

Brian D. Davison, Ph.D.

Professor and Department Chair

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Research Areas Data Science; Information Search, Ranking, Retrieval and Prediction; Datasets; World Wide Web; Text Mining; Online Social Networks; Adversarial Information Retrieval

Professional Experience DEPT. OF COMPUTER SCIENCE & ENGINEERING, LEHIGH UNIVERSITY Bethlehem, PA
Department Chair (2022 – present)
Professor with tenure (2021 – present)
Founding co-director, Master’s Program in Data Science (Spring 2022)
Associate Director, Institute for Data, Intelligent Systems, and Computation (2020 – 2022)
Associate Professor with tenure (2009 – 2021)
Assistant Professor (2002 – 2009)
Instructor (2001 – 2002)

FACEBOOK Menlo Park, CA
Visiting Professor, Core Data Science group, while on sabbatical from Lehigh (2013-2014)

Education RUTGERS, THE STATE UNIVERSITY OF NEW JERSEY New Brunswick, NJ
Ph.D., Computer Science, October 2002
M.S., Computer Science, May 1995

BUCKNELL UNIVERSITY Lewisburg, PA
Major: Computer Engineering
Bachelor of Science in Engineering, cum laude with dept. honors, May 1991

Selected Current Research Projects DNA-NANOCARBON HYBRID MATERIALS FOR PERCEPTION-BASED, ANALYTE-AGNOSTIC SENSING OF DISEASE
2023 – present *PI: A. Jagota; Co-PIs include B.D. Davison*

This multi-disciplinary and multi-university effort utilizes DNA carbon nanotube structures and machine learning to sense the presence of analytes in solution to detect disease state. This work is supported in part by grants from NIH and from NSF.

DYNAMICS OF PANDEMIC SPREAD AND PREVENTION IN INDIGENOUS COMMUNITIES
2022 – present *PI: A. Jagota*

This large, multi-disciplinary effort investigates many aspects of disease modeling, prediction and prevention for indigenous communities at different scales (community, individual, cellular). This work is supported by NSF.

Selected Past Research Experience DATASET DISCOVERY, ACCESS, AND RETRIEVAL FOR CROSS-DISCIPLINARY RESEARCH
2017 – 2022 *PI: Brian D. Davison; Co-PIs: J. Heflin and H. Jia*
With society’s increasing ability to sense, capture and store data, along with open data initiatives and increased funding agency requirements for sharing data, more data are now publicly available.

Researchers, professionals and decision-makers are working with data in innovative ways, not only at unprecedented scales, but more importantly across different fields and domains. It is difficult, however, for domain non-experts such as data journalists to know about all the datasets available in a given field, and impossible even for experts to know about datasets in other fields, which is becoming essential in interdisciplinary work. We have combined our strengths in data science, information retrieval, federating heterogeneous data sources, management of structured and semi-structured data, and user studies to create novel approaches to dataset search. Existing efforts are domain-specific, or are shallow, searching only the descriptions of the data, and so there are significant research opportunities to answer questions on how to generalize and scale such efforts. In this project, we learn from dataset searchers, propose novel interfaces, and create a useful prototype that indexes descriptions and content of datasets. This work was initially funded by an internal Lehigh seed research grant, and then by NSF award IIS-1816325.

SIGNALS FOR IP GEOLOCATION
2014 – 2020

IP geolocation databases map IP addresses to their geographical locations. These databases are important for several applications such as local search engine relevance, credit card fraud protection, geotargetted advertising, and online content delivery. While they are the most popular method of geolocation, they can have poor accuracy at the city level. In this work we evaluate and improve IP geolocation databases using a variety of signals, such as those collected from search engine logs and reverse DNS hostnames. We generate a large ground-truth dataset using real time global positioning data extracted from search engine logs. We show that incorrect geolocation information can have a negative impact on implicit user metrics. We investigate techniques to improve upon geolocation databases, and validate our approaches with large scale ground truth data.

PROBABILISTIC RESILIENCE ASSESSMENT OF INTERDEPENDENT SYSTEMS (PRAISYS)
2015 – 2020

PI: P. Bocchini, Co-PIs include B.D. Davison

After a disruptive extreme event, such as an earthquake or severe storm, the socio-economic recovery of the affected region depends on the recovery of its infrastructure systems. Lifelines, such as power and water distribution systems, transportation networks, communication systems, and critical buildings have a primary role in disaster response, management, and long-term recovery. The failure to rapidly restore the services required for personal, social, and commercial activities leads to continued socio-economic losses and progressive depopulation. This collaborative project brings together scholars in Civil Engineering, Systems Engineering, Computer Science, Economics, Urban Planning, and Policy Making. Its purpose is to establish and demonstrate a comprehensive framework that combines models of individual infrastructure systems with models of their interdependencies for the assessment of interdependent infrastructure system resilience for extreme events under uncertainty. The “PRAISys” platform (Probabilistic Resilience Assessment of Interdependent Systems) will emphasize a probabilistic approach that permeates all aspects of the models, including the interdependencies. Some types of uncertainties that were not considered before (e.g., the possibility of using contingency plans that provide services without functioning infrastructure) will be classified; while mathematical and computational tools will be devised to capture their characteristics. PRAISys will enable better management and design of next generation infrastructure, more resilient to extreme events and to component failures under normal conditions. This will reduce the likelihood of extreme events becoming catastrophic in terms of casualties and injuries, long-lasting socio-economic losses, and environmental impact. This work has been funded by NSF award ENG-1541177.

ARCHIVAL SEARCH
2008 – 2012

PI: Brian D. Davison; Co-PI: T. Suel (NYU)

Historical collections of web content are of tremendous value in preserving records of significant

aspects of modern society. This research project investigated efficient and effective approaches to store, index, mine and retrieve web content from large-scale historical archives. This work was collaborative with Torsten Suel (NYU Polytechnic) and the Internet Archive and was funded by NSF award IIS-0803605.

CONTEXTUAL LINK ANALYSIS
2005 – 2012

PI: Brian D. Davison

A web link or scholarly citation is never created in a vacuum. Yet traditional link analysis (such as PageRank) calculates estimates of authority regardless of the context of the link. As a result, a page that is highly ranked for one topic may also be highly ranked for another topic in which it is not authoritative. In this work we incorporate document context (such as topicality) to “color” the links and thus calculate the context-specific reputation for a document. This work has been funded by an NSF CAREER award IIS-0545875, and by an equipment grant from Sun Microsystems.

SEARCH ENGINE SPAM IDENTIFICATION AND ELIMINATION
Summer 2004 – 2011

PI: Brian D. Davison

In this effort we worked to identify and/or reduce the effects of various kinds of search engine spam. By analyzing the link graph of the Web, we can identify particular spamming techniques and eliminate their effect on link analysis algorithms. We also examined the prevalence of other kinds of spamming techniques. This work has been funded in part by Microsoft Live Labs.

UNDERSTANDING AND ENHANCING QUERIES
Summer 2002 – Summer 2008

PI: Brian D. Davison

Studied the relationships between queries and their search engine results in order to better understand aggregate query behavior. We are able to recommend queries for searchers and for content providers, and to find related Web pages. This work was funded by the National Science Foundation under grant IIS-0328825.

EDIFY: DISRUPTION AND DELAY TOLERANT NETWORKING
Spring 2005 – Fall 2006

PI: M.C. Chuah; Co-PIs: B.D. Davison and L. Cheng

In this DARPA-funded project, we designed a store-and-forward messaging architecture that is tolerant of delays, disruptions, and supports node mobility over an existing network infrastructure.

WEB PREFETCHING AND EVALUATION, RUTGERS UNIV. & LEHIGH UNIV.
Fall 2000 – Spring 2004

Rutgers PI: Haym Hirsh; Lehigh PI: Brian D. Davison

Investigated potential improvements to web caching performance through intelligent action prediction for application to interactive prefetching. Research issues include the design and implementation of a caching and network effects simulator, and the proposal of a new method for the evaluation of prefetching proxy caches, integrating multiple sources of information (historical, textual, and community-based), and HTTP log analysis. This research was funded under NSF grant ANI-9903052 to Rutgers, and via a subcontract to Lehigh University.

DISCOWEB SEARCH ENGINE PROJECT, RUTGERS UNIV.
Spring 1999 – Spring 2000

PI: Apostolos Gerasoulis

Worked to develop a system for web analysis that discovers *communities* of web sites with related views on search query topics. Research issues include the exploitation of web page interconnections for capturing flow of influence, text analysis for clustering and page ranking, and search engine technologies for retrieving pages and building graphs of page relationships. This project was primarily funded through DARPA research grants. It was later spun out as an Internet startup called Teoma, and purchased in 2001 by Ask Jeeves.

**Research
Grants
Awarded**

“DMREF: DNA-Nanocarbon Hybrid Materials for Perception-Based, Analyte-Agnostic Sensing”, NSF, \$1,995,603, (Lehigh portion: \$1,395,603), 2023-2027. PI: A. Jagota. Co-PIs: B.D. Davison, D. Heller (MSKCC), M. Zheng (NIST).

“Nanosensor Array Platform to Capture Whole Disease Fingerprints”. NIH via subcontract from Memorial Sloan Kettering Cancer Center, \$2,627,958 (Lehigh portion: \$336,308), 6/2023-4/2027 PI: D. Heller (MSKCC). Co-PIs: A. Jagota (Lehigh PI), B.D. Davison, M. Zheng (NIST), Y. Wang (U. Maryland-College Park).

“Enhancing Collaborative Infrastructure for Interdisciplinary Indigenous Research at Lehigh”, Lehigh internal Research Futures funding, \$400,000. 2023-2025. PI: C. Daley. Co-PIs: M. Gusmano, A. Jagota, and J. Marsh. With K. Arrington, M. Falk, W. Weyer, T. Watkins, P. Manzh, S. Daley, E. Gomez, B. Khan, A. Liu, T. McAndrew, F. Wakeel, P. Bocchini, X. Cheng, B.D. Davison, H. Jain, and Y. Liu.

“Catastrophe Modeling: a center for infrastructure resilience against disasters, preparedness against epidemics, and increased insurance social equity”, Lehigh internal Research Futures funding, \$600,000. 2023-2025. PI: P. Bocchini. With B.D. Davison, D. Conus, D. Casagrande, T. McAndrew, E. Yang.

“A Cross-City Knowledge Transfer Framework for Air Quality Inference”, Lehigh internal Accelerator funding, \$99,718. 2023-2024. PI: B.D. Davison. With Y. Yang, L. Sun, D.P. Robinson, and L. He.

“PIPP Phase I: Dynamics of Pandemic Spread and Prevention in Indigenous Communities”, NSF, \$999,894. 8/2022-1/2024. PI: A. Jagota. Co-PIs: X. Cheng, M. Falk, P. Bocchini, J. Marsh. Senior Personnel: C. Arrington, C. Daley, B.D. Davison, H. Jain, B. Khan, Y. Liu, T. McAndrew, X. Zhang.

“Intelligent and Scalable Systems (Renewal)” REU Site, National Science Foundation, \$402,333, 2021-2024. PI: M. Spear. Co-PI: J. Heflin. With B.D. Davison, E. Baumer, L. Cheng, M. C. Chuah, J. Heflin, D. DiFranzo, L. He, R. Palmieri, J. Trinkle, and S. Xie.

“Perceptions Shaping Reality v2.0: Tracking Perceptions and Responses to the Unfolding COVID-19 Pandemic”, Lehigh internal CORE funding, \$58,950, 2020-2021. PI: D. Packer. Co-PIs: D. Abrahams, P. Bocchini, D. Casagrande, B.D. Davison, A. Lamadrid, J. Marsh, and R. Sause.

“Catastrophe Modeling for Natural Disasters and Health Related Threats”, Lehigh internal Research Futures funding, \$249,775, 2020-2021. PI: P. Bocchini. With D. Conus, B.D. Davison, J. Buceta.

“Efficient, Explainable and Robust Data Scientific Methods for Smart Engineering Systems”, Lehigh Accelerator Funding, \$99,996, 2020-2021. PI: P. Venkatasubramaniam. Co-PIs: R. Blum, P. Bocchini, B.D. Davison, J. Heflin, H. Munoz-Avila, T. Ralphs, S. Xie.

“Perceptions Shaping Reality in Disaster Recovery”, Internal Lehigh CORE Funding, \$59,600, 2019-2020. PI: J. Marsh. Co-PIs: P. Bocchini, D. Casagrande, B.D. Davison, A. Lamadrid, D. Packer, and R. Sause.

“Domain-Agnostic Dataset Search”, National Science Foundation, \$515,770, 2018-2021. B.D. Davison, principal investigator. Co-PI: J. Heflin and H. Jia.

“Intelligent and Scalable Systems” REU Site, National Science Foundation, \$359,959, 2018-2021. B.D. Davison, principal investigator. Co-PI: M. Spear. With E. Baumer, Y. Cao, L. Cheng, M. C. Chuah, J. Heflin, H. Muñoz-Avila, R. Palmieri, J. Spletzer, T. Wang, and S. Xie. Supplement \$12,000 awarded 2019-2020.

“Cross-browser Fingerprinting: Attacks, Dynamics, and Detection”, Amazon, \$80,000 (plus \$20,000 in AWS credits), 2018. PI: Y. Cao. B.D. Davison, co-PI.

“Dataset Discovery, Access, and Retrieval for Cross-Disciplinary Research”, Internal Lehigh CORE Funding, \$58,771, 2017-2018. B.D. Davison, principal investigator. Co-PI: J. Heflin and H. Jia.

“IoT sensor testing for sleep analytics”, Internal Lehigh Faculty Research Grant, \$6,000, 2016-2017. B. Davison, principal investigator. With L. Napper and P. Costa.

“Collaborative Research: CRISP Type 2: Probabilistic Resilience Assessment of Interdependent Systems - PRAISys”, National Science Foundation, \$1,903,209, 2015-2018. PI: Paolo Bocchini. With A. Lamadrid, R. Sause, and L. Snyder. Collaborative with D. Mitsova-Boneva (Florida Atlantic Univ.), A. Sapat (Florida Atlantic Univ.), and A.-M. Esnard (Georgia State Univ.). REU Supplement \$16,000 awarded 2018. Additional \$158,000 supplement awarded 2019.

“The Lehigh Smart Spaces Project”, REU Site, National Science Foundation, \$340,000, 2014-2016. PIs: J. Spletzer and M. C. Chuah. With B. Chen, L. Cheng, J. Heflin, X. Huang, D. Lopresti, H. Munoz-Avila, M. Spear, and G. Tan.

“Detecting Biases in Online News Media”, Internal Lehigh FIG Funding, \$23,371, 2013-2014, B. Davison, principal investigator.

“III:RI:Small:RUI:Tracking Predators and Bullies via Chat Log Transcripts”, National Science Foundation, \$498,428, 2009-2012, A. Kontostathis (PI, Ursinus) and L. Edwards (Co-PI, Ursinus). Subcontract to Lehigh: \$181,597, B. Davison, principal investigator.

“Enhancing Productivity at Air Products Using Information and Systems Technology”, Pennsylvania Infrastructure Technology Alliance (PITA), \$36,850, plus funding from Air Products of \$55,000, 2009, R. Nagel, principal investigator, S. Goldman, B. Davison and E. Zimmers, co-principal investigators.

“Efficient and Effective Search Services Over Archival Webs”, National Science Foundation, \$900,000, 2008-2011, B. Davison, principal investigator, T. Suel (NYU Polytechnic), co-principal investigator. In collaboration with the Internet Archive.

“Social Networks and Virtual Reality as Environments for Business Development and Globalization”, Pennsylvania Infrastructure Technology Alliance (PITA), \$56,500, plus industrial and non-profit sponsors, \$87,000, 2008, R. Nagel, principal investigator, B. Davison and E. Zimmers, co-PIs.

“CAREER: Contextual Link Analysis”, National Science Foundation, \$500,000, 2006-2011, B. Davison, principal investigator.

“Incorporating Trust into Web Authority”, Microsoft Research / Live Labs “Accelerating Search”, \$34,898, 2006-2007, B. Davison, principal investigator.

“Unsupervised Continuous Adaptation for Accented Speech Recognition”, Johns Hopkins (subcontract of an NSF award), \$25,000, 2004-2005, B. Davison, principal investigator, for D. W. Kirsch, student researcher.

“Enhanced Disruption/Fault Tolerant Bundle Delivery System (EDIFY)”, DARPA, \$348,000 (Phase I, 2005-2006), \$456,634 (Phase II, 2006-2007), M. Chuah, principal investigator, B. Davison, and L. Cheng, co-principal investigators.

“Understanding and Enhancing Queries”, National Science Foundation, award IIS-0328825, \$255,000, 2004-2007, B. Davison, principal investigator.

“REU Supplement: Understanding and Enhancing Queries”, National Science Foundation, award IIS-0328825, \$6,000, 2005, B. Davison, principal investigator.

“Intelligent Web Prefetching to Reduce Client Latencies”, National Science Foundation, award ANI-9903052, \$438,020, 2000-2004, H. Hirsh, principal investigator. Subcontract to Lehigh, \$297,241, B. Davison, principal investigator.

**Other
Grants**

“Computer Science and Engineering Undergraduate Lab Enhancement - Server and Hosting Environment Upgrades”, P.C. Rossin College of Engineering and Applied Science, \$74,400, February 2023. T. George, B.D. Davison, D. Saldana, M. Spear, and G. Witmer.

“Computer Science and Engineering Undergraduate Lab Enhancements and Upgrades”, P.C. Rossin College of Engineering and Applied Science, \$70,000, January 2022. T. George, B. Davison, D. Saldana, M. Spear, and G. Witmer.

“Computer Science and Engineering Undergraduate Sandbox Lab Expansion”, P.C. Rossin College of Engineering and Applied Science, \$51,683, June 2018. Y. Cao, B. Davison, B. Hodgson, J. Loew, D. Lopresti, R. Palmieri, M. Spear.

“Primary Undergraduate Labs Enhancements and Upgrades”, P.C. Rossin College of Engineering and Applied Science, \$32,097, January 2015, B. Chen, B. Davison, B. Hodgson, H. Korth, M. Spear and G. Tan.

“Computer Science & Engineering Undergraduate Sandbox Lab Upgrade”, P.C. Rossin College of Engineering and Applied Science, \$66,000, December 2010, B. Chen, B. Davison, B. Hodgson, H. Korth, D. Lopresti, M. Spear, and J. Spletzer.

“CSE Unix Lab Upgrade and Expansion”, P.C. Rossin College of Engineering and Applied Science, \$44,000, October 2008, H. Korth, B. Hodgson and B. Davison.

“Academic Excellence Grant”, Sun Microsystems, \$40,358, 2008 (equipment grant), B. Davison.

“Learning to Label a Graph: Application to Web Spam Detection”, EU Network of Excellence PASCAL, 12,000 Euros, 2007 (grant to provide competition support), R. Baeza-Yates, C. Castillo, B. Davison, and P. Gallinari.

“Undergraduate Laboratory Enhancement for Computer Science and Engineering”, P.C. Rossin College of Engineering and Applied Science, \$70,000, August 2006, H. Korth, H. Munoz-Avila, D. Hillman, B. Hodgson, B. Davison, L. Cheng, J. Spletzer, and M. Arnold.

“CS&E Undergraduate Labs Upgrade and Expansion”, P.C. Rossin College of Engineering and Applied Science, \$55,766, 2002, M. Arnold, L. Cheng, B. Davison, B. Hodgson, E. Kay, and J. Vollmer.

**Edited Books
and
Proceedings**

K. Collins-Thompson, Q. Mei, B. D. Davison, Y. Liu, and E. Yilmaz, eds. *Proceedings of the 41st International ACM SIGIR Conference on Research & Development in Information Retrieval*. July 2018, ACM Press. 978-1-4503-5657-2.

B. D. Davison, T. Suel, N. Craswell, and B. Liu, eds. *Proceedings of the Third ACM International Conference on Web Search and Data Mining*. February 2010, ACM Press. 978-1-60558-889-6.

C. Castillo, B. D. Davison, L. Denoyer, and P. Gallinari, eds. *Proceedings of the Graph Labelling Workshop and Web Spam Challenge*. September 2007, at ECML/PKDD in Warsaw, Poland.

C. Castillo, K. Chellapilla, and B. D. Davison, eds. *Proceedings of the Third International Workshop on Adversarial Information Retrieval on the Web (AIRWeb)*. ACM International Conference Proceedings Series; Vol. 215. May 2007, ACM Press. 978-1-59593-732-2.

B. D. Davison, M. Najork, and T. Converse, eds. *Proceedings of the Second International Workshop on Adversarial Information Retrieval on the Web*, August 2006, Technical Report LU-CSE-06-027, Department of Computer Science and Engineering, Lehigh University.

B. D. Davison, ed. *Proceedings of the First International Workshop on Adversarial Information Retrieval on the Web*, May 2005, Technical Report LU-CSE-05-030, Department of Computer Science and Engineering, Lehigh University.

F. Douglis and B. D. Davison, eds. *Web Content Caching and Distribution: Proceedings of the 8th International Workshop*. Kluwer, July, 2004. 1-4020-2257-3.

Journal Articles

H. Jia, L. Miller, J. Hicks, E. Moscot, A. Landberg, J. Heflin, and B.D. Davison. **Truth in a Sea of Data: Adoption and Use of Data Search Tools among Researchers and Journalists**. *Information, Communication and Society*. (Online Nov. 2022) DOI: 10.1080/1369118X.2022.2147398

O. Dan, V. Parikh and B.D. Davison. **IP Geolocation through Geographic Clicks**. *ACM Transactions on Spatial Algorithms and Systems*, 8(1):No 2, March 2022. DOI: 10.1145/3476774

W. Sun, P. Bocchini, and B.D. Davison. **Overview of Interdependency Models of Critical Infrastructure for Resilience Assessment**. *Natural Hazards Review*, 23(1): ASCE, February 2022. DOI: 10.1061/(ASCE)NH.1527-6996.0000535

O. Dan, V. Parikh, and B.D. Davison. **IP Geolocation through Reverse DNS**. *Transactions on Internet Technology (TOIT)*, 22(1):17, ACM, February 2022. DOI: 10.1145/3457611

W. Wang, F. Xia, J. Wu, Z. Gong, H. Tong, and B.D. Davison. **Scholar2vec: Vector Representation of Scholars for Lifetime Collaborator Prediction**. *Transactions on Knowledge Discovery from Data (TKDD)*, 15(3):40, 19 pages. ACM, April 2021. DOI: 10.1145/3442199

W. Sun, P. Bocchini, and B.D. Davison. **Policy-based disaster recovery planning model for interdependent infrastructure systems under uncertainty**. *Journal of Structure and Infrastructure Engineering*, 17(4):555-578. Taylor and Francis, 2021. DOI: 10.1080/15732479.2020.1843504

Y. Zhang and B.D. Davison. **Domain Adaptation for Object Recognition Using Subspace Sampling Demons**. *Multimedia Tools and Applications (MTAP)*. Springer, 2020. DOI: 10.1007/s11042-020-09336-0

W. Sun, P. Bocchini, and B.D. Davison. **Applications of artificial intelligence for disaster management**. *Journal of Natural Hazards*, 103: 2631-2689, Springer, July 2020. DOI: 10.1007/s11069-020-04124-3

W. Sun, P. Bocchini, and B.D. Davison. **Model for estimating the impact of interdependencies on system recovery**. *Journal of Infrastructure Systems*, 26(3), September 2020. DOI: 10.1061/(ASCE)IS.1943-555X.0000569

W. Sun, P. Bocchini, and B.D. Davison. **Resilience metrics and measurement methods for transportation infrastructure: The state of the art**. *Sustainable and Resilient Infrastructure*, 2020. DOI: 10.1080/23789689.2018.1448663

S. Kuang and B.D. Davison. **Learning Class-specific Word Embeddings**. *Journal of Supercomputing*. Springer, 2019. In Press. DOI: 10.1007/s11227-019-03024-z

S. Kuang and B.D. Davison. **Learning word embeddings with Chi-square weights for health-care tweet classification.** *Applied Sciences*, Volume 7, Issue 8, Article 846, MDPI, August 2017. DOI: 10.3390/app7080846

O. Dan and B.D. Davison. **Measuring and Predicting Search Engine Users' Satisfaction.** *ACM Computing Surveys*, Volume 49, Issue 1, Article 18, July 2016. DOI: 10.1145/2893486

Z. Yang, L. Hong, D. Yin and B.D. Davison. **Ranking Authors with Learning-to-Rank Topic Modeling.** *International Journal of Innovative Computing, Information and Control (IJICIC)*, Volume 11, Issue 4, pages 1295-1316, August 2015. DOI: 10.24507/ijicic.11.04.1295

N. Dai and B.D. Davison. **Topic-Sensitive Search Engine Evaluation.** *Online Information Review*, Volume 35, Issue 6, pages 893-908, 2011. DOI: 10.1108/14684521111193184

C. Castillo and B.D. Davison. **Adversarial Web Search.** *Foundations and Trends in Information Retrieval*, Volume 4, Number 5, pages 377-486, 2010. Now Publishers. DOI: 10.1561/15000000021

Q. Ye, L. Cheng, M. C. Chuah, and B.D. Davison. **Performance Comparison of Different Multicast Routing Strategies in Disruption Tolerant Networks.** *Computer Communications*, Volume 32, Number 16, pages 1731-1741, October 2009. DOI: 10.1016/j.comcom.2009.02.007

X. Qi and B.D. Davison. **Web Page Classification: Features and Algorithms.** *ACM Computing Surveys*, Volume 41, Number 2, February 2009. DOI: 10.1145/1459352.1459357

B.D. Davison, W. Zhang, and B. Wu. **Connecting P2P to the Web: Lessons from a Prototype Gnutella-WWW Gateway.** *Internet Research*, Volume 18, Number 3, pages 336-356, 2008. **Highly Commended Award Winner.** DOI: 10.1108/10662240810883344

B.D. Davison. **A Web Caching Primer.** *IEEE Internet Computing*, Volume 5, Number 4, July/August, pages 38-45, 2001. DOI: 10.1109/4236.939449

B.D. Davison and V. Liberatore. **Pushing Politely: Improving Web Responsiveness One Packet at a Time.** *Performance Evaluation Review*, Volume 28, Number 2 (September), pages 43-49, 2000. DOI: 10.1145/362883.362914

H.Hirsh, C. Basu, and B. D. Davison. **Learning to Personalize.** *Communications of the ACM*, Volume 43, Issue 8 (August), pages 102-106, 2000. DOI: 10.1145/345124.345159

J.S. Hall, L. Steinberg, and B. D. Davison. **Combining Agoric and Genetic Methods in Stochastic Design.** *Nanotechnology*, Vol. 9, No. 3 (September), pages 274-284., 1998. DOI: 10.1088/0957-4484/9/3/019

**Encyclopedia
Articles
and Book
Chapters**

W. Sun, P. Bocchini, and B. D. Davison. **Quantitative models for interdependent functionality and recovery of critical infrastructure systems.** In M. Ettouney (ed.), *Objective Resilience: Objective Processes*, MOP 147, Chapter 4, American Society of Civil Engineers, April 2022. DOI: 10.1061/9780784415894.ch4

G. M. Weiss and B. D. Davison. **Data Mining.** In H. Bidgoli (ed.), *The Handbook of Technology Management*, Volume 2, Chapter 39, Wiley, January 2010.

S. L. Goldman, R. N. Nagel, B. D. Davison, and P. D. Schmid. **Next Generation Agility: Smart Business and Smart Communities.** In P.H.M. Vervest, D.W. van Liere, and L. Zheng (eds.), *The Network Experience: New Value from Smart Business Networks*, Chapter 4, pp. 49-55. Springer-Verlag, 2009.

B. Wu and B. D. Davison. **Web Spam Identification and Blocking**. In *The McGraw-Hill 2008 Yearbook of Science and Technology*, pp. 370-372, 2008.

B. D. Davison. **World wide web search engines**. In *The McGraw-Hill Yearbook of Science and Technology*, pp. 347-349, 2006.

B. D. Davison. **Search engine**. In *The World Book Encyclopedia*, pp. 268-269, 2005.

A. Kontostathis, W. M. Pottenger, and B. D. Davison. **Identification of critical values in latent semantic indexing**. In T. Y. Lin, S. Ohsuga, C.J. Liao, X. T. Hu, and S. Tsumoto (eds.), *Foundations of Data Mining and Knowledge Discovery*, Springer-Verlag, 2005.

B. D. Davison. **Learning Web Request Patterns**. In M. Levene and A. Poulouvassilis, eds, *Web Dynamics: Adapting to Change in Content, Size, Topology and Use*, pp. 435-459, Springer-Verlag, 2004.

**Refereed
Publications
in High
Impact
Conferences**

D. Luo, L. Zou, Q. Ai, Z. Chen, D. Yin, and B.D. Davison. **Model-based Unbiased Learning to Rank**. In *Proceedings of the 16th ACM International Conference on Web Search and Data Mining (WSDM 2023)*, pp. 895-903, Singapore, February 2023. DOI: 10.1145/3539597.3570395. Also arXiv preprint arXiv:2202.02595.

M. Trabelsi, Z. Chen, S. Zhang, B.D. Davison, and J. Heflin. **StruBERT: Structure-aware BERT for Table Search and Matching**. In *Proceedings of the 31st edition of the Web Conference*, pp. 442-451, April 2022. DOI: 10.1145/3485447.3511972

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- B. D. Davison, A. Gerasoulis, K. Kleisouris, Y. Lu, H. Seo, W. Wang, and B. Wu. **DiscoWeb: Applying Link Analysis to Web Search.** In *Poster Proceedings of the Eighth International World Wide Web Conference*, pp. 148-149, Toronto, May, 1999.
- B. D. Davison. **Simultaneous Proxy Evaluation.** In *Proceedings of the Fourth International Web Caching Workshop (WCW99)*, pp. 170-178, San Diego, March, 1999.
- B. D. Davison. **A Survey of Proxy Cache Evaluation Techniques.** In *Proceedings of the Fourth International Web Caching Workshop (WCW99)*, pp. 67-77, San Diego, March, 1999.
- B. D. Davison. **Web Traffic Logs: An Imperfect Resource for Evaluation.** In *Proceedings of the Ninth Annual Conference of the Internet Society (INET'99)*, San Jose, June, 1999.
- B. D. Davison and H. Hirsh. **Predicting Sequences of User Actions.** In *Predicting the Future: AI Approaches to Time Series Problems*, Technical Report WS-98-07, pp. 5-12, AAI Press. Proceedings of the 1998 AAI/ICML Workshop, July, 1998.
- B. D. Davison and H. Hirsh. **Toward An Adaptive Command Line Interface.** In *Advances in Human Factors/Ergonomics Volume 21B - Design of Computing Systems: Social and Ergonomic Considerations*, pp. 505-508: Elsevier Science, August 1997.

J. S. Hall, L. Steinberg, and B. D. Davison. **Rational Control of Multi-level Stochastic Design.** *Proceedings of the IASTED International Conference on Modelling and Simulation*, Pittsburgh, PA, 1997.

H. Hirsh and B. D. Davison. **An Adaptive UNIX Command-Line Assistant.** In *Proceedings of the First International Conference on Autonomous Agents*, pp. 542-543, Marina del Ray, CA: ACM, January, 1997.

**Other
Articles
and
Reports**

K. Zhang, J. Yu, Z. Yan, Y. Liu, E. Adhikarla, S. Fu, X. Chen, C. Chen, Y. Zhou, X. Li, L. He, B.D. Davison, Q. Li, Y. Chen, H. Liu, and L. Sun. **BiomedGPT: A Unified and Generalist Biomedical Generative Pre-trained Transformer for Vision, Language, and Multimodal Tasks**, arXiv preprint arxiv:2305.17100, May 2023.

D. Luo, L. Zou, Q. Ai, Z. Chen, C. Li, D. Yin, and B.D. Davison. **Unconfounded Propensity Estimation for Unbiased Ranking.** arXiv preprint arXiv:2305.09918, May 2023.

E. Adhikarla, D. Luo and B.D. Davison. **Memory Defense: Robust Classification via a Memory-Masking Autoencoder**, arXiv preprint arXiv:2202.02595, February 2022.

Y. Zhang and B.D. Davison. **Weighted Pseudo Labeling Refinement for Plant Identification**, CLEF Working Notes 2021, CLEF: Conference and Labs of the Evaluation Forum, Bucharest, Romania, CEUR Workshop Proceedings 2936, CEUR-WS.org, pp.1659-1667, September 2021.

Y. Zhang and B. D. Davison. **Adversarial Consistent Learning on Partial Domain Adaptation of PlantCLEF 2020 Challenge**, CLEF Working Notes 2020, CLEF: Conference and Labs of the Evaluation Forum, Thessaloniki, Greece, CEUR Workshop Proceedings 2696, CEUR-WS.org, September 2020.

Y. Zhang and B. D. Davison. **Modified Distribution Alignment for Domain Adaptation with Pre-trained Inception ResNet**, arXiv preprint arXiv:1904.02322, April 2019.

P. Bocchini, B. D. Davison, A.-M. Esnard, A. Lamadrid, D. Mitsova-Boneva, A. Sapat, R. Sause, L. Snyder, W. Sun. **Probabilistic Resilience Assessment of Interdependent Systems: the PRAISys Platform**, Poster at the NSF CRISP/RIPS Grantees Workshop, Arlington, VA, December 2018.

Z. Yang, D. Yin and B. D. Davison. **Optimizing MAP in Joint Multi-Relational Models for Recommendations in the Academic Network**, Technical Report LU-CSE-14-002, Dept. of Computer Science and Engineering, Lehigh University, 2014.

X. Qi and B. D. Davison. **Optimizing Hierarchical Classification Through Tree Evolution**, Technical Report LU-CSE-11-002, Dept. of Computer Science and Engineering, Lehigh University, 2011.

X. Qi, D. Yin, Z. Xue, B. D. Davison. **Enhancing Taxonomies by Providing Many Paths.** Technical Report LU-CSE-10-005, Dept. of Computer Science and Engineering, Lehigh University, 2010.

D. Yin, Z. Xue, X. Qi and B. D. Davison. **Diversifying Search Results with Popular Subtopics.** In *Proceedings of the Eighteenth Text REtrieval Conference (TREC 2009)*, Gaithersburg, MD: NIST, November 2009.

R. N. Nagel, S. L. Goldman, and B. D. Davison. **Migrating to Agility 2.0: Social Computing Enables Organizational Growth and Innovation.** White paper sponsored by the PA Infrastructure Technology Alliance, March 2009.

B. D. Davison, M. Lalmas and D. D. Lewis. **ACM SIGIR Annual Business Meeting 2008: Secretary's Notes**. *SIGIR Forum*, 42(2):3-8, December 2008.

C. Castillo, K. Chellapilla, and B. D. Davison. **Adversarial Information Retrieval on the Web (AIRWeb 2007)**. *SIGIR Forum*, 42(1):68-72, June 2008.

M. Najork and B. D. Davison. **Introduction to Special Section on Adversarial Issues in Web Search**. In *ACM Transactions on the Web*, 2(1), February, 2008.

B. D. Davison, M. Najork, and T. Converse. **Adversarial Information Retrieval on the Web (AIRWeb 2006)**. *SIGIR Forum*, 40(2), December 2006.

B. D. Davison. **Is Your Web Site Cache Friendly?** Invited article in *Web Techniques* magazine, Vol. 5, No. 3 (March), pp. 101-103, 2000.

Book Review Q. Wang and B. D. Davison. **Review: Web Caching and Replication**. *SIGMOD Record*, Volume 32, Number 4, December 2003, pp. 107-108.

Patent L. Steinberg, J. S. Hall, and B. D. Davison. **Method of producing optimized designs using computer systems and designs produced therefrom**. United States Patent 6,367,052. Granted 2 April 2002.

Invited Talks *Introduction to Time-Series Analysis with PI System Data*. With M. Takac. OSIssoft PI World Conference, Analytics Track, Barcelona, September 2018 and San Francisco, April 2018. **Best product talk** (one of three awarded at the Barcelona event).

Searching for Datasets. International Workshop on Data Search (DATA:SEARCH'18), co-located with SIGIR 2018, Ann Arbor, MI, July 2018.

Keynote from Academia: Revamping Student Education with Real-World Data. OSIssoft PI World Conference, Academic Symposium, April 2018.

Useful Web Mining with R, Course for the International Summer School on Web Science and Technology (WebST 2016), Bilbao, Spain, July 18-22, 2016.

The Times of Our Lives, Keynote for the Workshop on Temporal, Social and Spatially-aware Information Access (TAIA 2015), Santiago, Chile, August 13, 2015.

The Potential for Research and Development in Adversarial Information Retrieval

- Universite de Paris-Sud XI, Orsay, France, November 30, 2010.
- AIRWeb 2009 Keynote, Madrid, Spain, April 21, 2009.

Managing and Mining Information in Microblogs, Georgetown University, Washington, DC, October 22, 2010.

Searching Archival Webs Efficiently and Effectively, International Internet Preservation Consortium, Ottawa, Canada, May 4, 2009.

Contextual Link Analysis for Web Search

- Microsoft Research, Cambridge, UK, July 2008.
- Polytechnic University, Brooklyn, NY, April 2007.

- Stern School of Business, New York University, New York, NY, March 2007.

Mining the Web for Fool's Gold

- Lafayette College, Easton, PA, February 2008
- Ursinus College, Collegeville, PA, September 2007
- High Performance Computing Day at Lehigh University, Bethlehem, PA, April 2007

Incorporating Trust into Web Authority, Microsoft Research Search Summit, Redmond, WA, July 2007

Search Engine Spam: Significance and Some Solutions

- Bucknell University, Lewisburg, PA, October 2006.
- Fordham University, New York, NY, October 2006.

Application-Layer Networking, Wireless Day, Lehigh University, December 2003.

Understanding and Enhancing Search Engine Queries, Department of Computer Science, Rutgers University, New Brunswick, NJ, October 2003.

Organizing information so that it can be found, 4th Annual ECCMA Membership Conference, Bethlehem, PA, October 2003.

The Design and Evaluation of Web Cache Pre-Loading Techniques, Spring 2001.

- Lehigh University, Bethlehem, PA
- George Mason University, Fairfax, VA
- Northwestern University, Evanston, IL
- Northeastern University, Boston, MA
- Pennsylvania State University, State College, PA
- Purdue University (CS & ECE), Lafayette, IN
- University of Pittsburgh (CS & DIST), Pittsburgh, PA
- Johns Hopkins University, Baltimore, MD

Web Caching: Balancing User Needs and Network Utilization, Lucent Bell Labs, Murray Hill, NJ, September 1999.

**Graduate
Students
Advised**

Current students:

- Eashan Adhikarla (doctoral student)
- Xuehan Chen (doctoral student, co-supervised by A. Jagota)
- Jiaxin Liu (doctoral student, co-supervised by S. Xie)
- Dan Luo (doctoral candidate)

Postdoctoral Advisees:

- Dr. Wenjuan Sun (2015-2020)

Graduated from Lehigh University:

- Zhiyu Chen (PhD, 2022)

- Youshan Zhang (PhD, 2021)
- Sicong Kuang (PhD, 2020)
- Ovidiu Dan (PhD, 2019)
- William West (MS, 2014)
- Zaihan Yang (PhD, 2014)
- Dawei Yin (PhD, 2013)
- Liangjie Hong (PhD, 2013)
- Na Dai (PhD, 2013)
- Jennifer Bayzick (MS, 2013)
- Xiaoguang Qi (PhD, 2012)
- Zhenzhen Xue (MS, 2010)
- Jian Wang (MS, 2009)
- Lan Nie (PhD, 2008)
- YaoShuang Wang (MS, 2008)
- Shruti Bhandari (MS, 2008)
- Baoning Wu (PhD, 2007)
- Vinay Goel (MS, 2006)
- Wei Zhang (MS, 2004)
- Yonghui Mou (MS, 2004)
- Kiran K. Komaravolu (MS, 2004)
- Kalyan C. Boggavarapu (MS, 2004)
- David B. Lewanda (MS, 2003)
- David G. Deschenes (MS, 2003)

Instructional Experience

DEPT. OF COMPUTER SCIENCE & ENGINEERING, LEHIGH UNIV.
Served as Instructor for:

Bethlehem, PA

- Graduate course in data science (Spring '22, Summer '22, Fall '23)
- Undergraduate course in data science (Fall '15, Spring '16, Fall '16, Spring '17, Fall '17, Spring '18, Fall '18, Spring '19, Fall '19, Spring '20, Fall '20, Spring '21, Fall '21, Fall '22, Spring '23)
- Undergraduate course on computers, internet and society (Fall '18, Fall '19)
- Undergraduate course in system administration (Spring '04, Spring '06, Spring '08, Spring '10, Spring '12, Fall '14, Spring '16)
- Undergraduate course in C and UNIX programming (Spring '05, Spring '07, Spring '09, Spring '11, Spring '13)
- Undergraduate course introducing programming (Fall '12)
- Undergraduate course in data structures and Java (Fall '10)
- Undergraduate course in system administration (Spring '04, Spring '06, Spring '08, Spring '10, Spring '12, Fall '14)
- Undergraduate course in networking (Spring '02, Fall '03, Fall '04, Fall '05, Fall '06, Fall '07, Fall '08, Fall '09)
- Undergraduate course in search engine marketing (Fall '06)

- Graduate course in research methods (Fall '14, Fall '15, Fall '16, Fall '17)
- Graduate/undergraduate course in WWW search engines (Fall '02, Fall '03, Fall '04, Spring '07, Spring '09, Spring '15, Spring '17)
- Graduate/undergraduate course in data mining (Spring '15)
- Graduate course in advanced programming techniques (Fall '12)
- Graduate seminar in network mining (Spring '10)
- Seminar in technology behind social networking (Spring '09)
- Graduate seminar in Web mining (Fall '05, Spring '08)
- Seminar in business applications of social networking (Spring '08)
- Graduate seminar in advanced networking topics (Spring '03)
- Graduate course in Web technologies and performance (Fall '01)

DEPARTMENT OF COMPUTER SCIENCE, RUTGERS UNIVERSITY

New Brunswick, NJ

Served as Instructor for:

- Second-semester undergraduate course in data structures (Spring '98)
- Undergraduate course in computer architecture (Summer '92)

Served as teaching assistant for:

- Graduate course in artificial intelligence (Fall '98)
- Advanced undergraduate course in digital system design (Spring '93)
- Undergraduate course in software engineering (Fall '92)
- Undergraduate course in computer architecture (Fall '91, Spring '92)

**Other
Experience**

VARIOUS LAW FIRMS

September 2002 – Present **Technical Consulting Expert**

Provided technical expertise on caching, content delivery, and search technologies for patent attorneys in multiple cases.

UNITED ONLINE

New York City

August 2003 **Consultant**

Consulted on Web prefetching techniques and simulation thereof.

WWW.WEB-CACHING.COM

July 1998 – Present **Creator and Maintainer**

A leading Web resource on web caching and content delivery networks providing news, tools, references, and related resources.

DAVISON COMPUTER SERVICES

Lehigh Valley, PA

May 1992 – Present **Founder and Owner**

While originally started and operated to provide local (NJ) Internet access (1992-1996), DCS now serves as a side business for occasional consulting, and served as parent for the now defunct *Brian's Books* online business of selling discounted computer books (operational 1995-2004).

PRINCIPIA PRODUCTS, A DIV. OF COMPUCON SERVICES CORP.

West Chester, PA

Summer 1991 – Summer 1994 **Application Developer**

Developed interface and library routines for a Microsoft Windows-based application to read standardized forms.

GENERAL ELECTRIC AEROSPACE
Summers 1989, 1990 **Summer Intern**

Valley Forge, PA

Wrote network monitoring scripts and reporting modules.

Community Service

BETHLEHEM AREA MORAVIANS
February 2020 – Present **President, Board of Directors**
February 2017 – January 2020 **Secretary/Treasurer**
February 2016 – Present **Member, Board of Directors**

Bethlehem, PA

EAST HILLS MORAVIAN CHURCH
January 2015 – January 2020 **President, Church Council**
January 2008 – August 2013 **Member, Board of Elders**

Bethlehem, PA

Honors and Awards

Lehigh MS in Business Analytics Excellence in Teaching Award, 2022-2023.

Outstanding Senior PC Member for the Twelfth International ACM Conference on Web Search and Data Mining (WSDM), Melbourne, Australia, February 2019.

Best Product Talk at the OSIsoft PI World Conference, Barcelona, September 2018.

Best Paper Award at the International Workshop on Profiling and Searching Data on the Web (Profiles & Data:Search'18, co-located with The Web Conference), Lyon, France, for Generating Schema Labels through Dataset Content Analysis. April 2018.

Outstanding Senior PC Member for the Twenty-fifth International Joint Conference on Artificial Intelligence (IJCAI), New York City, July 2016.

Outstanding Reviewer for the Eighth International Conference on Web Search and Data Mining, WSDM 2015.

Senior Member, IEEE, promoted August 2011.

Best Poster Paper Award at the 20th International World Wide Web Conference, Hyderabad, India, for *Predicting Popular Messages in Twitter*. March 2011.

Highly Commended Award Winner from *Internet Research* for our 2008 article on “Connecting P2P to the web: Lessons from a prototype Gnutella-WWW gateway”, 2009.

National Science Foundation Faculty Early Career Development (CAREER) Award, 2006.

Microsoft Live Labs “Accelerating Search” award, 2006.

Best paper award at the 30th International Conference for the Resource Management and Performance Evaluation of Enterprise Computing Systems (CMG2004) for *Implementing a Web Proxy Evaluation Architecture*. December 2004.

Sigma Xi. Elected associate member, 1991. Promoted to full member, 2004.

Rutgers University Dean’s Award for Graduate Research. Spring, 2001.

AT&T Student Research Symposium (a regional ACM Student Research Competition). Awarded *First Place, PhD Division* for “Measuring the Performance of Prefetching Proxy Caches.” November 1998.

ACM International Student Research Competition. Awarded *Third Place, Graduate Category* for the same work. March 1999.

Tau Beta Pi. Elected member, 1991.

National Merit Scholar. 1987.

Professional Memberships

Academic Data Science Alliance (ADSA)
Association for the Advancement of Artificial Intelligence (AAAI)
Association for Computing Machinery (ACM)
Institute of Electrical and Electronics Engineers (IEEE)
Internet Society (ISOC)

Editorial Service

Associate Editor, *SIGKDD Explorations*, 2022–present.
Senior Associate Editor, *ACM Transactions on Intelligent Systems and Technology*, 2021–present.
Associate Editor, *Frontiers in Big Data: Data Mining and Management*, 2018–present.
Editor-in-Chief, *ACM Transactions on the Web*, 2015–2021. (Joint with M. Winslett 2015-2017).
Associate Editor, *ACM Transactions on the Web*, 2013–2014.
Special Section Co-editor, with M. Najork, *ACM Transactions on the Web*, Adversarial Issues in Web Search, February 2008.

University Service Leadership

Department Chairs Executive Committee (2023-present, member)
Undergraduate Data Science minor (2017-2022, director)
Ad hoc committee for data sciences curriculum development (2016-2017, chair)
Faculty Committee on Student Life (2009-2011 member; 2011-2012, chair, 2013 past chair)
Faculty Steering Committee (2011-2012, member while chair of FCSL)
Research Computing Steering Committee (2004-2008, 2017-2019 member; 2008-2009, chair; 2009-2013, 2014-2017, co-chair)
CSE Graduate Admissions Committee (2014-2016 chair)
CSE Graduate Program Advisor (2012-2013, Master’s program advisor; 2014-2016, PhD program advisor)

Other University Service

Data Governance Executive Committee (2017-present, member)
LTS Data Architect Recruiting Committee (2017-2018, member)
University Strategic Analytics Planning Committee (2016-2017, faculty advisor)

Middle States Accreditation Self-Study Working Group on Support for Student Experience (2016-2017, section co-chair)

Lehigh Advocates and Allies for Gender Equity (part of ADVANCE) (2016-present, member)

LTS ACIS - Advisory Council for Information Services (Fall 2015, member)

RCEAS representative to the College of Education (2020-2021, representative)

Faculty Advisory Council for the Institute for Data, Intelligent Systems, and Computation (2018-2020, 2022-present, member)

RCEAS Faculty Council for the establishment of an Institute for Data Science and Intelligent Systems (2017-2018, member)

RCEAS Dean Search Committee (2014-2015, member)

Mountaintop Campus Designer Selection Committee (2013, member)

RCEAS Task Force on First Year Engineering (2003-2004, 2009-2012, member)

Faculty Search Committees (2022-present, chair, Smith Family Endowed Chair committee; 2021-2022, chair, CSE committee, member, interdisciplinary Data Science PoP committee; 2018-2019, co-chair, RCEAS Fundamentals of Data Science and Analytics interdisciplinary committee, chair, CSE POP committee, member, CSE committee; 2017-2018, member, RCEAS Data Science and Analytics Interdisciplinary committee; 2016-2017, member, Data X / BIS Faculty committee; 2015-2016, member, ISE POP committee; 2015-2016, co-chair, Data X / Marketing committee; 2014-2015, member, BIS committee, member, CSE POP committee; 2012-2013, chair, CSE committee; 2009-2011, member, ISE committee; 2002-2003, 2007-2009, member, CSE committee; 2001-2002, member, ECE committee).

High Performance Computing subcommittee of the Research Advisory Council for Engineering (2008-2013, member)

Lehigh Grants Internal Review Committee (2011-2020, member)

Student life leadership awards selection committee (2011, member)

CSE Computer Facilities Committee (2001-2009, 2010-2011, 2017-2020 chair; 2009-2010, 2014-2017, 2020-present member)

CSE curriculum committee (2001, 2005-2009, 2011-2012, member)

CSE curriculum revision committee (2014-2017, member)

CSE Publicity and Web Committee (2016-2017, chair; 2018-2021, member)

CSE Building C Rules and Procedures Committee (2016-2018, member)

Lehigh in Ireland summer program (2015-2019, 2022, departmental advisor)

**Conference
Leadership
Service**

Chair, *Test of Time Award Committee for WSDM 2021*, March 2021, Jerusalem, Israel.

Member, *Test of Time Award Committee for SIGIR 2019*, July 2019, Paris, France.

Co-Program Chair, *Forty-first International ACM SIGIR Conference on Research and Development in Information Retrieval*, July 2018, Ann Arbor, Michigan.

Tutorial Co-chair, *Tenth ACM International Conference on Web Search and Data Mining (WSDM)*, February 2017, Cambridge, UK.

Doctoral Consortium Co-chair, *Thirty-ninth Annual International ACM SIGIR Conference on Research and Development in Information Retrieval*, July 2016, Pisa, Italy.

Best Paper Selection Committee Chair, *Ninth ACM International Conference on Web Search and Data Mining (WSDM)*, February 2016, San Francisco, CA.

Doctoral Consortium Co-chair, *Thirty-eighth Annual International ACM SIGIR Conference on Research and Development in Information Retrieval*, August 2015, Santiago, Chile.

Workshop Chair, *Seventh ACM International Conference on Web Search and Data Mining (WSDM)*, February 2014, New York City.

Co-organizer, *Workshop on Application of the Web (AppWeb 2012)*, April 2012, Lyon, France.

Co-chair, *First WSDM Doctoral Consortium*, February 2012, Seattle.

Co-chair, *Third ACM International Conference on Web Search and Data Mining (WSDM)*, February 2010, New York City.

Co-organizer, *ECML/PKDD Graph Labelling Workshop and Web Spam Challenge*, September 2007, in Warsaw, Poland.

Co-organizer, *The Web Spam Challenge*, part of the EU PASCAL Network of Excellence Challenge Program, 2007.

Co-organizer and Program Co-chair, *3rd International Workshop on Adversarial Information Retrieval on the Web (AIRWeb 2007)*, May 2007, Banff, Canada.

Co-organizer and Program Chair, *2nd International Workshop on Adversarial Information Retrieval on the Web (AIRWeb '06)*, August 2006, Seattle, WA.

Organizer and Program Chair, *1st International Workshop on Adversarial Information Retrieval on the Web (AIRWeb '05)*, May 2005, Chiba, Japan.

General Chair, *8th Int'l Workshop on Web Content Caching and Distribution*, September/October 2003, Hawthorne, NY.

Program Committees

The WebConf 2024: Thirty-third International World Wide Web Conference, May 2024, Singapore. Web Mining and Content Analysis track. *Area Chair*.

Seventeenth ACM International Conference on Web Search and Data Mining (WSDM), March 2024, Merida, Mexico. *Senior Program Committee Member*.

Thirty-second ACM International Conference on Information and Knowledge Management (CIKM), October 2023, Birmingham, UK. *Applied Research Track*.

Forty-sixth Annual International ACM SIGIR Conference on Research and Development in Information Retrieval, July 2023, Taipei, Taiwan. *Senior Program Committee Member*.

The WebConf 2023: Thirty-second International World Wide Web Conference, April 2023, Austin TX. Web Mining and Content Analysis track. *Senior Program Committee Member*.

Sixteenth ACM International Conference on Web Search and Data Mining (WSDM), February 2023, Singapore.

Forty-fifth Annual International ACM SIGIR Conference on Research and Development in Information Retrieval, July 2022, Madrid, Spain. Senior Program Committee Member.

The WebConf 2022: Thirty-first International World Wide Web Conference, April 2022. Web Mining and Content Analysis Track Co-Chair.

AAAI-22 Undergraduate Consortium, February 2022.

Fifteenth ACM International Conference on Web Search and Data Mining (WSDM), February 2022.

Ninth IEEE International Conference on Big Data, December 2021.

IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (ASONAM), November 2021. Multidisciplinary Track.

Forty-fourth Annual International ACM SIGIR Conference on Research and Development in Information Retrieval, July 2021, Online. Senior Program Committee Member.

Fourteenth ACM International Conference on Web Search and Data Mining (WSDM), March 2021, Online. Senior Program Committee Member.

Eighth IEEE International Conference on Big Data, December 2020, Online.

Forty-third Annual International ACM SIGIR Conference on Research and Development in Information Retrieval, July 2020, Online. Senior Program Committee Member.

Twenty-ninth International World Wide Web Conference (WWW), April 2020, Online. User Modeling, Personalization, and Experience track. Senior Program Committee Member.

Thirteenth ACM International Conference on Web Search and Data Mining (WSDM), February 2020, Houston, TX. Senior Program Committee Member.

Seventh IEEE International Conference on Big Data, December 2019, Los Angeles, CA.

Twenty-eighth ACM International Conference on Information and Knowledge Management (CIKM 2019), November 2019, Beijing, China. Senior Program Committee Member.

Second ACM/IEEE Workshop on Hot Topics on Web of Things (HotWoT 2019), collocated with ACM/IEEE SEC, November 2019, Washington, DC.

Forty-second Annual International ACM SIGIR Conference on Research and Development in Information Retrieval, July 2019, Paris, France. Senior Program Committee Member.

Twenty-eighth International World Wide Web Conference (WWW), May 2019, San Francisco, CA. Modeling, Personalization, and Experience track. Senior Program Committee Member.

Twelfth ACM International Conference on Web Search and Data Mining (WSDM), February 2019, Melbourne, Australia. Senior Program Committee Member.

Sixth IEEE International Conference on Big Data, December 2018, Seattle, WA.

First ACM/IEEE Workshop on Hot Topics on Web of Things (HotWoT2018), collocated with ACM/IEEE SEC, October 2018, Bellevue, WA.

Twenty-seventh International World Wide Web Conference (WWW), April 2018, Lyon, France. Senior Program Committee Member for the Web Search and Mining track.

Eleventh ACM International Conference on Web Search and Data Mining (WSDM), February 2018, Los Angeles, CA. Senior Program Committee Member.

Fifth IEEE International Conference on Big Data, December 2017, Boston, MA.

Fifth IEEE Workshop on Hot Topics in Web Systems and Technologies (HotWeb), October 2017, San Jose, CA.

Fortieth Annual International ACM SIGIR Conference on Research and Development in Information Retrieval, August 2017, Tokyo, Japan. Senior Program Committee Member.

Twenty-sixth International World Wide Web Conference (WWW), April 2017, Perth, Australia. User Modeling, Recommendation and Personalization track.

Tenth ACM International Conference on Web Search and Data Mining (WSDM), February 2017, Cambridge, UK. Senior Program Committee Member.

Twenty-fifth ACM International Conference on Information and Knowledge Management (CIKM 2016), October 2016, Indianapolis, IN.

Fourth IEEE Workshop on Hot Topics in Web Systems and Technologies (HotWeb 2016), October 2016, Washington, DC.

Fifth-fourth Annual Meeting of the Association for Computational Linguistics (ACL 2016), August 2016, Berlin Germany. Document Analysis track.

Twenty-fifth International Joint Conference on Artificial Intelligence (IJCAI), July 2016, New York City. Senior Program Committee Member for AI and the Web.

Twenty-fifth International World Wide Web Conference (WWW), April 2016, Montreal, Canada. Senior Program Committee Member for Behavioral Analysis and Personalization.

Ninth ACM International Conference on Web Search and Data Mining (WSDM), February 2016, San Francisco, CA. Senior Program Committee Member.

IEEE/WIC/ACM International Conference on Web Intelligence, Special Session on Quality of User Generated Content, December 2015, Singapore.

Twenty-fourth ACM International Conference on Information and Knowledge Management (CIKM), October 2015, Melbourne, Australia. Senior Program Committee Member for Information Retrieval.

Twenty-first ACM SIGKDD Conference on Knowledge Discovery and Data Mining, August 2015, Sydney, Australia.

SIGIR 2015 Best Paper Award Committee, August 2015, Santiago, Chile.

Twenty-fourth International World Wide Web Conference (WWW), May 2015, Florence, Italy. Web Mining Area Co-Chair.

Eighth ACM International Conference on Web Search and Data Mining (WSDM), February 2015, Shanghai, China.

Twenty-third ACM International Conference on Information and Knowledge Management (CIKM), November 2014, Shanghai, China. IR Area Chair for Adversarial IR and Spam.

Twenty-eighth AAAI Conference on Artificial Intelligence, August 2014, Quebec City, Canada. Senior Program Committee Member.

Thirty-seventh Annual International ACM SIGIR Conference on Research and Development in Information Retrieval, July 2014, Gold Coast, Australia. *Area chair*.

Twenty-third International World Wide Web Conference (WWW), April 2014, Seoul, Korea. Web mining track.

Fourth Joint WICOW/AIRWEB Workshop on Web Quality (WebQuality 2014), April 2014, Seoul, Korea.

Seventh ACM International Conference on Web Search and Data Mining (WSDM), February 2014, New York City.

WSDM 2014 Tutorial Selection Committee, February 2014, New York City.

WSDM 2014 Doctoral Consortium Selection Committee, February 2014, New York City.

Nineteenth ACM SIGKDD Conference on Knowledge Discovery and Data Mining, August 2013, Chicago, IL.

Seventh International AAAI Conference on Weblogs and Social Media (ICWSM), July 2013, Boston, MA.

Thirty-sixth Annual International ACM SIGIR Conference on Research and Development in Information Retrieval, July 2013, Dublin, Ireland. *Area chair*.

Twenty-second International World Wide Web Conference (WWW), May 2013, Rio de Janeiro, Brazil. Content analysis track.

Sixth ACM International Conference on Web Search and Data Mining (WSDM), February 2013, Rome.

Demonstrations at the Twenty-first ACM International Conference on Information and Knowledge Management (CIKM), October 2012, Maui, Hawaii.

Thirty-fifth Annual International ACM SIGIR Conference on Research and Development in Information Retrieval, August 2012, Portland, Oregon.

Second Workshop on Social Media Analytics (SOMA), August 2012, Beijing, China.

Sixth International AAAI Conference on Weblogs and Social Media (ICWSM), June 2012, Dublin, Ireland.

Twenty-first International World Wide Web Conference (WWW), April 2012, Lyon, France. Web mining track.

Joint WICOW/AIRWEB Workshop on Web Quality (WebQuality 2012), April 2012, Lyon, France.

First International Workshop on Large Scale Network Analysis (LSNA 2012), April 2012, Lyon, France.

Fifth ACM International Conference on Web Search and Data Mining (WSDM), February 2012, Seattle.

WSDM 2012 workshop selection committee. February 2012, Seattle.

Workshop on Web Search Click Data at WSDM, February 2012, Seattle.

Eighteenth International Symposium on String Processing and Information Retrieval (SPIRE), October 2011, Pisa, Italy.

Seventeenth ACM SIGKDD Conference on Knowledge Discovery and Data Mining, August 2011, San Diego, CA.

Twenty-fifth AAAI Conference on Artificial Intelligence, August 2011, San Francisco, CA. Senior Program Committee Member of AI and the Web track.

Fifth International AAAI Conference on Weblogs and Social Media (ICWSM), July 2011, Barcelona, Spain.

Thirty-fourth Annual International ACM SIGIR Conference on Research and Development in Information Retrieval, July 2011, Beijing, China. Also served on best paper award committee.

Twentieth International World Wide Web Conference (WWW), March 2011, Hyderabad, India. Chair of Abuse, Security, and Privacy Track.

Joint WICOW/AIRWEB Workshop on Web Quality, March 2011, Hyderabad, India.

Fourth ACM International Conference on Web Search and Data Mining (WSDM), February 2011, Hong Kong. Also served on workshops selection committee and best paper award committee.

NIPS 2010 Workshop on Machine Learning for Social Computing, December 2010, Whistler, BC, Canada.

Thirty-third Annual International ACM SIGIR Conference on Research and Development in Information Retrieval, July 2010, Geneva, Switzerland.

SIGIR 2010 Workshop on Feature Generation and Selection for Information Retrieval (FGSIR), July 2010, Geneva Switzerland.

SIGIR 2010 Web N-gram Workshop, July 2010, Geneva, Switzerland.

Sixteenth ACM SIGKDD International Conference on Knowledge Discovery and Data Mining, July 2010, Washington, DC. Senior Program Committee Member.

SIGKDD Workshop on Social Media Analytics (SOMA), July 2010, Washington, DC.

Fourth International AAAI Conference on Weblogs and Social Media (ICWSM), May 2010, Washington, DC.

Nineteenth International World Wide Web Conference, April 2010, Raleigh, NC. Search track.

IEEE International Conference on Data Mining (ICDM), December 2009, Miami.

CIKM 2009 Workshop on Complex Networks in Information & Knowledge Management (CNIKM), November 2009, Kong Kong.

Thirty-second Annual International ACM SIGIR Conference on Research and Development in Information Retrieval, July 2009, Boston. Also served as a mentor.

Fifth International Workshop on Adversarial Information Retrieval on the Web (AIRWeb), April 2009, Madrid, Spain.

Eighteenth International World Wide Web Conference, April 2009, Madrid, Spain. Search track.

ECIR Workshop on Information Retrieval over Social Networks, April 2009, Toulouse, France.

Second ACM International Conference on Web Search and Data Mining (WSDM), February 2009, Barcelona, Spain. Main track and late-breaking papers track.

Workshop on Web Search Click Data (WSCD09) at WSDM, February 2009, Barcelona, Spain.

Wikis, Blogs, Bookmarking Tools - Mining the Web 2.0 Workshop at ECML/PKDD, September 2008, Antwerp, Belgium.

Fourteenth ACM SIGKDD International Conference on Knowledge Discovery and Data Mining, August 2008, Las Vegas.

First Workshop on Information Retrieval for Advertising, July 2008, Singapore.

Thirty-first Annual International ACM SIGIR Conference on Research and Development in Information Retrieval, July 2008, Singapore.

Seventeenth International World Wide Web Conference, April 2008, Beijing, China. Search track.

Fourth International Workshop on Adversarial Information Retrieval on the Web (AIRWeb), April 2008, Beijing, China.

Workshop on Targeting and Ranking for Online Advertising (TROA), April 2008, Beijing, China.

First ACM International Conference on Web Search and Data Mining (WSDM), February 2008, Stanford, CA.

Encuentro Internacional de Ciencias de la Computación: ENC-IR 2007, September 2007, Mexico.

Thirtieth Annual International ACM SIGIR Conference on Research and Development in Information Retrieval, July 2007, Amsterdam.

Sixteenth International World Wide Web Conference, May 2007, Banff, Alberta, Canada. Search track and posters.

Document Recognition and Retrieval XIV (IS&T/SPIE Annual Symposium on Electronic Imaging), January 2007, San Jose, CA.

WebKDD 2006: SIGKDD Workshop on Web Mining and Usage Analysis, August 2006, Philadelphia, PA.

Twenty-ninth Annual International ACM SIGIR Conference on Research and Development in Information Retrieval, August 2006, Seattle, WA.

Fifteenth International World Wide Web Conference, May 2006, Edinburgh, Scotland. Search track.

Document Recognition and Retrieval XIII (IS&T/SPIE Annual Symposium on Electronic Imaging), January 2006, San Jose, CA.

Fourteenth International World Wide Web Conference, May 2005, Chiba, Japan. Search track.

Second International Workshop on Human Interactive Proofs, May 2005, Bethlehem, PA.

Thirteenth International World Wide Web Conference, May 2004, Budapest, Hungary. Search track.

Third International Workshop on Web Dynamics, May 2004, Budapest, Hungary.

IUI Workshop on Behavior-based User Interface Customization, January 2004, Island of Madeira, Portugal.

Twentieth International Conference on Machine Learning, August 2003, Washington, DC.

Practical Aspects of Performance Analysis Workshop, June 2002, Marina Del Rey, CA.

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International Journal of Systems Architecture
Internet Research
Journal of Artificial Intelligence Research
Journal of American Society for Information Science and Technology
Journal of Systems and Software
Journal of Web Engineering
Machine Learning Journal
Web Intelligence and Agent Systems (WIAS): An International Journal
World Wide Web: Internet and Web Information Systems
Adaptive Hypermedia and Adaptive Web-based Systems conference
International Joint Conference on Artificial Intelligence (IJCAI)
International Conference on High Performance Computing (HiPC)
International Wireless Communications and Mobile Computing Conference (IWCMC)
ACM SIGMOD Conference
IEEE International Conference on Pervasive Computing and Communications
IEEE INFOCOM Conference
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Dissertation Title *The Design and Evaluation of Web Prefetching and Caching Techniques* (2002)

Dissertation Abstract User-perceived retrieval latencies in the World Wide Web can be improved by pre-loading a local cache with resources likely to be accessed. A user requesting content that can be served by the cache is able to avoid the delays inherent in the Web, such as congested networks and slow servers. The difficulty, then, is to determine what content to prefetch into the cache.

This work explores machine learning algorithms for user sequence prediction, both in general and specifically for sequences of Web requests. We also consider information retrieval techniques to allow the use of the content of Web pages to help predict future requests. Although history-based mechanisms can provide strong performance in predicting future requests, performance can be improved by including predictions from additional sources.

While past researchers have used a variety of techniques for evaluating caching algorithms and systems, most of those methods were not applicable to the evaluation of prefetching algorithms or systems. Therefore, two new mechanisms for evaluation are introduced. The first is a detailed trace-based simulator, built from scratch, that estimates client-side response times in a simulated network of clients, caches, and Web servers with various connectivity. This simulator is then used to evaluate various prefetching approaches. The second evaluation method presented is a novel architecture to simultaneously evaluate multiple proxy caches in a live network, which we introduce, implement, and demonstrate through experiments. The simulator is appropriate for evaluation of algorithms and research ideas, while simultaneous proxy evaluation is ideally suited to implemented systems.

We also consider the present and the future of Web prefetching, finding that changes to the HTTP standard will be required in order for Web prefetching to become commonplace.

Dissertation Advisor Haym Hirsh (Professor and former Dean of the Faculty of Computing and Information Science at Cornell University; former Professor and department chair, Dept. of Computer Science, Rutgers University; former Director of the Division of Information and Intelligent Systems at the National Science Foundation)

Nationality U.S. Citizen

References and extended curriculum vitae available upon request.