.
36. 2014 Annual Borchert Lecture, The University of Minnesota Geographic Information Science (GISc), November 19, 2014.
37. The eighth annual Borchert Lecture, November 14, 2014
38. Keynote Talk, Ocean’s Big Data Mining Workshop (OBIDAM14), Brest, France, September 8, 2014.
39. Keynote Talk, Eighteenth Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD-18), Tainan, Taiwan, May 15, 2014.
40. Keynote Talk, SDM Workshop on Optimization methods for Anomaly Detection, Philadelphia, April 26, 2014.
41. Distinguished Speaker Series, Computer Science Department, Penn State University, April 4, 2014.
42. Distinguished Speaker Series, Computer Science Department, University of Florida, March 21, 2014.
43. Distinguished Speaker Series, Computer Science Department, University of Oklahoma, January 24, 2014.
44. Distinguished Speaker Series, Computer Science Department, George Mason University, October 23, 2013.
45. Distinguished Speaker Series, University of California, Davis, January 2013.
46. Plenary Talk, SIGKDD Innovation Award Acceptance Speech, Beijing, August 12, 2012.
47. Plenary Talk, 2012 NASA Summer Short Course for Earth System Modeling and Supercomputing, July 2012.
48. Plenary Talk, Duke-ARO Workshop on Big Data, June 14-15, 2012.
49. Keynote Talk, SDM Workshop on Broadening Participation in Data Mining (BPDM 2012), Anaheim, April 28, 2012.
50. Keynote Talk, 23rd IEEE International Conference on Tools with Artificial Intelligence (ICTAI) Boca Raton, Florida, Nov. 7-9, 2011.
51. Keynote Talk, NGDM ’11: Next Generation Data Mining Summit, September 4, 2011, Athens.
52. Plenary Talk, NASA AIST Forum on Revolutionary Information Systems Technology & the Impact on Earth Science, Pasadena, June 21, 2011.
53. Keynote Talk, The annual Information and Computing Technology (ICT) Conference, the University at Buffalo, April 22, 2011.
54. Distinguished Speaker Series, Computer Science Department, UNC Charlotte, March 25, 2011.
55. Plenary Talk, SIAM Conference on Computational Science and Engineering (CSE11), March 2, 2011.
56. Distinguished Speaker Series, Computer Science Department, Temple University, April 21, 2010.
57. Keynote Talk, The 2010 International Conference on Electronic-Business Intelligence (ICEBI2010), Kunming, Yunnan, China, December 19, 2010.
58. Keynote Talk, International Workshop on Spatial and Spatiotemporal Data Mining (SSTD-10), Sydney, December 14, 2010.

59. Keynote Talk, NASA Conference on Intelligent Data Understanding (CIDU-2010), Bay Area, October 6, 2010.
60. Keynote Talk, The Fourteenth Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD-14), Hyderabad, June 24, 2010.
61. Keynote Talk, SIAM International Conference on Data Mining (SDM), Columbus, Ohio, April 29-May 1, 2010.
62. Keynote Talk, International Conference on Data Mining (ICDM), Miami, December 8, 2009.
63. Keynote Talk, The Second International Conference on Contemporary Computing (IC3 2009), Noida, India, August 19, 2009.
64. Distinguished Speaker Series, EECS Department, Northwestern University, June 3, 2009.
65. Distinguished Speaker Series, Oak Ridge national lab, May 18, 2009.
66. Keynote Talk, The 2008 International Conference on Computational Science and Applications (ICCSA 2008), University of Perugia, Perugia (Italy), June 30 - July 3, 2008.
67. Keynote Talk, International Conference on High Performance Computing (HiPC), Goa, India, December 18-21, 2007.
68. Keynote Talk, International Conference on Information Systems, Technology and Management, New Delhi, March 12-13, 2007.
69. Distinguished Speaker Series, University of Central Florida, May 2007.
70. Keynote Talk, The IEEE International Conference in Sensor Networks, Ubiquitous and Trustworthy Computing (SUTC 2006), Taichung, Taiwan, June 5th-7th, 2006.
71. Distinguished Speaker Series, University of California, Davis, February 16, 2006.
72. Keynote Talk, 17 International Conference on Parallel and Distributed Computing Systems (PDCS-2004), San Francisco, September 15-17, 2004.
73. Keynote Talk, 17th International Parallel and Distributed Processing Symposium, Nice, France, April 24, 2003.
74. Keynote Talk, 5th International Conference on High Performance Computing in Computational Sciences (VECPAR-2002), Porto, Portugal, June 27, 2002
75. Keynote Talk, The Sixth Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD-02), Taipei, May 7, 2002.
76. Keynote Talk, International Parallel Computing Conference (ParCo2001), Naples, Italy, September 2001.
77. Keynote Talk, Workshop on Patterns - Trends - Predictions, Delray Beach, FL, May 2001.
78. Keynote Talk, IRREGULAR'00, Cancun, Mexico, May 2000.
79. Keynote Talk, PAREO'98, Versailles, France, July 1998.
80. Keynote Talk, Petaflops Algorithms Workshop, Williamsburg, April 1997.
81. Plenary Talk, Stratagem'96, Nice, France, July 1996.
82. Plenary Talk, Parallel Optimization Colloquium, University of Versailles, France, March 1996.
83. Plenary Talk, Symposium on Parallel Algorithms for Irregular Problems (Irregular'94), Geneva, September 1994.
84. Plenary Talk, 16th IFIP Conference on System Modeling and Optimization, France, July 1993.
85. Plenary Talk, 10th Army Mathematics Conference, U.S. Military Academy, West Point, New York, June 1992.

Other Invited Talks

1. DSMMA Journal Club Seminar Talk, University of Minnesota, March, 2021.
2. Predicting Emergence of Virulent Entities by Novel Technologies (PREVENT), GA Tech, February 23, 2021.
3. Data Science Working Group Webinar Series, US Climate Variability and Predictability (CLIVAR), January 11, 2021.
4. AI for Atoms: How to Machine Learn STEM, Oak Ridge National Laboratory, December 9, 2020.
5. Tufts T-TRIPODS Seminar Series, Tufts University. November 5, 2020.
6. ECMWF-ESA Workshop on Machine Learning for Earth System Observation and Prediction, European Centre for Medium-Range Weather Forecasts, October 7, 2020.
7. TADS Seminar, Iowa State University. September 24, 2020.
8. JISEA 10th Annual Meeting, Joint Institute for Strategic Energy Analysis, August 3, 2020.
9. Invited Speaker at the Qatar Computing Research Institute, February 18, 2020.
10. 2019 Conference on Hydroinformatics, Brigham Young University, July 29, 2019.
11. Data-Driven Forecasting and Prediction for Energy Systems Workshop, National Renewable Energy Laboratory (NREL), July 10, 2019.
12. International Agriinformatics Alliance, University of Minnesota, May 30, 2019.
13. Consortium of Universities for the Advancement of Hydrologic Science (CUAHSI) 2019 Spring Seminar Series, May 3, 2019.
14. CESTA Seminar Series, March 26, 2019.
15. Earth and Environment Engineering Seminar Series, Columbia University, March 15, 2019.
16. Computational Sustainability Virtual Seminar Series, April 27, 2018.
17. AAAS Annual Meeting Session Finding Water Management Solutions With Artificial Intelligence, February 17, 2018.
18. Opening Workshop of the year long program at the Statistical and Applied Mathematical Sciences Institute (SAMSI) on Mathematical and Statistical Methods for Climate and the Earth System (CLIM), August 21, 2017.
19. Applied Data Science Track of KDD-2017: The 23rd ACM SIGKDD Conference on Knowledge Discovery and Data Mining, August 16, 2017.
20. MICDE Seminar at the University of Michigan, January 27, 2017.
21. Open Data Ecosystem for the Neurosciences (ODEN 2016), July 26, 2016.
22. Big Data Coursework for Computational Medicine (BDC4CM), July 12, 2016.
23. Sandia National Labs, May 19, 2016.

24. Mayo Clinic: Delivery Science Summit 2015, September 18, 2015.
25. Department of Computer Science, Penn State University, April 4, 2014
26. Department of Computer Science, University of Florida, March 21, 2014.
27. Department of Computer Science, George Mason University, October 23, 2013.
28. Interface Symposium 2013, April 15, 2013.
29. Topics in Atmospheric and Oceanic (TAOS) 2013, March 6, 2013.
30. AGU Fall Meeting, December 3, 2012.
31. 2012 Summer Short Course for Earth System Modeling and Supercomputing, July 20, 2012.
32. ARO Big Data at Large Workshop, June 14, 2012.
33. Scientific Data and Analytics for Extreme Scale Computing Workshop, July 27, 2011.
34. Earth Science Technology Forum (ESTF) in the special session on Revolutionary Information Systems Technology & the Impact on NASA Earth Science, June 21, 2011.
35. Draper Laboratory's Global Climate Monitoring Symposium, October 21, 2010.
36. US China Computer Science Leadership Summit, June 14-15, 2010.
37. Computer Science Department, Notre Dame University, January 21, 2010.
38. US/India Workshop on Geo-spatial Technologies and Applications, IIT Mumbai, December 16-18, 2009.
39. NSF Workshop on New Generation Data Mining, Baltimore, MD, November 1, 2009.
40. CompSust09: 1st International Conference on Computational Sustainability, Cornell University, June 8, 2009.
41. Conference on Intelligent Data Understanding (CIDU), September 9, 2008.
42. Mathematics for Analysis of Petascale Data, June 2, 2008.
43. IEEE Data Mining Forum 2008, Hong Kong, May 28-29, 2008.
44. Honeywell ACS Fellows Symposium, Minneapolis, October 3, 2007.
45. New Generation Data Mining Workshop, Baltimore, October 10-12, 2007.
46. NOAA Interdisciplinary Scientific Environmental Technology Center (ISET), NCAT, Greensboro, April 2007.
47. IBM T.J. Watson Research Center, August 12, 2006.
48. NSF workshop on Cyber infrastructure in Materials Science, August 4, 2006.
49. Workshop on Edge Computing using New Commodity Architectures, UNC Chapel Hill, May 23-24, 2006.
50. 2006 AMS-IMS-SIAM Summer Conference on Machine and Statistical Learning, Snowbird, Utah, June 24-28, 2006.
51. Indian Institute of Technology, Roorkee, December 27, 2005.
52. Indian Institute of Technology, Delhi, December 22, 2005.
53. School of Computer Engineering, Nanyang Technological University, May 10, 2005.
54. The Air Force Research Laboratory (AFRL), Wright Patterson Air Force Base, Dayton, Ohio, September 30, 2004.
55. Transformation and Operations in Cyberspace (TOPS in Cyberspace) Conference Hamilton College, Clinton, NY and AFRL/IF in Rome, NY, June 15-17, 2004.
56. NSF Workshop on Information Technology, Islamabad, Pakistan, December 23-24, 2003.
57. IBM India Research Laboratory, New Delhi, December 17, 2003.
58. ExxonMobil's Corporate Strategic Research Laboratories, October 3, 2003.
59. Workshop on Satellite Data Applications and Information Extraction, August 20-21, 2003.
60. Minnesota High-Technology Association, Minneapolis, June 18, 2003.
61. NSF Workshop on Next Generation Data Mining, November 1-2, 2002.
62. University of Maryland, Baltimore, March 22, 2002.
63. IPAM, UCLA, January 2002.
64. IEEE International Conference on Cluster Computing (Cluster 2001), Newport Beach, October 8-11, 2001.
65. Ohio State University, November 8, 2001.
66. Joint Statistical Meetings, 2001, session on large-scale scientific data mining, Atlanta, August 2001.
67. Sixth U.S. National Congress on Computational Mechanics, Minisymposium on Dynamic Load Balancing for Adaptive Computations, August 1-4, 2001.
68. The 2001 International Conference on Computational Science, session on Novel Models for Parallel Computation, San Francisco, May 2001.
69. University of Florida, January 2001.
70. Illinois Institute of Technology, December 2000.
71. ECE Department, University of Minnesota, November 2000.
72. First SIAM Conference on Computational Science and Engineering, Washington DC, September, 2000.
73. Minisymposium on parallel adaptive computation, Washington University, St. Louis, May 2000.
74. IMA Workshop Resource Recovery, Minneapolis, February 2000.
75. Virginia Tech, Blacksburg, January 2000.
76. International Bioinformatics Conference, Seattle, September 1999.
77. Summer Institute on Advanced Computation, Dayton, Ohio, August 1999.
78. KDD Workshop on Parallel and Distributed Data Mining, August, 1999.
79. University of Illinois, August, 1999.
80. ARL Tech Advisory Board Review, June 1999.
81. Carlson School of Management, University of Minnesota, February 26, 1999.
82. Petaflops II Conference, Santa Barbara, CA, February 18, 1999.
83. NASA Goddard Space Flight Center, December 4, 1998.
84. University of California, Riverside, November 23, 1998.

85. Lawrence Livermore National Lab, CASC Group, November 5, 1998.
86. Lawrence Livermore National Lab, Dyna3D Group, October 23, 1998.
87. Workshop on Advances in Parallel and Distributed Systems, Purdue University, October 20, 1998.
88. West Publishing Company, Eagan, September 9, 1998.
89. PAREO'98, Versailles, France, July 8, 1998.
90. Petaflops systems Operations Working Review Workshop, Bodega Bay, June 1998.
91. DIMACS Workshop on Performance Data Mining, Princeton, April 27, 1998.
92. State University of New York, Buffalo, April 17, 1998.
93. ICPP Panel on "Wide-spread acceptance of general-purpose large-scale parallel machines: fact, future, or fantasy?", Chicago, August 1997.
94. ASAE Technical Session on Parallel processing and its application for image processing, August 10, 1997.
95. NSF Summer School, University of Missouri-Rolla, June 23, 1997.
96. GTE Labs, June 13, 1997.
97. IMA Workshop on Discrete Optimizations, Minneapolis, May 1997.
98. University of Texas, San Antonio, Computer Science Department, May 2, 1997.
99. Lawrence Livermore National Lab, April 24, 1997.
100. Petaflops Algorithm Workshop, Williamsburg, April 14, 1997.
101. SIAM Conference on Parallel Processing, Minisymposium on Message Passing, March 1997.
102. Purdue University, Computer Science Department, February 10, 1997.
103. IMA Workshop on Data Mining, Minneapolis, November 1996.
104. Los Alamos National Lab, September 4, 1996
105. Workshop on Parallel Unstructured Grid Computations, Argonne National Lab, September 1996.
106. PetaFlop Software Summer Study, Bodega Bay, CA, June 1996.
107. NAS Group, NASA Ames, June 4, 1996.
108. ICASE Workshop on Computational Electromagnetics and its Applications, Newport News, May 1996.
109. University of Iowa, November 1995.
110. Minisymposium at the SIAM National Meeting, October 1995.
111. RCI Conference, Washington DC, October 30-31, 1995.
112. IEEE Chapter, St. Louis, October 1995.
113. PetaFlop Workshop, Bodega Bay, CA, August 1995.
114. Nordic Summer School on Parallel Processing, Sweden, August 1995.
115. ICASE, NASA Langley, July 1995.
116. U.S. Army Waterways Experiment Station, Jackson, MS, July 1995.
117. TARDEC, Detroit, MI, May 1995.
118. IBM T. J. Watson Research Center, Yorktown Heights, June 1994.
119. Army Research Lab, Aberdeen, MD, April 1994.
120. ARPA Fellows Workshop, Portland, Oregon, November 1993.
121. Fall ORSA/TIMS conference in Phoenix, AZ, Nov 1993.
122. ICASE, NASA, Norfolk, VA, May 1993.
123. Army Research Office Workshop on "Virtual, Distributed, Interactive Simulation", Research Triangle Park, May 1993.
124. DIMACS Workshop on Quadratic Problem and Related Problems, Princeton, New Jersey, May 1993.
125. Hewlett Packard Research Labs, February 1993.
126. Center for Supercomputing Development (CSRSD), University of Illinois, November 1992.
127. Siemens Corporate Research Inc., June 1992.
128. First International Workshop on Parallel Algorithms for Machine Intelligence, held in conjunction with IJCAI-91, Sydney, August 1991.
129. U.S. Army Workshop on the Role of AI and Simulation in Modelling of Complex Systems, Falls Church, Virginia, July 1991.
130. Workshop on Distributed Computing, Supercomputing Research Center, Maryland, June 1991.
131. Army Artificial Intelligence Center Meeting, University of Pennsylvania, December 1990.
132. Institute for New Generation Computing Technology, Tokyo, October 1990.
133. US/Japan Panel on Research on Parallel Logic Programming (sponsored by NSF and ICOT), Tokyo, September 1990.
134. High performance Computing Seminar, sponsored by Concept Analysis Agency, Falls Church, April 1990.
135. Army High performance Computing Research Center, Minneapolis, July 1990.
136. Computer Science Department, Washington University, St. Louis, February 1989.
137. Microelectronics and Computer Technology Corporation, Austin, June 1989.
138. IEEE Computer Society Workshop on Artificial Intelligence for Computer Vision, San Diego, June 1989.
139. US/Japan Panel on Research on Parallel Logic Programming, Argonne National Lab, October 1989.
140. Butterfly Parallel Processing Seminar, Houston, Texas, April 5, 1988.
141. IBM T.J. Watson Research Center, Yorktown Heights, New York, January, 1988.
142. IEEE Computer Society, Dallas Chapter, October 1987.
143. Computer Science Department, University of Maryland, College park, December 1987.

United States Patents

Issued

- US7668843B2: Identification of anomalous data records (granted 2010, expires 2026)
- US8958603B2: Automated Mapping Land Cover Change Using Sequences of Aerial Imagery (granted 2015, expires 2033)
- US9430839B2: Unsupervised Framework to Monitor Lake Dynamics (granted 2016, expires 2035)
- US9478038B2: An Unsupervised Spatio-Temporal Data Mining Framework for Burned Area (granted 2016, expires 2035)
- US20160314411A1: Classification of Highly-Skewed Data (granted 2020, expires 2039)
- US20190057245A1: Satellite image classification across multiple resolutions and time using ordering constraint among instances (granted 2021, expires 2039)
- US20190303703A1: Predicting land covers from satellite images using temporal and spatial context (granted 2021, expires 2039)

Pending

- US20190303713A1: Discovery of shifting patterns in sequence classification (filed 2018, pending 2020)
- US20190057183A1: Machine based classifier for genetic interactions (filed 2017, pending 2020)

Books

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2. Top-10 Algorithms in Data Mining, edited by Xindong Wu and Vipin Kumar, Chapman & Hall/CRC - Data Mining and Knowledge Discovery Series, Spring 2009.
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4. Introduction to Data Mining, Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Addison-Wesley ISBN: 0321321367, April 2005. Chinese translation: 2005, Korean Translation: 2007.
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10. Parallel Processing for Artificial Intelligence, Volume 1, edited by Laveen Kanal, Vipin Kumar, Hiroaki Kitano and Christian B. Suttner, North-Holland, June 1994.
11. Parallel Processing for Artificial Intelligence, Volume 2, edited by Hiroaki Kitano, Vipin Kumar, and Christian B. Suttner, North-Holland, July 1994.
12. Parallel Algorithms for Machine Intelligence and Vision edited by V. Kumar, P.S. Gopalkrishnan, and L. Kanal, Springer-Verlag, March 1990.
13. Search in Artificial Intelligence, edited by Laveen Kanal and Vipin Kumar, Springer-Verlag, 1988.

Refereed Journal Articles

1. X. Jia, J. Willard, A. Karpatne, J. Read, J. Zwart, M. Steinbach, V. Kumar. Physics-Guided Machine Learning for Scientific Discovery: An Application in Simulating Lake Temperature Profiles. **ACM Transactions on Data Science** (Accepted for publication) 2021.
2. Y. Gil, D. Garijo, D. Khider, C. Knoblock, V. Ratnakar, M. Osorio, H. Vargas, M. Pham, J. Pujara, B. Shbita, B. Vu, Y.-Y. Chiang, D. Feldman, Y. Lin, H. Song, V. Kumar, A. Khandelwal, M. Steinbach, K. Tayal, S. Xu, S. Pierce, L. Pearson, D. Hardesty-Lewis, E. Deelman, R. F. da Silva, R. Mayani, A. Kermanian, Y. Shi, L. Leonard, S. Peckham, M. Stoica, K. Cobourn, Z. Zhang, C. Duffy, and L. Shu. Artificial Intelligence for Modeling Complex Systems: Taming the Complexity of Expert Models to Improve Decision Making. **ACM Transactions on Interactive Intelligent Systems**, (Accepted for publication) 2021.
3. Z. Wei, K. Jia, X. Jia, A. Khandelwal, V. Kumar. Global River Monitoring Using Semantic Fusion Networks. **Water**, 12(8):2258, 2020. <https://doi.org/10.3390/w12082258>

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6. X. Jia, A. Khandelwal, K. M. Carlson, J. S. Gerber, P. C. West, L. H. Samberg, V. Kumar. Automated Plantation Mapping in Southeast Asia Using MODIS Data and Imperfect Visual Annotations. **Remote Sensing**, 2020, 12(4), 636; DOI: 10.3390/rs12040636
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5. I. Melnyk, P. Yadav, M. Steinbach, J. Srivastava, V. Kumar, A. Banerjee: Detection of Precursors to Aviation Safety Incidents Due to Human Factors. **Proceedings of International Conference on Data Mining Workshops 2013**: 407-412 November 2013.
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Panel Reports and Other Invited Articles

1. Ulrich Rude, Karen Willcox, Lois Curfman McInnes, Hans De Sterck, G. Biroso, Hans-Joachim Bungartz, J. Coronas, Evin Cramer, J. Crowley, Omar Ghattas, Max Gunzburger, M. Hanke, R. J. Harrison, M. A. Heroux, Jan Hesthaven, Peter K. Jimack, C. Johnson, K. E. J., D E. Keyes, Rolf H. Krause, V. Kumar, S. Mayer, Juan Meza, Knut M. Morken, J. Tinsley Oden, Linda R. Petzold, Padma Raghavan, S M. Shontz, Anne E. Trefethen, Peter R. Turner, Vladimir Voevodin, Barbara I. Wohlmuth, Carol S. Woodward: Research and Education in Computational Science and Engineering. CoRR abs/1610.02608, 2016.
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3. G. Atluri, R. Gupta, G. Fang, G. Pandey, M. Steinbach and V. Kumar, Association Analysis Techniques For Bioinformatics Problems, *Proceedings of the 1st International Conference on Bioinformatics and Computational Biology (BICoB)*, (invited article) April 2009.

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6. Thoughts on Parallel Processing in *Byte (special issue on Multiprocessing)*, Vol. 10, No. 5, May 1985.

Book Chapters

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2. A. Karpatne, J. Faghmous, J. Kawale, L. Styles, M. Blank, V. Mithal, X. Chen, A. Khandelwal, S. Boriah, K. Steinhaeuser, M. Steinbach, and V. Kumar, **Earth science applications of sensor data**, In *Managing and Mining Sensor Data*, C. Aggarwal (Ed.), Springer, 505–530, 2013. DOI:10.1007/978-1-4614-6309-2_15.
3. C. Kamath, N. Wale, G. Karypis, G. Pandey, V. Kumar, **Scientific Data Analysis**, in *Scientific Data Management: Challenges, Existing Technology, and Deployment*, A. Shoshani and D. Rotem (Eds.), CRC Press, 2009.
4. S. Boriah, V. Kumar, M. Steinbach, P.-N. Tan, C. Potter, and S. Klooster, **Detecting ecosystem disturbances and land cover change using data mining**, in *Next Generation of Data Mining*, H. Kargupta, J. Han, P. Yu, R. Motwani, and V. Kumar (Eds.), CRC Press, 2009.
5. M. Steinbach, P.-N. Tan, H. Xiong, and V. Kumar, **Objective measures for Association Pattern Analysis**, in *Proceedings of the AMS-IMS-SIAM Joint Summer Research Conference on Machine Learning and Statistical Learning: Prediction and Discovery*, Verducci, Shen, and Lafferty (Eds.), American Mathematical Society, 2007.
6. V. Chandola, E. Eilertson, L. Ertoz, G. Simon and V. Kumar, **Data Mining for Cyber Security**, in *Data Warehousing and Data Mining Techniques for Computer Security*, editor Anoop Singhal, Springer, 2007.
7. A. Lazarevic, V. Kumar, and J. Srivastava, **A Survey of Intrusion Detection Systems**, in *Managing Cyber Threats: Issues, Approaches and Challenges*, edited by V. Kumar, J. Srivastava, and A. Lazarevic, Kluwer Academic Publishers, May 2005.
8. V. Kumar, P. Tan, M. Steinbach, **Data Mining**, in *Handbook of Data Structures and Applications*, editors: D. Mehta and S. Sahni, Chapman & Hall/CRC Press. 2005.
9. P. Zhang, M. Steinbach, V. Kumar, S. Shekhar, P.-N. Tan, S. Klooster, C. Potter, **Discovery of Patterns of Earth Science Data Using Data Mining**, M. Kantardzic and J. Zurada (editors) in *Next Generation of Data Mining Applications*, Wiley-IEEE Press, March 2005.
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11. M. Steinbach, L. Ertoz, and V. Kumar, **Challenges of Clustering High Dimensional Data**, in *New Directions in Statistical Physics - Applications in Econophysics, Bioinformatics, and Pattern Recognition*, L. T. Wille (editor), Springer-Verlag, 2004.
12. L. Ertoz, E. Eilertson, A. Lazarevic, P. Tan, J. Srivastava, V. Kumar, P. Dokas, **MINDS - Minnesota Intrusion Detection System**. In *Data Mining: Next Generation Challenges and Future Directions*, editors: H. Kargupta, A. Joshi, K. Sivakumar, and Y. Yesha MIT/AAAI Press, 2004.
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17. M. V. Joshi, E-H. Han, G. Karypis, and V. Kumar, **Parallel Algorithms for Data Mining**, J. Dongarra, I. Foster, G. Fox, W. Gropp, K. Kennedy, L. Torczon, and A. White (editors) in *Sourcebook of Parallel Computing*, Morgan Kaufmann, 2002.
18. K. Schloegel and G. Karypis and V. Kumar, **Graph Partitioning for High Performance Scientific Simulations** J. Dongarra, I. Foster, G. Fox, W. Gropp, K. Kennedy, L. Torczon, and A. White (editors) in *Sourcebook of Parallel Computing*, Morgan Kaufmann, 2002.
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20. M. Joshi, V. Kumar, G. Karypis, A. Gupta, F. Gustavson, **An Efficient and Scalable Parallel Sparse Direct Solver**, in *Parallel Numerical Computations with Applications*, T. Yang (ed.), Kluwer International Series in Engineering and Computer Science, Vol. 515, September 1999.
21. E-H. Han, G. Karypis, V. Kumar and B. Mobasher, **Hypergraph-based Clustering in High Dimensional Data Sets: A Summary of Results**, *Bulletin of the Technical Committee on Data Engineering*, Volume 21, Number 1, March 1998.
22. M. Gini, D. Challou, D. Boley, V. Kumar, C. Olsen, **Parallel Search Algorithms for Robot Motion Planning**, *Practical Motion Planning in Robotics* Edited by K. Gupta and A. del Pobil, John Wiley and Sons, Ltd. 1998.
23. A. Grama, V. Kumar and A. Sameh, **Parallel Hierarchical Solvers and Preconditioners for Boundary Element Methods**, *Computational Electromagnetics and Its Applications* Edited by T. G. Campbell, R. A. Nicolaides, and Manuel D. Salas, Kluwer Academic Publisher, 1997, Volume 5 in ICASE/LARC Interdisciplinary Series in Science and Engineering.
24. A. Gupta, G. Karypis and V. Kumar, **Scalable Parallel Algorithm for Sparse Linear Systems**, *Parallel Computing in Optimization* Edited by A. Migdalas, P. M. Pardalos, and S. Stroy, Kluwer Academic Publisher, 1997.
25. V. Kumar, A. Grama A. Gupta, and G. Karypis **Scalable Parallel Algorithm for Unstructured Problems** *Parallel Algorithms for Irregular Problems: State of the Art*. Edited by A. Ferreira and J. Rolim, Kluwer Academic Publisher, 1995.
26. D. Challou, M. Gini, and V. Kumar, **Toward Real-Time Motion Planning**, *Parallel Processing for Artificial Intelligence* Volume 2 H. Kitano, V. Kumar, and C.B. Suttner (editors), Elsevier Science Publ, pp 163-175, 1994.
27. YA. Grama V. Kumar, P. Pardalos **Parallel Processing of Discrete Optimization Problems** in *Encyclopedia of Microcomputers*, John Wiley & Sons, 1993.
28. V. Kumar and L. Kanal. **The CDP: A Unifying Formulation For Heuristic Search, Dynamic Programming, and Branch & Bound Procedures**, *Search in Artificial Intelligence*, edited by L. Kanal and V. Kumar, Springer Verlag, 1988, pp. 1-27.
29. V. Kumar, D. Nau, D. and L. Kanal. **A General Branch-and-Bound Procedure for AND/OR Graph and Game Tree Search**. *Search in Artificial Intelligence*, edited by L. Kanal and V. Kumar, Springer Verlag, 1988, 91-130.
30. **Branch-and-Bound Search** in *Encyclopedia of Artificial Intelligence (second edition)* John Wiley & Sons, 1992, pp 1468-1472. An earlier version appeared in *Encyclopedia of Artificial Intelligence* John Wiley & Sons, 1987.
31. **Depth-First Search** in *Encyclopedia of Artificial Intelligence (second edition)* John Wiley & Sons, 1992, pp 1473-1473. An earlier version appeared in *Encyclopedia of Artificial Intelligence* John Wiley & Sons, 1987.

Software Systems, Datasets, and Other Publications

The MINDS (Minnesota Intrusion Detection System) project at the AHPARC is developing a suite of data mining techniques to automatically detect attacks against computer networks and systems. MINDS is currently being used to monitor over 40,000 computers at the University of Minnesota. In addition, it is an integral part of the Army's Interrogator architecture that is used to analyze network traffic from multiple DOD sites around the country at the Army Research Laboratory's Center for Intrusion Monitoring and Protection. MINDS routinely detects novel intrusions, policy violations and insider abuse that are missed by other widely used tools. A NSF's (NSF) news clip on MINDS is available at <http://www.nsf.gov/od/lpa/news/04/tip040414.htm>.

PSPASES, an MPI-based portable library for computing Cholesky factorization of large sparse, has been used to solve some of the largest sparse linear systems that have been solved using direct methods.

Metis/ParMetis/hMetis (Serial and parallel graph-partitioning libraries developed by Kumar's group are extensively used world-wide at academic institutions, national research labs (e.g., Los Alamos, Sandia, Lawrence Livermore, Army Research Lab, JPL), and commercial organizations under licensing agreement (e.g., HP, SUN, IBM, SGI, Boeing, Ford, Rockwell, NEC, Centric, Ansys, MSC, HKS, AEA, Adapco, Altair, CSAR, STAR Inc., NAG). These libraries have enabled parallel execution of some of the largest computational simulations performed to date, and are routinely included in various Unix distributions such as FreeBSD and Linux. In Fall 1996, the Army Research Office published a brochure on Metis celebrating its success in technology transfer, and summarizing its research accomplishments.

1. Mahesh Joshi, George Karypis, Vipin Kumar, and Anshul Gupta, "PSPASES: Scalable Parallel Direct Solver Library for Sparse Symmetric Positive Definite Systems (Version 0.0beta)". Tech Report 97-059, department of computer science, University of Minnesota, 1997.
2. George Karypis, Kirk Schloegel, and Vipin Kumar, "ParMETIS: Parallel Graph Partitioning and Sparse Matrix Ordering Library (Version 1.0)". Tech Report 97-060, department of computer science, University of Minnesota, 1997.
3. George Karypis and Vipin Kumar, "METIS: A Software Package for Partitioning Unstructured Graphs, Partitioning Meshes, and Computing Fill-Reducing Orderings of Sparse Matrices (Version 3.0.3)". Tech Report 97-061, department of computer science, University of Minnesota, 1997.

Recent Major Department/University Service Activities

Service Contributions to the Department:

- Mentoring Committee, Catherine Zhao, 2015-2020
- WPE Committee, 2019-2020
- Awards Committee, 2018-2019, 2020-2021

- Graduate Affairs Committee, 2016-2017

Service Contributions to the University:

- Review committee for the Digital Technology Center, 2019
- Review committee for the Research Computing component of the Office of the Vice President for Research (MSI, UMII, U-Spatial), 2019
- MSI Advisory Committee, 2015-2021
- UMII Executive Committee, 2015-2019
- Leadership Council and Advisory Board, Institute for Research in Statistics and its Applications (IRSA), University of Minnesota, 2018-2019
- Chair, Committee to review Minnesota Super-computing Institute (MSI), 2015
- Search committee for the Director for Institute for health Informatics (IHI), 2013-2015
- Information Exchange oversight committee for Clinical and Translational Science Institute (CTSI), 2010-15
- Steering Committee, University of Minnesota Informatics Institute (UMII), 2010-2014
- The Neuroscience Visioning initiative organized by UMN OVPR, 2014-15
- The CSE Dean search committee 2015-16
- Review panel, grand challenge projects, 2016
- Mentoring committees of a number of faculty members in AHC, 2005-2020

External Service (see resume section on Advisory Boards and Site Visit/Review Panel):

- Review panel for Data Science PhD program, Oklahoma University, 2021
- Review panel, ACM Eugene L. Lawyer Award, 2021
- Review panel for SLOAN Research Foundation, 2020
- Review panel for NSF Expedition in Computing program, 2020
- Committee member SIGKDD Innovation/Service/Rising Star awards selection, 2020-current
- Review panel, ACM India Early CAREER Award, 2020 - current
- Panelist at the Water Summit organized by Novo Nordisk Foundation to formulate a research agenda for addressing global water challenges, 2020
- Review panel for Qatar Computing Research Institute (QCRI), 2020
- General Co-Chair for the 2018 ACM SigKDD conference (the largest data science conference – attended by well over 3000 people)
- Advisory council of UT Austin’s grand challenge research program, Planet Texas 2050 (PT2050), 2018-current
- Scientific Advisory Panel for USAID, Global Development Lab, 2019
- CCC AI Roadmap Workshop (one of the three workshops organized by CCC and NSF to create a roadmap for AI research in the US for the next 20 years), January 2019
- Review Panel for Georgia Tech, School of Computational Science, 2018