Lenwood Scott Heath

Curriculum Vitae
August 12, 2025

CONTACT INFORMATION

Mailing Address:
Virginia Tech
Department of Computer Science
1160 Torgersen Hall
620 Drillfield Drive
Blacksburg, VA 24061

Physical Office:
2160J Torgersen Hall

Web: `http://people.cs.vt.edu/~heath/`

Google Scholar: `http://scholar.google.com/citations?user=9VDFIQoAAAAJ`

ORCID: `https://orcid.org/0000-0003-1608-431X`

Primary Email: `heath@vt.edu`

Secondary Email: `heath@cs.vt.edu`

EDUCATION

Ph.D., Computer Science, University of North Carolina, Chapel Hill, 1985
Dissertation: **Algorithms for Embedding Graphs in Books**

M.S., Mathematics, University of Chicago, 1976

B.S., Mathematics, University of North Carolina, Chapel Hill, 1975

RESEARCH INTERESTS

Algorithms, theoretical computer science, graph theory, bioinformatics, computational biology, computational epidemiology, genomics, probability, symbolic computation, computational algebra, parallel architectures, graph embeddings, topology, computational geometry

PROFESSIONAL EXPERIENCE

2021–	Affiliated Faculty of the Center for Advanced Innovation in Agriculture (CAIA), Virginia Polytechnic Institute and State University, Blacksburg, VA
2020–	Affiliated Faculty of the Center for Emerging, Zoonotic, and Arthropod-borne Pathogens (CeZAP), Virginia Polytechnic Institute and State University, Blacksburg, VA

2019–2021	Member of the Quantum Information Science and Engineering (QISE) Working Group, Virginia Polytechnic Institute and State University, Blacksburg, VA
2014–	Faculty of Health Sciences, Virginia Polytechnic Institute and State University, Blacksburg, VA
2011–	Faculty of Sanghani Center for Artificial Intelligence and Data Analytics (Formerly, the Discovery Analytics Center (DAC)), Virginia Polytechnic Institute and State University, Blacksburg, VA
2003–	Faculty of the Genomics, Bioinformatics, and Computational Biology (GBCB) PhD program, Founding Faculty Member, Virginia Polytechnic Institute and State University, Blacksburg, VA
2003–	Professor of Computer Science, Virginia Polytechnic Institute and State University, Blacksburg, VA
1993–2003	Associate Professor of Computer Science, Virginia Polytechnic Institute and State University, Blacksburg, VA
1987–1993	Assistant Professor of Computer Science, Virginia Polytechnic Institute and State University, Blacksburg, VA
1985–1987	Instructor of Applied Mathematics, Theoretical Computer Science Group, Department of Mathematics, Massachusetts Institute of Technology, Cambridge, MA
1984–1985	Research Assistant, Duke University, Durham, NC; VLSI theory
1983	Instructor, University of North Carolina, Chapel Hill; computer organization
1982–1983	Research Assistant, University of North Carolina, Chapel Hill; transfer of software engineering technology to VLSI design
1981–1982	Teaching Assistant, University of North Carolina, Chapel Hill; NMOS and CMOS VLSI, language and automata theory
1977–1982	Software Engineer, Telex Terminal Communications, Raleigh, NC; application of microprocessors to communications
1976–1977	President and Engineer, Micronics, Inc., Greenville, NC; microcomputer products
1973–1975	Programmer, Burroughs-Wellcome Co., Greenville, NC; scientific and business programming; summer employment

Journal Papers

Published

[1] “Variant Evolution Graph: Can We Infer How SARS-CoV-2 Variants are Evolving?,” Badhan Das and Lenwood S. Heath. **PLOS ONE 20**, 2025, 25 pages.

[2] "Genotypic and Phenotypic Analyses Show *Ralstonia solanacearum* Cool Virulence is a Quantitative Trait Not Restricted to 'Race 3 biovar 2'," Ronnie J. Dewberry, Parul Sharma, Jessica L. Prom, Noah A. Kinscherf, Tiffany Lowe-Power, Reza Mazloom, Xuemei Zhang, Mohammad Arif, Michael Stulberg, Lenwood S. Heath, Kellye Eversole, Gwyn A. Beattie, Boris Vinatzer, and Caitilyn Allen. **Phytopathology,** 2024, 13 pages.

[3] "LINgroups as a Robust Principled Approach to Compare and Integrate Multiple Bacterial Taxonomies," Reza Mazloom, N. Tessa Pierce-Ward, Parul Sharma, Leighton Pritchard, C. Titus Brown, Boris A. Vinatzer, and Lenwood S. Heath. **IEEE/ACM Transactions on Computational Biology and Bioinformatics,** 2024, 2304–2314.

[4] "Investigating the Nature of Prokaryotic Genomic Island Locations Within a Genome," Reem Aldaihani and Lenwood S. Heath. **PLOS ONE,** 2024, 14 pages.

[5] "A Deep-Learning Approach for Identifying Prospective Chemical Hazards," Sohaib Habiballah, Lenwood S. Heath, and Brad Reisfeld. **Toxicology 501,** 2024, 9 pages.

[6] "Genomic Delineation and Description of Species and Within-species Lineages in the Genus Pantoea," Katherine C. Crosby, Mariah Rojas, Parul Sharma, Marcela Aguilera Johnson, Reza Mazloom, Brian H. Kvitko, Theo H. M. Smits, Stephanus N. Venter, Teresa A. Coutinho, Lenwood S. Heath, Marike Palmer, and Boris A. Vinatzer. **Frontiers in Microbiology 14,** 2023, 23 pages.

[7] "ARGem: A New Metagenomics Pipeline for Antibiotic Resistance Genes: Metadata, Analysis, and Visualization," Xiao Liang, Jingyi Zhang, Yoonjin Kim, Josh Ho, Kevin Liu, Ishi Keenum, Suraj Gupta, Benjamin Davis, Shannon L. Hepp, Liqing Zhang, Kang Xia, Katharine F. Knowlton, Jingqiu Liao, Peter J. Vikesland, Amy Pruden, and Lenwood S. Heath. **Frontiers in Genetics 14,** 2023, 14 pages.

[8] "Towards Understanding Paleoclimate Impacts on Primate De Novo Genes," Xiao Liang and Lenwood S. Heath. **G3: Genes—Genomes—Genetics,** 2023, 14 pages.

[9] "Adaptive Group Testing Strategy for Infectious Diseases using Social Contact Graph Partitions," Jingyi Zhang and Lenwood S. Heath. **Scientific Reports 13,** 2023, 16 pages.

[10] "A Complete Theoretical Framework for Inferring Horizontal Gene Transfers using Partial Order Sets," Nahla A. Belal and Lenwood S. Heath. **PLOS ONE,** 2023, 39 pages.

[11] "A Time Evolving Online Social Network Generation Algorithm," Pouyan Shirzadian, Blessy Antony, Akshaykumar Gattani, Nure Tasnina, and Lenwood S. Heath. **Scientific Reports 13,** 2023, 14 pages.

[12] "Connecting Genomic Islands across Prokaryotic and Phage Genomes via Protein Families," Reem Aldaihani and Lenwood S. Heath. **Scientific Reports 13,** 2023, 9 pages.

[13] "HT-ARGfinder: A Comprehensive Pipeline for Identifying Horizontally Transferred Antibiotic Resistance Genes and Directionality in Metagenomic Sequencing Data," Badhan Das, Muhit Islam Emon, Nazifa Ahmed Moumi, Justin Sein, Amy Pruden, Lenwood S. Heath, and Liqing Zhang. **Frontiers in Environmental Science 10**, 2022, 9 pages.

[14] "Investigating Plant Disease Outbreaks with Long-read Metagenomics: Sensitive Detection and Strain-level Identification of *Xylella fastidiosa*," Marcela A. Johnson, Haijie Liu, Elizabeth Bush, Parul Sharma, Shu Yang, Reza Mazloom, Lenwood S. Heath, Mizuho Nita, Song Li, and Boris A. Vinatzer. **Microbial Genomics 8**, 2022, 14 pages.

[15] "Could a Focus on the "Why" of Taxonomy Help Taxonomy Better Respond to the Needs of Science and Society?" Leighton Pritchard, C. Titus Brown, Bailey Harrington, Lenwood S. Heath, N. Tessa Pierce-Ward, and Boris Vinatzer. **Frontiers in Microbiology 13,** Evolutionary and Genomic Microbiology, 2022, 4 pages.

[16] "Meta Analysis of the *Ralstonia solanacearum* Species Complex (RSSC) Based on Comparative Evolutionary Genomics and Reverse Ecology," Parul Sharma, Marcela A. Johnson, Reza Mazloom, Caitilyn Allen, Lenwood S. Heath, Tiffany M. Lowe-Power, and Boris A. Vinatzer. **Microbial Genomics 8,** 2022, 14 pages.

[17] "Developmental Gene Regulatory Network Connections Predicted by Machine Learning from Gene Expression Data Alone," Jingyi Zhang, Farhan Ibrahim, Emily Najmulski, George Katholos, Doaa Altarawy, Lenwood S. Heath, and Sarah L. Tulin. **PLOS ONE 16,** 2021, 17 pages.

[18] "MetaMLP: A Fast Word Embedding Based Classifier to Profile Target Gene Databases in Metagenomic Samples," Gustavo Arango-Argoty, Lenwood S. Heath, Amy Pruden, Peter Vikesland, and Liqing Zhang. **Journal of Computational Biology 28,** 2021, 12 pages.

[19] "Next Generation Sequencing Approaches to Evaluate Water and Wastewater Quality," Emily Garner Benjamin C. Davis, Erin Milligan, Matthew F. Blair, Ishi Keenum, Ayella Maile-Moskowitz, Jin Pan, Mariah Gnegy, Krista Liguori, Suraj Gupta, Aaron J. Prussin, Linsey C. Marr, Lenwood S. Heath, Peter J. Vikesland, Liqing Zhang, and Amy Pruden. **Water Research 194,** 2021, 24 pages.

[20] "LINflow: A Computational Pipeline that Combines an Alignment-free with an Alignment-based Method to Accelerate Generation of Accurate Similarity Matrices for Prokaryotic Genomes," Long Tian, Reza Mazloom, Lenwood S. Heath, and Boris A. Vinatzer. **PeerJ,** 2021, 17 pages.

[21] "AgroSeek: A System for Computational Analysis of Environmental Metagenomic Data and Associated Metadata," Xiao Liang, Kyle Akers, Ishi Keenum, Lauren Wind, Suraj Gupta, Chaoqi Chen, Reem Aldaihani, Amy Pruden, Liqing Zhang, Katharine F. Knowlton, Kang Xia, and Lenwood S. Heath. **BMC Bioinformatics 22,** 2021, 14 pages.

[22] "Systematic Auditing is Essential to Debiasing Machine Learning in Biology," Fatma-Elzahraa Eid, Haitham Elmarakeby, Yujia Alina Chan, Nadine Fornelos, Mahmoud ElHefnawi, Eli Van Allen, Lenwood S. Heath, and Kasper Lage. **Communications Biology 4,** 2021, 9 pages.

[23] "Computing Genomic Signatures Using de Bruijn Chains," Lenwood S. Heath and Amrita Pati. **Advances in Computing and Engineering 1,** 2021, 26 pages.

[24] "Characterization of Protein-protein Interactions Between Rice Viruses and Vector Insects," Junjie Zhu, Fatma Elzahraa Eid, Lu Tong, Wan Zhao, Wei Wang, Lenwood S. Heath, Le Kang, and Feng Cui. **Insect Science 28,** 2021, 976–986.

[25] "Strain-level Identification of Bacterial Tomato Pathogens Directly from Metagenomic Sequences," Marco E. Mechan Llontop, Parul Sharma, Marcela Aguilera Flores, Shu Yang, Jill Pollock, Long Tian, Chenjie Huang, Lenwood S. Heath, Steve Rideout, Song Li, and Boris A. Vinatzer. **Phytopathology 110,** 2020, 12 pages.

[26] "LINbase: A Web Server for Genome-based Identification of Prokaryotes as Members of Crowdsourced Taxa," Long Tian, Chengjie Huang, Reza Mazloom, Lenwood S. Heath, and Boris A. Vinatzer. **Nucleic Acids Research,** 2020, 9 pages.

[27] "ARGminer: A Web Platform for Crowdsourcing-based Curation of Antibiotic Resistance Genes," Gustavo Alonso Arango-Argoty, Giselle K. P.Guron, Emily Garner, Virginia Riquelme, Peter J. Vikesland, and Liqing Zhang. **Bioinformatics,** 2020, 8 pages.

[28] "Comparing Time Series Transcriptome Data Between Plants Using a Network Module Finding Algorithm," Jiyoung Lee, Lenwood S. Heath, Ruth Grene, and Song Li. **Plant Methods 15,** 2019, 16 pages.

[29] "NanoARG: A Web Service for Contextualizing Antimicrobial Resistance Genes Identified from Nanopore-Derived Metagenomes," Gustavo Arango, Dongjuan Dai, Amy Pruden, Peter Vikesland, Lenwood S Heath, and Liqing Zhang. **Microbiome 7,** 2019, 18 pages.

[30] "Cyberbiosecurity Challenges of Pathogen Genome Databases," Boris A. Vinatzer, Lenwood S. Heath, Hussain Almohri, Micheal J. Stuhlberg, Christopher Lowe, and Song Li. **Frontiers in Bioengineering and Biotechnology,** 2019, 11 pages.

[31] "Effect of Antibiotic Use and Composting on Antibiotic Resistance Gene Abundance and Resistome Risks of Soils Receiving Manure-derived Amendments," Chaoqi Chen, Christine A. Pankow, Min Oh, Lenwood S. Heath, Liqing Zhang, Pang Du, Kang Xia, and Amy Pruden. **Environment International 128,** 2019, 233–243.

[32] "MCAT: Motif Combining and Association Tool," Yanshen Yang, Jeffrey A. Robertson, Zhen Guo, Jake Martinez, Christy Coghlan, and Lenwood S. Heath. **Journal of Computational Biology 26,** 2018, 15 pages.

[33] "MetaCompare: A Computational Pipeline for Prioritizing Environmental Resistome Risk," Min Oh, Amy Pruden, Lenwood S. Heath, Kang Xia, and Liqing Zhang. **FEMS Microbiology Ecology 94,** 2018, 9 pages.

[34] "DeepARG: A Deep Learning Approach for Predicting Antibiotic Resistance Genes from Metagenomic Data," Gustavo Arango-Argoty, Emily Garner, Amy Pruden, Lenwood S. Heath, Peter Vikesland, and Liqing Zhang. **Microbiome 6,** 2018, 15 pages.

[35] "Identification of Regulatory Modules in Genome Scale Transcription Regulatory Networks," Qi A. Song, Ruth Grene, Lenwood S. Heath, and Song Li. **BMC Systems Biology 18,** 2017, 18 pages.

[36] "PEAK: Integrating Curated and Noisy Prior Knowledge in Gene Regulatory Network Inference," Doaa Altarawy, Fatma-Elzahraa Eid, and Lenwood S. Heath. **Journal of Computational Biology 24,** 2017, 863–873.

[37] "MicroTarget: MicroRNA Target Gene Prediction Approach with Application to Breast Cancer," Hanaa Torkey, Lenwood S. Heath, and Mahmoud Elhefnawi. **Journal of Bioinformatics and Computational Biology 15,** 2017, 17 pages.

[38] "Beacon Editor: Capturing Signal Transduction Pathways Using the SBGN Activity Flow Language," Haitham Elmarakeby, Mostafa Arefiyan, Elijah Myers, Song Li, Ruth Grene, and Lenwood S. Heath. **Journal of Computational Biology 24,** 2017, 4 pages.

[39] "Expresso: A Database and Web Server for Exploring the Interaction of Transcription Factors and Their Target Genes in *Arabidopsis thaliana* Using ChIP-Seq Data," Delasa Aghamirzaie, Karthik Raja Velmurugan, Shuchi Wu, Doaa Altarawy, Lenwood S. Heath, and Ruth Grene. **F1000Research 6,** 2017, 5 pages.

[40] "A Proposal for a Portal to Make Earth's Microbial Diversity Easily Accessible and Searchable," Boris A. Vinatzer, Long Tian, and Lenwood S. Heath. **Antonie van Leeuwenhoek 110,** 2017, 1271–1279.

[41] "A Proposal for a Precise Genome Similarity-based Taxonomy for Plant Pathogenic Bacteria that is Sufficiently Precise to Reflect Phylogeny, Host Range, and Outbreak Affiliation Applied to *Pseudomonas syringae sensu lato* as a Proof of Concept," Boris A. Vinatzer, Alexandra J. Weisberg, Caroline L. Monteil, Haitham A. Elmarakeby, Samuel K. Sheppard, and Lenwood S. Heath. **Phytopathology 107,** 2017, pp. 18–28.

[42] "Labeled Cuts in Graphs," Tridib Dutta, Lenwood S. Heath, V. S. Anil Kumar, and Madhav V. Marathe. **Theoretical Computer Science 648,** 2016, pp. 34–39.

[43] "Computational Identification of Tissue-Specific Splicing Regulatory Elements in Human Genes from RNA-Seq Data," Eman Badr and Lenwood S. Heath. **PLOS ONE 11,** 2016, 18 pages.

[44] "A Machine Learning Approach to Predict Gene Regulatory Networks in Seed Development in Arabidopsis," Ying Ni, Delasa Aghamirzaie, Haitham Elmarakeby, Eva Collakova, Song Li, Ruth Grene, and Lenwood S. Heath. **Frontiers in Plant Science 7,** 2016, 13 pages.

[45] "Metagenomic Profiling of Historic Colorado Front Range Flood Impact on Distribution of Riverine Antibiotic Resistance Genes," Emily Garner, Joshua Wallace, Gustavo Argoty, Caitlin Wilkinson, Nicole Fahrenfeld, Lenwood S. Heath, Liqing Zhang, Mazdak Arabi, Diana Aga, and Amy Pruden. **Scientific Reports 6,** 2016, 10 pages.

[46] "MetaStorm: A Public Resource for Customizable Metagenomics Annotation," Gustavo Arango-Argoty, Gargi Singh, Lenwood S. Heath, Amy Pruden, Weidong Xiao, and Liqing Zhang. **PLOS ONE 11,** 2016, 13 pages.

[47] "DeNovo: Virus-Host Sequence-Based Protein-Protein Interaction Prediction," Fatma-Elzahraa Eid, Mahmoud ElHefnawi, and Lenwood S. Heath. **Bioinformatics 32,** 2016, pp. 1144-1150.

[48] "Potential Targets of VIVIPAROUS1/ABI3-LIKE1 (VAL1) Repression in Developing *Arabidopsis thaliana* Embryos," Andrew Schneider, Delasa Aghamirzaie, Haitham Elmarakeby, Arati N. Poudel, Abraham J. Koo, Lenwood S. Heath, Ruth Grene, and Eva Collakova. **The Plant Journal 85,** 2016, pp. 305–319.

[49] "Transcriptome-wide Functional Characterization Reveals Novel Relationships Among Differentially Expressed Transcripts in Developing Soybean Embryos," Delasa Aghamirzaie, Dhruv Batra, Lenwood S. Heath, Andrew Schneider, Ruth Grene, and Eva Collakova. **BMC Genomics 16,** 2015, 23 pages.

[50] "CoSREM: A Graph Mining Algorithm for the Discovery of Combinatorial Splicing Regulatory Elements," Eman Badr and Lenwood S. Heath. **BMC Bioinformatics 16,** 2015, 15 pages.

[51] "Similarity-Based Codes Sequentially Assigned to Ebolavirus Genomes are Informative of Species Membership, Associated Outbreaks, and Transmission Chains," Alexandra J. Weisberg, Haitham A. Elmarakeby, Lenwood S. Heath, and Boris A. Vinatzer. **Open Forum Infectious Diseases 2,** 2015, 11 pages.

[52] "Identifying Splicing Regulatory Elements with de Bruijn Graphs," Eman Badr and Lenwood S. Heath, **Journal of Computational Biology 21,** 2014, pp. 880-897.

[53] "A System to Automatically Classify and Name Any Individual Genome-Sequenced Organism Independently of Current Biological Classification and Nomenclature," Haitham Marakeby, Eman Badr, Hanaa Torkey, Yuhyun Song, Scotland Leman, Caroline L. Monteil, Lenwood S. Heath, and Boris A. Vinatzer. **PLOS ONE 9,** 2014, 12 pages.

[54] "Mining Posets from Linear Orders," Proceso L. Fernandez, Lenwood S. Heath, Naren Ramakrishnan, Michael Tan, and John Paul C. Vergara. **Discrete Mathematics, Algorithms and Applications 5,** 2013, 15 pages.

[55] "Changes in RNA Splicing in Developing Soybean (*Glycine max*) Embryos," Delasa Aghamirzaie, Mahdi Nabiyouni, Yihui Fang, Curtis Klumas, Lenwood S. Heath, Ruth Grene, and Eva Collakova. **Biology 2,** Special issue on Insights from Plant Genomes, 2013, 1311–1337.

[56] "The Poset Cover Problem," Lenwood S. Heath and Ajit K. Nema. **Open Journal of Discrete Mathematics 3,** 2013, 101–111.

[57] "Metabolic and Transcriptional Reprogramming in Developing Soybean (*Glycine max*) Embryos," Eva Collakova, Delasa Aghamirzaie, Yihui Fang, Curtis Klumas, Farzaneh Tabataba, Akshay Kakumanu, Elijah Myers, Lenwood S. Heath, and Ruth Grene. **Metabolites 3,** 2013, 26 pages.

[58] "Evidence for Extensive Heterotrophic Metabolism, Antioxidant Action, and Associated Regulatory Events during Winter Hardening in Sitka Spruce," Eva Collakova, Curtis Klumas, Haktan Suren, Elijah Myers, Lenwood S. Heath, Jason A. Holliday, and Ruth Grene. **BMC Plant Biology 13,** 2013, 16 pages.

[59] "Mining and Visualization of Microarray and Metabolomic Data Reveal Extensive Cell Wall Remodeling During Winter Hardening in Sitka Spruce (*Picea sitchensis*)," Ruth Grene, Curtis Klumas, Haktan Suren, Kuan Yang, Eva Collakova, Elijah Samuel Myers, Lenwood S. Heath, and Jason A. Holliday. **Frontiers in Plant Systems Biology 3,** 2012, 14 pages.

[60] "REGEN: Ancestral Genome Reconstruction for Bacteria," Kuan Yang, Lenwood S. Heath, and João C. Setubal. **Genes 3,** 2012, pp. 423–443.

[61] "Mining for Meaning: Visualization Approaches to Deciphering Arabidopsis Stress Responses in Roots and Shoots," Lecong Zhou, Christopher Franck, Kuan Yang, Guillaume Pilot, Lenwood S. Heath, and Ruth Grene. **OMICS: A Journal of Integrative Biology 16,** 2012, pp. 208–228.

[62] "ClaMS: A Classifier for Metagenomic Sequences," Amrita Pati, Lenwood S. Heath, Nikos C. Kyrpides, and Natalia Ivanova. **Standards in Genomic Sciences 5,** 2011, pp. 248–253.

[63] "Generating Random Graphs with Tunable Clustering Coefficient," Lenwood S. Heath and Nidhi Parikh. **Physica A 390,** 2011, pp. 4577–4587.

[64] "A Network of SCOP Hidden Markov Models and Its Analysis," Liqing Zhang, Layne T. Watson, and Lenwood S. Heath. **BMC Bioinformatics 12,** 2011, 11 pages.

[65] "A Theoretical Model for Whole Genome Alignment," Nahla A. Belal and Lenwood S. Heath. **Journal of Computational Biology 18,** 2011, pp. 705–728.

[66] "Differential Expression of Heat Shock Protein Genes in Preconditioning for Photosynthetic Acclimation in Water-Stressed Loblolly Pine," Cecilia Vasquez-Robinet, Jonathan I. Watkinson, Allan A. Sioson, Naren Ramakrishnan, Lenwood S. Heath, and Ruth Grene. **Plant Biochemistry and Physiology 48,** 2010, pp. 256–264.

[67] "Multimodal Networks: Structure and Operations," Lenwood S. Heath and Allan A. Sioson, **IEEE/ACM Transactions on Computational Biology and Bioinformatics 6,** 2009, pp. 321–332.

[68] "Semantics of Multimodal Network Models," Lenwood S. Heath and Allan A. Sioson, **IEEE/ACM Transactions on Computational Biology and Bioinformatics 6,** 2009, pp. 271–280.

[69] "Molecular and Physiological Adaptation to Prolonged Drought Stress in the Leaves of two Andean Potato Genotypes," Srinivasrao P. Mane, Cecilia Vasquez Robinet, Alexander Ulanov, Roland Schafleitner, Luz Tincopa, Amelie Gaudin, Giannina Nomberto, Carlos Alvarado, Christian Solis, Luis Avila Bolivar, Raul Blas, Oscar Ortega, Julio Solis, Ana Panta, Cristina Rivera, Ilanit Samolski, Doris H. Carbajulca, Meredith Bonierbale, Amrita Pati, Lenwood S. Heath, Hans J. Bohnert and Ruth Grene, **Functional Plant Biology 35,** 2008, pp. 669–688.

[70] "Tuber Development Phenotypes in Adapted and Acclimated, Drought-stressed *Solanum tuberosum* ssp. andigena Have Distinct Expression Profiles of Genes Associated with Carbon Metabolism," Jonathan I. Watkinson, Lori Hendricks, Allan A. Sioson, Lenwood S. Heath, Hans J. Bohnert, and Ruth Grene, **Plant Physiology and Biochemistry 46,** 2008, pp. 34–45.

[71] "CMGSDB: Integrating Heterogeneous *Caenorhabditis elegans* Data Sources Using Compositional Data Mining," Amrita Pati, Ying Jin, Karsten Klage, Rich Helm, Lenwood S. Heath, and Naren Ramakrishnan, **Nucleic Acids Research 36 (Database Issue),** 2008, pp. D69–76.

[72] "Early PLDα-Mediated Events in Response to Progressive Drought Stress in Arabidopsis: A Transcriptome Analysis," Srinivasrao P. Mane, Cecilia Vasquez-Robinet, Allan A. Sioson, Lenwood S. Heath, and Ruth Grene, **Journal of Experimental Botany 58**, 2007, pp. 241–252.

[73] "Accessions of *Solanum tuberosum ssp. andigena* Show Differences in Photosynthetic Recovery After Drought Stress as Reflected in Gene Expression Profiles," Jonathan I. Watkinson, Lori Hendricks, Allan A. Sioson, Cecilia Vasquez-Robinet, Lenwood S. Heath, Mary Schuler, Hans J. Bohnert, Merideth Bonierable, and Ruth Grene. **Plant Science 171,** 2006, pp. 745–758.

[74] "Effects of Chronic Ozone Exposure on Gene Expression in *Arabidopsis thaliana* Ecotypes and in *Thellungielia halophila,"* P. H. Li, S. P. Mane, A. A. Sioson, C. V. Robinet, L. S. Heath, H. J. Bohnert, and R. Grene, **Plant Cell and Environment 29**, 2006, pp. 854–868.

[75] "Response Diversity of *Arabidopsis thaliana* Ecotypes in Elevated [Co2] in the Field," P. H. Li, A. Sioson, S. P. Mane, A. Ulanov, G. Grothaus, L. S. Heath, T. M. Murali, H. J. Bohnert, and R. Grene, **Plant Molecular Biology 62**, 2006, pp. 593–609.

[76] "Some Fundamental Operations on Multimodal Networks in Biology," Allan A. Sioson and Lenwood S. Heath. **Philippine Computing Journal 1** 2006, pp. 13–22.

[77] "The Statistics of Identifying Differentially Expressed Genes in Expresso and TM4: A Comparison," Allan A. Sioson, Srinivasrao P. Mane, Pinghua Li, Wei Sha, Lenwood S. Heath, Hans J. Bohnert, and Ruth Grene. **BMC Bioinformatics 7,** 2006, 15 pages in main article; plus 5 pages in 2 additional files.

[78] "XcisClique: Analysis of Regulatory Bicliques," Amrita Pati, Cecilia Vasquez-Robinet, Lenwood S. Heath, Ruth Grene, and T. M. Murali. **BMC Bioinformatics 7,** 2006, 14 pages in main article; plus 16 pages in 7 additional files.

[79] "The PMU Placement Problem," Dennis J. Brueni and Lenwood S. Heath, **SIAM Journal on Discrete Mathematics 19,** 2005, pp. 744–761.

[80] "H++: A Server for Estimating pK(a)s and Adding Missing Hydrogens to Macromolecules," John C. Gordon, Jonathan B. Myers, Timothy Folta, Valia Shoja, Lenwood S. Heath, Alexey Onufriev, **Nucleic Acids Research 33,** 2005, pp. W368-W371, Supplement 2.

[81] "Processor-Efficient Sparse Matrix-Vector Multiplication," Lenwood S. Heath, Calvin J. Ribbens, and Sriram V. Pemmaraju, **Computers and Mathematics with Applications 48,** 2004, pp. 589–608.

[82] "Efficient Algorithms for Finding Conway Polynomials," Lenwood S. Heath and Nicholas A. Loehr, **Journal of Symbolic Computation 38,** 2004, pp. 1003-1024.

[83] "Photosynthetic Acclimation is Reflected in Specific Patterns of Gene Expression in Drought-Stressed Loblolly Pine," Jonathan I. Watkinson, Allan A. Sioson, Cecilia Vasquez-Robinet, Maulik Shukla, Deept Kumar, Margaret Ellis, Lenwood S. Heath, Naren Ramakrishnan, Boris I. Chevone, Layne T. Watson, Leonel Merwe van Zyl, Ulrika Egertsdotter, Ronald R. Sederoff, and Ruth Grene, **Plant Physiology 133(4),** 2003, pp. 1702–1716.

[84] “Sorting by Short Swaps,” Lenwood S. Heath and John Paul C. Vergara, **Journal of Computational Biology 10(5),** 2003, pp. 775–789.

[85] “Clustering Mass Spectrometry Data using Order Statistics,” Douglas J. Slotta, Lenwood S. Heath, Naren Ramakrishnan, Rich Helm, and Malcolm Potts, **Proteomics 3 (9),** 2003, pp. 1687–1691.

[86] “Studying the Functional Genomics of Stress Responses in Loblolly Pine using the Expresso Microarray Management System,” Lenwood S. Heath, Naren Ramakrishnan, Ronald R. Sederoff, Ross W. Whetten, Boris I. Chevone, Craig A. Struble, Vincent Y. Jouenne, Dawei Chen, Leonel Merwe van Zyl, and Ruth Grene, **Comparative and Functional Genomics 3,** 2002, pp. 226–243.

[87] “Role of Superoxide Dismutase (SODs) in Controlling Oxidative Stress in Plants,” Ruth Alscher, Neval Erturk, and Lenwood S. Heath, **Journal of Experimental Botany 53,** 2002, pp. 1331-1341.

[88] “Constructing Homomorphism Spaces and Endomorphism Rings,” Edward L. Green, Lenwood S. Heath, and Craig A. Struble, **Journal of Symbolic Computation 32,** 2001, pp. 101-117.

[89] “The Pagenumber of k-Trees is $O(k)$,” Joseph L. Ganley and Lenwood S. Heath, **Discrete Applied Mathematics 109,** 2001, pp. 215–221.

[90] “Sorting by Short Block-Moves,” Lenwood S. Heath and John Paul C. Vergara, **Algorithmica 28,** 2000, pp. 323–352.

[91] “Stack and Queue Layouts of Directed Acyclic Graphs: Part I,” Lenwood S. Heath, Sriram V. Pemmaraju, and Ann Trenk, **SIAM Journal on Computing 28,** 1999, pp. 1510–1539.

[92] “Stack and Queue Layouts of Directed Acyclic Graphs: Part II,” Lenwood S. Heath and Sriram V. Pemmaraju, **SIAM Journal on Computing 28,** 1999, pp. 1588–1626.

[93] “Sorting by Bounded Block-Moves,” Lenwood S. Heath and John Paul C. Vergara, **Discrete Applied Mathematics 88,** Second special issue on computational biology, 1998, pp. 181–206.

[94] “Edge-Packing in Planar Graphs,” Lenwood S. Heath and John Paul C. Vergara, **Theory of Computing Systems 31,** 1998, pp. 629–662.

[95] “An Experimental Evaluation of Local Search Heuristics for Graph Partitioning,” Joseph L. Ganley and Lenwood S. Heath, **Computing 60,** 1998, pp. 121–132.

[96] “Edge-Packing Planar Graphs by Cyclic Graphs,” Lenwood S. Heath and John Paul C. Vergara, **Discrete Applied Mathematics 81,** 1998, pp. 169–180.

[97] “Stack and Queue Layouts of Posets,” Lenwood S. Heath and Sriram V. Pemmaraju, **SIAM Journal on Discrete Mathematics 10,** 1997, pp. 599–625.

[98] “Graph Embeddings and Simplicial Maps,” Lenwood S. Heath, **Theory of Computing Systems 30,** 1997, pp 51–65. Invited submission for the special issue on SPAA ’93.

[99] "Envision: A User-Centered Database of Computer Science Literature," Lenwood S. Heath, Deborah Hix, Lucy T. Nowell, William C. Wake, Guillermo A. Averboch, Eric Labow, Scott A. Guyer, Dennis J. Brueni, Robert K. France, Kaushal Dalal, and Edward A. Fox, **Communications of the ACM 38,** 1995, pp. 52–53.

[100] "Optimal and Random Partitions of Random Graphs," Joseph L. Ganley and Lenwood S. Heath, **The Computer Journal 37,** 1994, pp. 641–643.

[101] "New Results for the Minimum Weight Triangulation Problem," Lenwood S. Heath and Sriram V. Pemmaraju, **Algorithmica 12,** 1994, pp. 533–552.

[102] "Heuristics for Laying Out Information Graphs," Joseph L. Ganley and Lenwood S. Heath, **Computing 52,** 1994, pp. 389–405.

[103] "Representing Polyhedra: Faces are Better than Vertices," Lenwood S. Heath, Praveen K. Paripati, and John W. Roach, **Computational Geometry: Theory and Applications 3,** 1993, pp. 327–351.

[104] "Users, User Interfaces, and Objects: Envision, a Digital Library," Edward A. Fox, Deborah Hix, Lucy T. Nowell, Dennis J. Brueni, William C. Wake, Lenwood S. Heath, and Durgesh Rao, **Journal of the American Society for Information Science 44,** 1993, pp. 480–491.

[105] "A Generalized Comparison of Quadtree and Bintree Storage Requirements," Clifford A. Shaffer, Ramana R. Juvvadi, and Lenwood S. Heath, **Image and Vision Computing 11**, 1993, pp. 402-412.

[106] "Laying Out Graphs Using Queues," Lenwood S. Heath and Arnold L. Rosenberg, **SIAM Journal on Computing 21,** 1992, pp. 927–958.

[107] "The Pagenumber of Genus g Graphs is $O(g)$," Lenwood S. Heath and Sorin Istrail, **Journal of the Association for Computing Machinery 39,** 1992, pp. 479–501.

[108] "Comparing Queues and Stacks as Mechanisms for Laying Out Graphs," Lenwood S. Heath, Frank Thomson Leighton, and Arnold L. Rosenberg, **SIAM Journal on Discrete Mathematics 5,** 1992, pp. 398–412.

[109] "Practical Minimal Perfect Hash Functions for Large Databases," Edward A. Fox, Lenwood S. Heath, Qi Fan Chen, and Amjad M. Daoud, **Communications of the ACM 35,** 1992, pp. 105–121.

[110] "Order-Preserving Minimal Perfect Hash Functions and Information Retrieval," Edward A. Fox, Qi Fan Chen, Amjad M. Daoud, and Lenwood S. Heath, invited paper, **ACM Transactions on Information Systems 9,** 1991, pp. 281–308.

[111] "Optimal Embeddings of Butterfly-Like Graphs in the Hypercube," David S. Greenberg, Lenwood S. Heath, and Arnold L. Rosenberg, **Mathematical Systems Theory 23,** 1990, pp. 61–77.

[112] "Covering a Set with Arithmetic Progressions is NP-Complete," Lenwood S. Heath, **Information Processing Letters 34,** 1990, 293–298.

[113] "The Physical Mapping Problem for Parallel Architectures," Lenwood S. Heath, Arnold L. Rosenberg, and Bruce T. Smith, **Journal of the Association for Computing Machinery 35,** 1988, pp. 603–634.

[114] "Embedding Outerplanar Graphs in Small Books," Lenwood S. Heath, **SIAM Journal on Algebraic and Discrete Methods 8,** 1987, pp. 198–218.

Submitted

[115] "Insights into Vascular Streak Dieback, an Emerging Disease of Woody Ornamentals in the United States, using a Metagenomic Sequencing Approach," Kassaye Belay, Sahar Abdelrazek, Davin Bily, Tashi Gyatso, Farhat Avin, Lina Rodriguez Salamanca, John Bonkowski, Prabha Liyanapathiranage, Lenwood S. Heath, Fulya Baysal-Gurel, and Boris Vinatzer. Submitted to **New Phytologist,** 2025.

[116] "ViraFit: Tuneable Fitness Model for Viral Evolution Within a Contact Network," Badhan Das and Lenwood S. Heath. Submitted to **Journal of Computational Biology,** 2025.

[117] "Knowledge Graph Representation of Cross-Species Transmission and Network Analysis of Climate Change Impacts on Mammalian Habitats," Yoonjin Kim and Lenwood S. Heath. Submitted to **Ecological Information,** 2025.

[118] "Reflections on the Presence of Human Cancer Genes in Primate Species," Xiao Liang and Lenwood S. Heath. Submitted to **Journal of Computational Biology,** 2025.

In Preparation

[119] "Leveraging Information Theory to Select Host-Virus Testing Pairs for Cross-Species Transmission," Yoonjin Kim and Lenwood S. Heath. In preparation, 2025.

[120] "Network Analysis of Cross-Species Transmission and Habitat Migration Under Climate Change in Knowledge Graphs," Yoonjin Kim and Lenwood S. Heath. In preparation, 2025.

[121] "GRANet: Graph Regulatory Attention Network for Gene Regulatory Network Reconstruction". Jingyi Zhang, Gerardo Alejo-Jacuinde, Melvin J. Oliver, John C. Cushman, Luis Herrera-Estrella, and Lenwood S. Heath. In preparation, 2025.

[122] "Insights into the Origin, Preservation, and Absence of Human Brain and Immune-related Genes in Non-human Species," Xiao Liang and Lenwood S. Heath. In preparation, 2025.

Conference Papers

Published

[1] "LINgroups as a Principled Approach to Compare and Integrate Multiple Bacterial Taxonomies," Reza Mazloom, Leighton Pritchard, C. Titus Brown, Boris A. Vinatzer, and Lenwood S. Heath. **The 13th ACM Conference on Bioinformatics, Computational Biology, and Health Informatics (ACM-BCB 2022),** 2022, 7 pages.

[2] "SNPwise: A SNP Aware Short Read Aligner," Saima Sultana Tithi, Lenwood S. Heath and Liqing Zhang, **7th International Conference on Bioinformatics and Computational Biology (BICoB-2015)**, 2015, 6 pages.

[3] "Human MicroRNAs Targeting Hepatitis C Virus," Fatma Elzahraa Eid, Haitham Elmarakeby, Lenwood S. Heath, and Mahmoud Elhefnawi, **Proceedings of the Middle East Conference on Biomedical Engineering (MECBME),** 2014, pp. 184–187.

[4] "Blended HMMs: Reducing Redundancy in the SCOP HMM Database," Mingming Liu, Lenwood S. Heath, Layne T. Watson, and Liqing Zhang. **The 13th International Conference on Bioinformatics and Computational Biology (BIOCOMP'12),** 2012, 6 pages.

[5] "Sorting Genomes Using Almost-Symmetric Inversions," Zanoni Dias, Ulisses Dias, Lenwood S. Heath, and João C. Setubal. **Proceedings of the 27th ACM Symposium on Applied Computing (SAC 2012),** 2012, pp. 47–53.

[6] "Optimizing a Cost Matrix to Solve Rare-Class Biological Problems," Mark J. Lawson, Lenwood S. Heath, Hai Zhao, and Liqing Zhang. **The 2011 International Conference on Bioinformatics and Computational Biology (BIOCOMP'11),** 2011, pp. 544–550.

[7] "A Network of Hidden Markov Models and Its Analysis," Liqing Zhang, Layne T. Watson, and Lenwood S. Heath. **Proceedings of the 2011 International Conference on Bioinformatics and Computational Biology (BIOCOMP'11),** Las Vegas, Nevada, 2011, pp. 337–342.

[8] "Extracting Temporal Signatures for Comprehending Systems Biology Models," Naren Sundaravaradan, K. S. M. Tozammel Hossain, Vandana Sreedharan, Douglas J. Slotta, John Paul C. Vergara, Lenwood S. Heath, Naren Ramakrishnan, **16th ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD-2010),** Washington, DC, 2010, pp. 453–462.

[9] "A Genome Compression Algorithm Supporting Manipulation," Lenwood S. Heath, Ao-ping Hou, Huadong Xia, and Liqing Zhang, **9th Annual International Conference on Computational Systems Bioinformatics (CSB 2010),** Stanford, California, 2010, pp. 38–49.

[10] "Correlation Between Computed Equilibrium Secondary Structure Free Energy and siRNA Efficiency," Puranjoy Bhattacharjee, Naren Ramakrishnan, Lenwood S. Heath, and Alexey V. Onufriev, **IEEE International Conference on Bioinformatics and Biomedicine Workshop (BIBMW 2009),** Washington, DC, 2009, pp. 351–351.

[11] "Using Relative Importance Methods to Model High-throughput Gene Perturbation Screens," Ying Jin, Naren Ramakrishnan, Lenwood S. Heath, and Richard F. Helm, **Computational Systems Bioinformatics: Proceedings of the CSB 2008 Conference,** Stanford, California, 2008, pp. 225–236.

[12] "Using Cost-Sensitive Learning to Determine Gene Conversions," Mark J. Lawson, Lenwood S. Heath, Naren Ramakrishnan, and Liqing Zhang, **Proceedings of Advanced Intelligent Computing Theories and Applications, With Aspects of Artificial Intelligence,** Lecture Notes in Computer Science 5227, Springer, 2008, pp. 1030–1038.

[13] "Predicting Markov Chain Order in Genomic Sequences," Lenwood S. Heath and Amrita Pati, **Proceedings of the IEEE International Conference on Bioinformatics and Biomedicine (BIBM),** IEEE Computer Society Press, 2007, pp. 159–164.

[14] "Genomic Signatures in de Bruijn Chains," Lenwood S. Heath and Amrita Pati, **Proceedings of the Workshop on Algorithms in Bioinformatics (WABI),** Springer Lecture Notes in Computer Science, volume 4645, 2007, pp. 216–227.

[15] "Genomic Signatures from DNA Word Graphs," Lenwood S. Heath and Amrita Pati. **Proceedings of the Third International Symposium on Bioinformatics Research and Applications, ISBRA 2007,** Springer Lecture Notes in Computer Science, volume 4463, 2007, pp. 317–328.

[16] "Expresso and Chips: Creating a Next Generation Microarray Experiment Management Systems," Allan A. Sioson, Jonathan I. Watkinson, Cecilia Vasquez-Robinet, Margaret Ellis, Maulik Shukla, Deept Kumar, Naren Ramakrishnan, Lenwood S. Heath, Ruth Grene, Boris I. Chevone, K. Kafadar, and Layne T. Watson, **Proceedings of the Next Generation Software Workshop, 17th International Parallel and Distributed Processing Symposium (IPDPS'03),** Nice, France, IEEE Computer Society, ISBN 0769519261 (CDROM), 2003, 8 pages.

[17] "Networks in Bioinformatics," Lenwood S. Heath, **Proceedings of the 2002 International Symposium on Parallel Architectures, Algorithms, and Networks (I-SPAN 2002),** 2002, pp. 141–150.

[18] "Computational Approaches to Combining Predictive Biological Models," Douglas J. Slotta, Lenwood S. Heath, Naren Ramakrishnan, Rich Helm, and Malcolm Potts, **Proceedings of the High Performance Computing Symposium, Advanced Simulation Technologies Conference (HPC 2002),** 2002, pp. 75–80.

[19] "Expresso — A Problem Solving Environment for Bioinformatics: Finding Answers With Microarray Technology," Ruth G. Alscher, Boris I. Chevone, Lenwood S. Heath, and Naren Ramakrishnan, **Proceedings of the High Performance Computing Symposium, Advanced Simulation Technologies Conference (HPC 2001),** 2001, pp. 64–69.

[20] "Constructing Endomorphism Rings Via Duals," Edward L. Green, Lenwood S. Heath, and Craig A. Struble, **International Symposium on Symbolic and Algebraic Computation (ISSAC 2000),** 2000, pp. 129–136.

[21] "Efficient Construction of Drinfel'd Doubles," Gerard P. Brunick, Edward L. Green, Lenwood S. Heath, and Craig A. Struble, **International Symposium on Symbolic and Algebraic Computation (ISSAC'99),** 1999, pp. 45–52.

[22] "New Algorithms for Generating Conway Polynomials over Finite Fields," Lenwood S. Heath and Nicholas A. Loehr, **Tenth Annual ACM-SIAM Symposium on Discrete Algorithms (SODA),** 1999, pp. 429–437.

[23] "Opal: A System for Computing Noncommutative Gröbner Bases (System Description)," Edward A. Green, Lenwood S. Heath, and Benjamin J. Keller, **Eighth International Conference on Rewriting Techniques and Applications (RTA-97),** 1997, pp. 331–334.

[24] "Visualizing Search Results: Some Alternatives to Query-Document Similarity," Lucy T. Nowell, Robert K. France, Deborah Hix, Lenwood S. Heath, and Edward A. Fox, **Proceedings of the 19th Annual International ACM SIGIR Conference on Research and Development in Information Retrieval,** 1996, pp. 67–75.

[25] "SWAN: A Student-Controllable Data Structure Visualization System," Clifford A. Shaffer, Lenwood S. Heath, Jeffrey M. Nielsen, and Jun Yang, **Proceedings of ED-MEDIA 96,** 1996, pp. 632–637.

[26] "Using the SWAN Data Structure Visualization System for Computer Science Education," Clifford A. Shaffer, Lenwood S. Heath, and Jun Yang, **Proceedings of the Twenty-Seventh SIGCSE Technical Symposium on Computer Science Education,** 1996, pp. 140–144.

[27] "Recognizing Leveled-Planar Dags in Linear Time," Lenwood S. Heath and Sriram V. Pemmaraju, **Proceedings of Graph Drawing '95,** Springer, Lecture Notes in Computer Science 1027, 1996, pp. 300–311.

[28] "SWAN: A Data Structure Visualization System," Jun Yang, Clifford A. Shaffer, and Lenwood S. Heath, **Proceedings of Graph Drawing '95,** Lecture Notes in Computer Science 1027, 1996, pp. 520–523.

[29] "Progress in Interactive Learning with a Digital Library in Computer Science," Edward A. Fox, N. Dwight DAGS, Clifford A. Shaffer, Lenwood Heath, William C. Wake, Lucy T. Nowell, JAN Lee, Deborah Hix, and H. Rex Hartson, **Proceedings ED-MEDIA 95, World Conference on Educational Multimedia and Hypermedia,** 1995, Graz, Austria, pp. 7–12.

[30] "Lower Bounds for Graph Embeddings Via Algebraic Topology (Extended Abstract)," Lenwood S. Heath, **Proceedings of the Fifth Annual ACM Symposium on Parallel Algorithms and Architectures,** 1993, pp. 311–317.

[31] "A User-Centered Database from the Computer Science Literature," Edward A. Fox, Lenwood S. Heath, and Deborah Hix, **Proceedings of the NSF Scientific Database Projects 1991–1993,** AAAS Workshop on Advances in Data Management for the Scientist and Engineer, Boston, Massachusetts, February 14–16, 1993, Wesley W. Chu, A. F. Cardena, and Ricky K. Taira (Editors), pp. 70–75.

[32] "What If There Were Desktop Access to the Computer Science Literature?" Dennis J. Brueni, Bailey Cross, Edward A. Fox, Lenwood S. Heath, Deborah Hix, Lucy T. Nowell, and William C. Wake, **Proceedings of the 21st Annual ACM Computer Science Conference,** 1993, pp. 15–22.

[33] "A Faster Algorithm for Constructing Minimal Perfect Hash Functions," Edward A. Fox, Qi Fan Chen, and Lenwood S. Heath, **Proceedings of the 15th Annual International Conference on Research and Development in Information Retrieval (SIGIR),** 1992, pp. 266–273.

[34] "Edge Coloring Planar Graphs with Two Outerplanar Subgraphs," Lenwood S. Heath, **Proceedings of the Second ACM-SIAM Symposium on Discrete Algorithms,** 1991, pp. 195–202.

[35] "Graph Layout Using Queues (Extended Abstract)," Lenwood S. Heath, Frank Thomson Leighton, and Arnold L. Rosenberg, **Proceedings of the 28th Annual Allerton Conference on Communication, Control, and Computing,** 1990, pp. 305–314.

[36] "Order Preserving Minimal Perfect Hash Functions and Information Retrieval," Edward A. Fox, Qi Fan Chen, Amjad M. Daoud, and Lenwood S. Heath, **Proceedings of the 13th Annual International Conference on Research and Development in Information Retrieval,** 1990, pp. 279–311.

[37] "Polyhedra: Faces are Better than Vertices (Extended Abstract)," Lenwood S. Heath, P. K. Paripati, and J. W. Roach, **Proceedings of the Second Canadian Conference in Computational Geometry,** 1990, pp. 191–199.

[38] "A More Cost Effective Algorithm for Finding Minimal Perfect Hash Functions," Edward A. Fox, Qi Fan Chen, Lenwood S. Heath, and Sanjeev Datta, **Seventeenth Annual ACM Computer Science Conference,** 1989, pp. 114–122.

[39] "The Pagenumber of Genus g Graphs is $O(g)$," Lenwood S. Heath and Sorin Istrail, **Proceedings of the 19th Annual ACM Symposium on Theory of Computing,** 1987, pp. 388–397.

[40] "Embedding Planar Graphs in Seven Pages," Lenwood S. Heath, **Proceedings of the 25th Annual IEEE Symposium on Foundations of Computer Science,** 1984, pp. 74–83.

Submitted

[41] "Capturing the Mutational Dynamics of SARS-CoV-2 with Graphs," Badhan Das and Lenwood S. Heath. **Proceedings of the 16th ACM Conference on Bioinformatics, Computational Biology, and Health Informatics (ACM BCB)**, 2025. Submitted, 2025.

ABSTRACTS AND POSTERS

[1] "Constrained Mining of Minimal Separators with Applications to Gene Perturbation Studies (Poster)," Ying Jin, Naren Ramakrishnan, Lenwood S. Heath, and Richard Helm, **Seventh Asia Pacific Bioinformatics Conference (APBC 2009),** Beijing, China, January, 2009.

[2] "Genomic Signatures from DNA Word Graphs (Poster)", Amrita Pati and Lenwood S. Heath, Grace Hopper Celebration of Women in Computing, October 17-20, 2007.

[3] "Effects of Drought Stress on Phospholipid Signaling in Arabidopsis (Poster)," Srinivasrao Mane, Cecilia Vasquez-Robinet, Allan A. Sioson, Lenwood S. Heath, and Ruth Grene. InterDrought-II, The Second International Conference on Integrated Approaches to Sustain and Improve Plant Production Under Drought Stress, Rome, Italy, September, 2005. Also presented at the International Conference on Plant Lipid Mediated Signaling: Building Connections, Raleigh, NC, October, 2005.

[4] "XcisClique: Analyzing Regulatory Bicliques in *Arabidopsis thaliana* (Poster)," Amrita Pati, Cecilia Vasquez-Robinet, Lenwood S. Heath, Ruth Grene, and T. M. Murali. 8th Annual Conference on Computational Genomics, Cambridge, MA, November, 2005.

[5] “Clustering Mass Spectrometry Data using Order Statistics (Abstract),” Douglas J. Slotta, Lenwood S. Heath, and Naren Ramakrishnan. First Annual Proteomics Data Mining Conference, Duke University, Durham, NC, September, 2002.

[6] “Identifying Changes in Gene Expression During Drought Stress Using Expresso (Poster),” Jonathan I. Watkinson, Allan A. Sioson, Maulik Shukla, Lenwood S. Heath, Naren Ramakrishnan, Boris I. Chevone, Layne T. Watson, Jennifer W. Weller, Ronald R. Sederoff, Leonel Merwe van Zyl, and Ruth G. Alscher. Presented at ASPB (American Society of Plant Biologists) Plant Biology 2002, Denver, CO, August, 2002.

[7] “Effects of Drought Stress on Gene Expression Patterns in the Needles of Loblolly Pine Trees: Towards a PSE for the Analysis of Microarray Data (Poster),” Lenwood S. Heath, Naren Ramakrishnan, Ronald R. Sederoff, Leonel Merwe van Zyl, Dawei Chen, Y.-H. Sun, Boris I. Chevone, S.-H. Li, Keying Ye, Ross Whetten, and Ruth G. Alscher. Presented at the Gordon Conference on Biological Regulatory Mechanisms, Holderness, NH, July 2000.

Books

[1] **Understanding Computation: Pillars, Paradigms, Principles,** Arnold L. Rosenberg and Lenwood S. Heath, Springer, ISBN-13: 978-3-031-10054-3, 2022, 570 pp.

[2] **The Problem Solving Handbook for Computational Biology and Bioinformatics,** Lenwood S. Heath and Naren Ramakrishnan, editors, Springer, ISBN-13: 978-0387097596, 2011, 347 pp.

[3] **Graph Separators, with Applications,** Arnold L. Rosenberg and Lenwood S. Heath, Kluwer Academic Publishers, Norwell, Massachusetts, ISBN 0-306-46464-0, June, 2001, 264 pp.

Book Chapters

[1] “Stack and Queue Layouts of Directed Acyclic Graphs,” Lenwood S. Heath, Sriram V. Pemmaraju, and Ann Trenk, an extended abstract in **Planar Graphs,** William T. Trotter, editor, American Mathematical Society, Providence, Rhode Island, 1993, pp. 5–11.

[2] “Hashing,” Steve Wartik, Edward A. Fox, Lenwood S. Heath, and Qi Fan Chen, chapter in **Information Retrieval: Data Structures and Algorithms,** William B. Frakes and Ricardo Baeza-Yates, editors, Prentice-Hall, Engelwood Cliffs, NJ, 1992, pp. 293–362.

Preface

[1] “The Emerging Landscape of Bioinformatics Software Systems,” Lenwood S. Heath and Naren Ramakrishnan, Guest editors’ introduction to the Special Issue on Bioinformatics Software, **IEEE Computer 35,** July, 2002, pp. 41–45.

SOFTWARE

[1] Expresso System for Microarray Experiment Management, Design, and Analysis. Co-developer with Naren Ramakrishnan. 2000–2010.

[2] Hopf System for Noncommutative Algebra. Collaborator with Edward A. Green, graduate students, and undergraduate students. 1996–2001.

[3] Opal System for Noncommutative Groebner Bases. Co-advisor with Edward A. Green of system developer, Benjamin J. Keller, 1994–1997.

[4] SWAN Data Structure Visualization for Education. Collaborator with Clifford A. Shaffer and graduate students. 1995.

[5] Envision Digital Library System. Collaborator with Edward A. Fox, Deborah Hix, graduate students, and undergraduate students. Project manager. 1991–1995.

PUBLISHED REVIEWS

[1] Review of "New Tools to Study 1-11-representation of Graphs," **Mathematical Reviews MR4784917,** 2024.

[2] Review of "List Homomorphisms to Separable Signed Graphs," **Mathematical Reviews MR4736264,** 2024.

[3] Review of "Star Covers and Star Partitions of Double-split Graphs," **Mathematical Reviews MR4721758,** 2024.

[4] Review of "Perfect Matchings with Crossings," **Mathematical Reviews MR4716223,** 2024.

[5] Review of "Ann Wins the Nonrepetitive Game over Four Letters and the Erase-repetition Game over Six Letters," **Mathematical Reviews MR4691750,** 2024.

[6] Review of "A Polynomial Kernel for 3-leaf Power Deletion," **Mathematical Reviews MR4646392,** 2024.

[7] Review of "Min-max Partitioning of Hypergraphs and Symmetric Submodular Functions," **Mathematical Reviews MR4630464,** 2023.

[8] Review of "Reliability Analysis of 3-ary n-cube in Terms of Average Degree Edge-connectivity," **Mathematical Reviews MR4625932,** 2023.

[9] Review of "A Simple Algorithm for Graph Reconstruction," **Mathematical Reviews MR4622334,** 2023.

[10] Review of "A Bound on the Dissociation Number," **Mathematical Reviews MR4606415,** 2023.

[11] Review of "Completeness for the Complexity Class $\forall\exists\mathbb{R}$ and Area-universality," **Mathematical Reviews MR4598048,** 2023.

[12] Review of "Can Romeo and Juliet Meet? Or Rendezvous Games with Adversaries on Graphs," **Mathematical Reviews MR4596397,** 2023.

[13] Review of "Degree Distributions in Recursive Trees with Fitnesses," **Mathematical Reviews MR4583783,** 2023.

[14] Review of "Sharp Threshold for Rigidity of Random Graphs," **Mathematical Reviews MR4568355,** 2023.

[15] Review of "Kernelization of Arc Disjoint Cycle Packing in α-bounded Digraphs," **Mathematical Reviews MR4560567,** 2023.

[16] Review of "Angles of Arc-polygons and Lombardi Drawings of Cacti," **Mathematical Reviews MR4549460,** 2023.

[17] Review of "On the Explainability of Graph Convolutional Network with GCN Tangent Kernel." **Mathematical Reviews MR4531235,** 2023.

[18] Review of "Linearly Ordered Colourings of Hypergraphs." **Mathematical Reviews MR4614245,** 2023.

[19] Review of "Drawing Shortest Paths in Geodetic Graphs." **Mathematical Reviews MR4481424,** 2023.

[20] Review of "The Nature of Complex Networks." **Mathematical Reviews MR4477637,** 2023.

[21] Review of "Bumblebee Visitation Problem." **Mathematical Reviews MR4457781,** 2022.

[22] Review of "From Modular Decomposition Trees to Level-1 Networks: Pseudo-cographs, Polar-cats and Prime Polar-cats." **Mathematical Reviews MR4450427,** 2022.

[23] Review of "A Linear Time Algorithm for Connected p-centdian Problem on Block Graphs." **Mathematical Reviews MR4436576,** 2022.

[24] Review of "Preclustering Algorithms for Imprecise Points." **Mathematical Reviews MR4431039,** 2022.

[25] Review of "Computing the Inverse Geodesic Length in Planar Graphs and Graphs of Bounded Treewidth." **Mathematical Reviews MR4407502,** 2022.

[26] Review of "Computing Subset Transversals in H-free Graphs." **Mathematical Reviews MR4359425,** 2022.

[27] Review of "Computing a Metric Basis of a Bipartite Distance-hereditary Graph." **Mathematical Reviews MR4355151,** 2022.

[28] Review of "The Geodesic-transversal Problem." **Mathematical Reviews MR4312211,** 2022.

[29] Review of "Learning with Semi-definite Programming: Statistical Bounds Based on Fixed Point Analysis and Excess Risk Curvature." **Mathematical Reviews MR4329809,** 2021.

[30] Review of "Optimal Stopping for Many Connected Components in a Graph." **Mathematical Reviews MR4284173,** 2021.

[31] Review of "A Polynomial Kernel for Distance-hereditary Vertex Deletion." **Mathematical Reviews MR4276550,** 2021.

[32] Review of "The Complexity of the Parity Argument with Potential," Ishizuka, Takashi. **Mathematical Reviews MR4237463,** 2021.

[33] Review of "Fast and Simple Algorithms for Counting Dominating Sets in Distance-hereditary Graphs," Lin, Min-Sheng. **Mathematical Reviews MR4212280,** 2021.

[34] Review of "Distributed Edge Coloring and a Special Case of the Constructive Lovász Local Lemma," Chang, Yi-Jun, He, Qizheng, Li, Wenzheng, Pettie, Seth, and Uitto, Jara. **Mathematical Reviews MR4060406,** 2021.

[35] Review of "A Faster Algorithm for Minimum-cost Bipartite Perfect Matching in Planar Graphs," Asathulla, Mudabir Kabir, Khanna, Sanjeev, Lahn, Nathaniel, and Raghvendra, Sharath. **Mathematical Reviews MR4060400,** 2021.

[36] Review of "A Near-linear Approximation Scheme for Multicuts of Embedded Graphs with a Fixed Number of Terminals," Cohen-Addad, Vincent, Colin de Verdière, Éric, and de Mesmay, Arnaud. **Mathematical Reviews MR4194964,** 2021.

[37] Review of "The Use of a Pruned Modular Decomposition for Maximum Matching Algorithms on Some Graph Classes," Ducoffe, Guillaume and Popa, Alexandru. **Mathematical Reviews MR4192049,** 2021.

[38] Review of "The Complexity of Total k-domatic Partition and Total R-domination on Graphs with Weak Elimination Orderings," Lee, Chuan-Min. **Mathematical Reviews MR4156025,** 2021.

[39] Review of "Maximum Sparse Induced Subgraphs of the Binomial Random Graph with Given Number of Edges," Kamaldinov, Dmitry, Skorkin, Arkadiy, and Zhukovskii, Maksim. **Mathematical Reviews MR4173975,** 2021.

[40] Review of "A Compact Mixed Integer Linear Formulation for Safe Set Problems," Hosteins, Pierre. **Mathematical Reviews MR4163605,** 2021.

[41] Review of "Bounds on Maximum Concurrent Flow in Random Bipartite Graphs," Vilas, Fernando E., Olinick, Eli V., and Matula, David W. **Mathematical Reviews MR4163608,** 2021.

[42] Review of "Finding Independent Transversals Efficiently," Graf, Alessandra and Haxell, Penny. **Mathematical Reviews MR4152571,** 2021.

[43] Review of "On Nonfeasible Edge Sets in Matching-covered Graphs," Zhao, Xiao, Dong, Fengming, and Chen, Sheng. **Mathematical Reviews MR4158393,** 2021.

[44] Review of "A Strongly Polynomial Time Algorithm for the Maximum Supply Rate Problem on Trees," Takayama, Koki and Kobayashi, Yusuke **Mathematical Reviews MR4049945,** 2021.

[45] Review of "Strong Connectivity in Directed Graphs under Failures, with Applications," Georgiadis, Loukas, Italiano, Giuseppe F., and Parotsidis, Nikos. **Mathematical Reviews MR4142773,** 2021.

[46] Review of "Generating All Minimal Petri Net Unsolvable Binary Words," Erofeev, Evgeny, Barylska, Kamila, Mikulski, Łukasz, and Piątkowski, Marcin. **Mathematical Reviews MR4065835,** 2021.

[47] Review of "Planar Graphs Have Bounded Queue-number," **Mathematical Reviews MR4148600,** 2021. Dujmović, Vida, Joret, Gwenaël, Micek, Piotr, Morin, Pat, Ueckerdt, Torsten, and Wood, David R.

[48] Review of "Representative Sets and Irrelevant Vertices: New Tools for Kernelization," Kratsch, Stefan and Wahlström, Magnus. **Mathematical Reviews MR4116338,** 2021.

[49] Review of "Parameterized Algorithms in Bioinformatics: An Overview," Bulteau, Laurent and Weller, Mathias. **Mathematical Reviews MR4052490,** 2021.

[50] Review of "An Optimal Algorithm for Computing Minimum k-hop Dominating Set of Permutation Graphs," Sambhu Charan Barman, Madhumangal Pal, and Sukumar Mondal. **Mathematical Reviews MR4124060,** 2020.

[51] Review of "Representative Sets and Irrelevant Vertices: New Tools for Kernelization," Stefan Kratsch and Magnus Wahlström. **Mathematical Reviews MR4116338,** 2020.

[52] Review of "Counting and Enumerating Independent Sets With Applications to Combinatorial Optimization Problems," Frank Gurski and Carolin Rehs. **Mathematical Reviews MR4115637,** 2020.

[53] Review of "Enumeration and Extensions of Word-representants," Marisa Gaetz and Caleb Ji. **Mathematical Reviews MR4115490,** 2020.

[54] Review of "A Model for Finding Transition-minors," Benedikt Klocker, Herbert Fleischner, and Günther R. Raidl. **Mathematical Reviews MR4114894,** 2020.

[55] Review of "Matching Cut: Kernelization, Single-exponential Time FPT, and Exact Exponential Algorithms," Christian Komusiewicz, Dieter Kratsch, and Van Bang Le. **Mathematical Reviews MR4114880,** 2020.

[56] Review of "Parikh Word Representability of Bipartite Permutation Graphs," Wen Chean Teh, Zhen Chuan Ng, Muhammad Javaid, and Zi Jing Chern. **Mathematical Reviews MR4107749,** 2020.

[57] Review of "Linear-time Algorithms for Three Domination-based Separation Problems in Block Graphs," Gabriela R. Argiroffo, Silvia M. Bianchi, Yanina Lucarini, and Annegret K. Wagler. **Mathematical Reviews MR4103814,** 2020.

[58] Review of “Graph Stories in Small Area,” Manuel Borrazzo, Giordano Da Lozzo, Giuseppe Di Battista, Fabrizio Frati, and Maurizio Patrignani. **Mathematical Reviews MR4102957,** 2020.

[59] Review of “Fixed-parameter Tractable Algorithm and Polynomial Kernel for Max-cut Above Spanning Tree,” Jayakrishnan Madathil, Saket Saurabh, and Meirav Zehavi. **Mathematical Reviews MR4045730,** 2020.

[60] Review of “On the Equality of the Induced Matching Number and the Uniquely Restricted Matching Number for Subcubic Graphs,” M. Fürst and D. Rautenbach. **Mathematical Reviews MR4044819,** 2020.

[61] Review of “The Complexity of the Defensive Domination Problem in Special Graph Classes,” Tinaz Ekim, Arthur M. Farley, and Andrzej Proskurowski. **Mathematical Reviews MR4040048,** 2020.

[62] Review of “Towards Experimental P-systems Using Multivesicular Liposomes,” Richard Mayne, Neil Phillips, and Andrew Adamatzky. **Mathematical Reviews MR4059968,** 2020.

[63] Review of “Parameterized Algorithms in Bioinformatics: An Overview,” Laurent Bulteau and Mathias Weller. **Mathematical Reviews MR4052490,** 2020.

[64] Review of “A Sorting Network on Trees,” Avah Banerjee and Dana Richards. **Mathematical Reviews MR4040278,** 2020.

[65] Review of “Uniform Generation of Spanning Regular Subgraphs of a Dense Graph,” Pu Gao and Catherine Greenhill. **Mathematical Reviews MR4028826,** 2020.

[66] Review of “The Maximum 1-2 Matching Problem and Two Kinds of Its Variants,” Hiroki Izumi, Yuki Nishida, Sennosuke Watanabe, and Yoshihide Watanabe. **Mathematical Reviews MR4027131,** 2020.

[67] Review of “Ordered Level Planarity and Its Relationship to Geodesic Planarity, Bi-Monotonicity, and Variations of Level Planarity,” Boris Klemz and Günter Rote. **Mathematical Reviews MR4023999,** 2020.

[68] Review of “An Optimal $O(nm)$ Algorithm for Enumerating All Walks Common to All Closed Edge-covering Walks of a Graph,” Massimo Cairo, Paul Medvedev, Nidia Obscura Acosta, Romeo Rizzi, and Alexandru I. Tomescu. **Mathematical Reviews MR4023994,** 2020.

[69] Review of “Proportionally Dense Subgraph of Maximum Size: Complexity and Approximation,” Cristina Bazgan, Janka Chlebíková, Clément Dallard, and Thomas Pontoizeau. **Mathematical Reviews MR4023158,** 2020.

[70] Review of “The Parameterized Complexity Landscape of Finding 2-partitions of Digraphs,” J. Bang-Jensen, Kristine V. K. Knudsen, Saket Saurabh, and Meirav Zehavi. **Mathematical Reviews MR4017985,** 2020.

[71] Review of “Maximal Common Subsequence Algorithms,” Yoshifumi Sakai. **Mathematical Reviews MR4012284,** 2020.

[72] Review of "Superlogarithmic Cliques in Dense Inhomogeneous Random Graphs," Gweneth McKinley. **Mathematical Reviews MR4011679,** 2020.

[73] Review of "Kinetic Uncertainty Relations for the Control of Stochastic Reaction Networks," Jiawei Yan, Andreas Hilfinger, Glenn Vinnicombe, and Johan Paulsson. **Mathematical Reviews 4008491,** 2019.

[74] Review of "On the Minimum Clique Partitioning Problem on Weighted Chordal Graphs," Changseong Jo, Jihoon Choi, Suh-Ryung Kim, and Yoshio Sano. **Mathematical Reviews 4000714,** 2019.

[75] Review of "A Decidable Dichotomy Theorem on Directed Graph Homomorphisms With Non-negative Weights," Jin-Yi Cai and Xi Chen. **Mathematical Reviews 3995901,** 2019.

[76] Review of "Subset Feedback Vertex Set in Chordal and Split Graphs," Geevarghese Philip, Varun Rajan, Saket Saurabh, and Prafullkumar Tale. **Mathematical Reviews 3993504,** 2019.

[77] Review of "Maximum Independent Sets Near the Upper Bound," Ingo Schiermeyer. **Mathematical Reviews 3991610,** 2019.

[78] Review of "Rank Vertex Cover as a Natural Problem for Algebraic Compression," Syed M. Meesum, Fahad Panolan, Saket Saurabh, and Meirav Zehavi. **Mathematical Reviews 3982676,** 2019.

[79] Review of "Counting Edge-injective Homomorphisms and Matchings on Restricted Graph Classes," Radu Curticapean, Holger Dell, and Marc Roth. **Mathematical Reviews 3980573,** 2019.

[80] Review of "Edge-orders," Lena Schlipf, and Jens M. Schmidt. **Mathematical Reviews 3968964,** 2019.

[81] Review of "Statistical Inference in a Directed Network Model with Covariates," Ting Yan, Binyan Jiang, Stephen E. Fienberg, and Chenlei Leng. **Mathematical Reviews 3963186,** 2019.

[82] Review of "Perfect Matchings in $O(n^{1.5})$ Time in Regular Bipartite Graphs," Ashish Goel, Michael Kapralov, and Sanjeev Khanna. **Mathematical Reviews 3962904,** 2019.

[83] Review of "Cops, Robbers, and Threatening Skeletons: Padded Decomposition for Minor-free Graphs," Ittai Abraham, Cyril Gavoille, Anupam Gupta, Ofer Neiman, and Kunal Talwar. **Mathematical Reviews 3953473,** 2019.

[84] Review of "Rank-maximal Matchings — Structure and Algorithms," Pratik Ghosal, Meghana Nasre, and Prajakta Nimbhorkar. **Mathematical Reviews 3944714,** 2019.

[85] Review of "Hierarchical Partial Planarity," Patrizio Angelini and Michael A. Bekos. **Mathematical Reviews 3942870,** 2019.

[86] Review of "FPT Algorithms to Recognize Well Covered Graphs," Rafael Araújo, Eurinardo Costa, Sulamita Klein, Rudini Sampaio, and Uéverton S. Souza. **Mathematical Reviews 3939802,** 2019.

[87] Review of "Parameterized Algorithms and Kernels for Rainbow Matching," Sushmita Gupta, Sanjukta Roy, Saket Saurabh, and Meirav Zehavi. **Mathematical Reviews 3936172,** 2019.

[88] Review of "Attaching Leaves and Picking Cherries to Characterise the Hybridisation Number for a Set of Phylogenies," Simone Linz, and Charles Semple. **Mathematical Reviews 3903151,** 2019.

[89] Review of "Optimally Embedding 3-ary n-cubes into Grids," Wei-Bei Fan, Jian-Xi Fan, Cheng-Kuan Lin, Yan Wang, Yue-Juan Han, and Ru-Chuan Wang. **Mathematical Reviews 3888319,** 2019.

[90] Review of "Structure Learning in Power Distribution Networks," Deepjyoti Deka, Scott Backhaus, Michael Chertkov. **Mathematical Reviews 3860993,** 2018.

[91] Review of "Reconfiguration on Nowhere Dense Graph Classes," Sebastian Siebertz. **Mathematical Reviews 3853876,** 2018.

[92] Review of "On the (Parameterized) Complexity of Recognizing Well-covered (r, ℓ)-graph," Sancrey Rodrigues Alves, Konrad K. Dabrowski, Luerbio Faria, Sulamita Klein, Ignasi Sau, and Uéverton S. Souza. **Mathematical Reviews 3851408,** 2018.

[93] Review of "On Comparing Algorithms for the Maximum Clique Problem," Alexandre Prusch Züge and Renato Carmo. **Mathematical Reviews 3843314,** 2018.

[94] Review of "Improved Bounds in Stochastic Matching and Optimization," Alok Baveja, Amit Chavan, Andrei Nikiforov, Aravind Srinivasan, and Pan Xu. **Mathematical Reviews 3840929,** 2018.

[95] Review of "Deferred On-line Bipartite Matching," Jakub Kozik and Grzegorz Matecki. **Mathematical Reviews 3814258,** 2018.

[96] Review of "On the Kernelization of Split Graph Problems," Yongjie Yang, Yash Raj Shrestha, Wenjun Li, and Jiong Guo. **Mathematical Reviews 3808411,** 2018.

[97] Review of "Complexity of Secure Sets," Bernhard Bliem and Stefan Woltran. **Mathematical Reviews 3807982,** 2018.

[98] Review of "Fully Dynamic Maximal Matching in $O(\log n)$ Update Time (Corrected Version)," Surender Baswana, Manoj Gupta, and Sandeep Sen. **Mathematical Reviews 3797733,** 2018.

[99] Review of "Matrix Rigidity from the Viewpoint of Parameterized Complexity," Fedor V. Fomin, Daniel Lokshtanov, S. M. Meesum, Saket Saurabh, and Meirav Zehavi. **Mathematical Reviews 3796360,** 2018.

[100] Review of "An Improved Upper Bound and Algorithm for Clique Covers," Ryan McIntyre and Michael Soltys. **Mathematical Reviews 3787710,** 2018.

[101] Review of “Realizability of Graphs as Triangle Cover Contact Graphs,” Shaheena Sultana and Md. Saidur Rahman. **Mathematical Reviews 3771932,** 2018.

[102] Review of “Average Nearest Neighbor Degrees in Scale-free Networks,” Dong Yao, Pim van der Hoorn, and Nelly Litvak. **Mathematical Reviews 3766244,** 2018.

[103] Review of “Solving Problems on Graphs of High Rank-width,” Eduard Eiben, Robert Ganian, and Stefan Szeider. **Mathematical Reviews 3757570,** 2018.

[104] Review of “On the Forbidden Induced Subgraph Probe and Sandwich Problems,” Fernanda Couto, Luerbio Faria, Sylvain Gravier, and Sulamita Klein. **Mathematical Reviews 3736910,** 2018.

[105] Review of “Matching Index and its Algorithm of Uncertain Random Graph,” B. Zhang, J. Peng, and S. Li. **Mathematical Reviews 3728222,** 2018.

[106] Review of “Finding a Maximum 2-matching Excluding Prescribed Cycles in Bipartite Graphs,” Kenjiro Takazawa. **Mathematical Reviews 3720280,** 2018.

[107] Review of “Popular Matchings with Two-sided Preferences and One-sided Ties,” Ágnes Cseh, Chien-Chung Huang, and Telikepalli Kavitha. **Mathematical Reviews 3713901,** 2018.

[108] Review of “A q-Robinson-Schensted-Knuth Algorithm and a q-polymer‘,” Yuchen Pei. **Mathematical Reviews 3711039,** 2018.

[109] Review of “Local Community Detection Based on Small Cliques,” Michael Hamann, Eike Röhrs, and Dorothea Wagner. **Mathematical Reviews 3708452,** 2017.

[110] Review of “Communication-Free Distributed Coverage for Networked Systems,” Yazicioğlu, Magnus Egerstedt, and Jeff S. Shamma. **Mathematical Reviews 3704393,** 2017.

[111] Review of “Inapproximability of H-Transversal/Packing,” Venkatesan Guruswami and Euiwoong Lee. **Mathematical Reviews 3679310,** 2017.

[112] Review of “On Computing an Optimal Semi-Matching,” František Galčík, Ján Katrenič, and Gabriel Semanišin. **Mathematical Reviews 3670743,** 2017.

[113] Review of “Structural Monostability of Activation-Inhibition Boolean Networks,” Shun-ichi Azuma, Takahiro Yoshida, and Toshiharu Sugie. **Mathematical Reviews 3667937,** 2017.

[114] Review of “Bounded Clique Cover of Some Sparse Graphs,” Andrea Munaro. **Mathematical Reviews 3665074,** 2017.

[115] Review of “On the Complexity of the Identifiable Subgraph Problem, Revisited,” Stefan Kratsch and Martin Milanič. **Mathematical Reviews 3659384,** 2017.

[116] Review of “To Augment or not to Augment: Solving Unsplittable Flow on a Path by Creating Slack,” Fabrisio Grandoni, Tobias Mömke, Andreas Wiese, and Hang Zhou. **Mathematical Reviews 3627888,** 2017.

[117] Review of "Bi-Objective Matchings with the Triangle Inequality," Laurent Gourvès, Jérôme Monnot, Fanny Pascual, and Daniel Vanderpooten. **Mathematical Reviews 3620112,** 2017.

[118] Review of "Real-World Algorithms. A Beginner's Guide," Panos Louridas. **Mathematical Reviews 3616121,** 2017.

[119] Review of "Local Computation Algorithms for Graphs of Non-Constant Degrees," Reut Levi, Ronitt Rubinfeld, and Anak Yodpinyanee. **Mathematical Reviews 3612209,** 2017.

[120] Review of "Restricted Swap-Based Neighborhood Search for the Minimum Connected Dominating Set Problem," Xinyun Wu, Zhipeng Lü, and Philippe Galinier. **Mathematical Reviews 3610666,** 2017.

[121] Review of "Line-Distortion, Bandwidth and Path-Length of a Graph," Feodor F. Dragan, Ekkehard Köhler, and Arne Leitert. **Mathematical Reviews 3604390,** 2017.

[122] Review of "Branch-and-Cut Approaches for p-Cluster Editing," Teobaldo Bulhōes, Gilberto F. de Sousa Filho, Anand Subramanian, and Lucídio dos Anjos F. Cabral. **Mathematical Reviews 3599457,** 2017.

[123] Review of "Recent Advances in Graph Partitioning," Aydin Buluç, Henning Meyerhenke, Ilya Safro, Peter Sanders, and Christian Schulz. **Mathematical Reviews 3609422,** 2017.

[124] Review of "Generalized Network Improvement and Packing Problems," Michael Holzhauser. **Mathematical Reviews 3588010,** 2017.

[125] Review of "Computing a Nonnegative Matrix Factorization — Provably," Sanjeev Arora, Rong Ge, Ravi Kannan, and Ankur Moitra. **Mathematical Reviews 3542024,** 2017.

[126] Review of "Half-Integrality, LP-Branching, and FPT Algorithms," Yoichi Iwata, Magnus Wahlström, and Yuichi Yoshida. **Mathematical Reviews 3534475,** 2016.

[127] Review of "Edge-Disjoint Packing of Stars and Cycles," Minghui Jiang, Ge Xia, and Yong Zhang. **Mathematical Reviews 3516811,** 2016.

[128] Review of "The VC-Dimension of Graphs with Respect to k-Connected Subgraphs," Andrea Munaro. **Mathematical Reviews 3515323,** 2016.

[129] Review of "Pattern-Based Computing via Sequential Phase Transitions in Hierarchical Mean Field Neuropercolation," Robert Kozma and Marko Puljic. **Mathematical Reviews 3504103,** 2016.

[130] Review of "Abelian Networks I. Foundations and Examples," Benjamin Bond and Lionel Levine. **Mathematical Reviews 3493110,** 2016.

[131] Review of "Abelian Networks III: The Critical Group," Benjamin Bond and Lionel Levine. **Mathematical Reviews 3482442,** 2016.

[132] Review of "Complexity of the Maximum Leaf Spanning Tree Problem on Planar and Regular Graphs," Alexander Reich. **Mathematical Reviews 3476580,** 2016.

[133] Review of "Constrained Multilinear Detection and Generalized Graph Motifs," Andreas Björklund, Petteri Kaski, and Łukasz Kowalik. **Mathematical Reviews 3452915,** 2016.

[134] Review of "Complexity of Total Outer-Connected Domination Problem in Graphs," B. S. Panda and Arti Pandey. **Mathematical Reviews 3432060,** 2016.

[135] Review of "Fractional Order Darwinian Particle Swarm Optimization. Applications and Evaluation of an Evolutionary Algorithm," Micael Couceiro and Pedram Ghamisi. **Mathematical Reviews 3380205,** 2015.

[136] Review of "Model-Order Reduction of Ion Channel Dynamics Using Approximate Bisimulation," Md. Ariful Islam, Abhishek Murthy, Ezio Bartocci, Elizabeth M. Cherry, Flavio H. Fenton, James Glimm, Scott A. Smolka, and Radu Grosu. **Mathematical Reviews 3396858,** 2015.

[137] Review of "Random-Walk Perturbations for Online Combinatorial Optimization," Luc Devroye, Gábor Lugosi, and Gergely Neu. **Mathematical Reviews 3367822,** 2015.

[138] Review of "On Feedback Vertex Set: New Measure and New Structures," Yixin Cao, Jianer Chen, and Yang Liu. **Mathematical Reviews 3361780,** 2015.

[139] Review of "Chance-Constrained Multi-Terminal Network Design Problems," Yongjia Song and Minjiao Zhang. **Mathematical Reviews 3353485,** 2015.

[140] Review of "Random Models and Analyses for Chemical Graphs," Tina M. Kouri, Daniel Pascua, and Dinesh P. Mehta. **Mathematical Reviews 3343157,** 2015.

[141] Review of "On the Average-Case Complexity of Parameterized Clique," Nikolaos Fountoulakis, Tobias Friedrich, and Danny Hermelin. **Mathematical Reviews 3326480,** 2015.

[142] Review of "On the Maximum Independent Set Problem in Subclasses of Subcubic Graphs," Vadim Lozin, Jérôme Monnot, and Bernard Ries. **Mathematical Reviews 3314935,** 2015.

[143] Review of "Why Do Simple Algorithms for Triangle Enumeration Work in the Real World?," Jonathan W. Berry, Luke K. Fostvedt, Daniel J. Nordman, Cynthia A. Phillips, C. Seshadhri, and Alyson G. Wilson. **Mathematical Reviews 3393344,** 2015.

[144] Review of "Convergence of Rank Based Degree-Degree Correlations in Random Directed Networks," Pim van der Hoorn and Nelly Litvak. **Mathematical Reviews 3375960,** 2015.

[145] Review of "Seeded Graph Matching for Correlated Erdös-Rényi Graphs," Vince Lyzinski, Donniell E. Fishkind, and Carey E. Priebe. **Mathematical Reviews 3291408,** 2015.

[146] Review of "Learning a Hidden Graph," Huilan Chang, Hung-Lin Fu, and Chih-Huai Shih. **Mathematical Reviews 3279608,** 2015.

[147] Review of "A Testing Based Extraction Algorithm for Identifying Significant Communities in Networks," James D. Wilson, Simi Wang, Peter J. Mucha, Shankar Bhamidi, and Andrew B. Nobel. **Mathematical Reviews 3271356,** 2015.

[148] Review of "Extending Common Intervals Searching from Permutations to Sequences," Irena Rusu. **Mathematical Reviews 3277529,** 2015.

[149] Review of "A Symmetry Property for q-Weighted Robinson-Schensted and Other Branching Insertion Algorithms," Yuchen Pei. **Mathematical Reviews 3265231,** 2014.

[150] Review of "Prefix-Suffix Duplication," García López, Jesús, Florin Manea, and Victor Mitrana. **Mathematical Reviews 3212310,** 2014.

[151] Review of "On the Polarity and Monopolarity of Graphs," Ross Churchley and Jing Huang. **Mathematical Reviews 3190270,** 2014.

[152] Review of "The Parameterized Complexity of the Shared Center Problem," Zhi-Zhong Chen, Wenji Ma, and Lusheng Wang. **Mathematical Reviews 3183416,** 2014.

[153] Review of "Fixed-Parameter Tractability of Multicut Parameterized by the Size of the Cutset," Dániel Marx and Igor Razgon. **Mathematical Reviews 3172250,** 2014.

[154] Review of "Sex-Equal Stable Matchings: Complexity and Exact Algorithms," Eric McDermid and Robert W. Irving. **Mathematical Reviews 3160645,** 2014.

[155] Review of "Algorithms for Unipolar and Generalized Split Graphs," Elaine Eschen and Xiaoqiang Wang. **Mathematical Reviews 3128522,** 2014.

[156] Review of "An Improved Satisfiability Algorithm for Nested Canalyzing Functions and Its Application to Determining a Singleton Attractor of a Boolean Network," Avraham A. Melkman and Tatsuya Akutsu. **Mathematical Reviews 3138879,** 2013.

[157] Review of "Computing K-Terminal Reliability of d-Trapezoid Graphs," Min-Sheng Lin and Chao-Chun Ting. **Mathematical Reviews 3095452,** 2013.

[158] Review of "Partition into Triangles on Bounded Degree Graphs," Johan M. M. van Rooij, Marcel E. van Kooten Niekerk, and Hans L. Bodlaender. **Mathematical Reviews 3038518,** 2013.

[159] Review of "Near-Popular Matchings in the Roommates Problem," Chien-Chung Huang and Telikepalli Kavitha. **Mathematical Reviews 3032904,** 2013.

[160] Review of "A Local Clustering Algorithm for Massive Graphs and Its Application to Nearly Linear Time Graph Partitioning," Daniel A. Spielman and Shang-Hua Teng. **Mathematical Reviews 3033119,** 2013.

[161] Review of "Tile Complexity of Approximate Squares," Harish Chandran, Nikhil Gopalkrishnan, and John Reif. **Mathematical Reviews 3023804,** 2013.

[162] Review of "Algebraic Methods Applied to Shortest Path and Maximum Flow Problems in Stochastic Networks," K. C. Hastings and D. R. Shier. **Mathematical Reviews 3021396,** 2013.

[163] Review of "Generating Bracelets With Fixed Content," S. Karim, J. Sawada, Z. Alamgir, and S. M. Husnine. **Mathematical Reviews 3018489,** 2013.

[164] Review of “Book Embedding of Toroidal Bipartite Graphs,” Atsuhiro Nakamoto, Katsuhiro Ota, and Kenta Ozeki. **Mathematical Reviews 2967490,** 2012.

[165] Review of “Markov Chain-Based Degree Distributions of Evolving Networks,” XIang Xing Kong, Zhen Ting Hou, Ding Hua Shi, Quan Rong Chen, and Qing Gui Zhao. **Mathematical Reviews 2966950,** 2012.

[166] Review of “The Mathematical Structure of Information Bottleneck Methods,” Tomáš Gedeon, Albert E. Parker, and Alexander Dimitrov. **Mathematical Reviews 2908830,** 2012.

[167] Review of “On Supervised Mining of Dynamic Content-Based Networks,” Charu C. Aggarwal and Nan Li. **Mathematical Reviews 2902339,** 2012.

[168] Review of “Analysis of an Iterated Local Search Algorithm for Vertex Cover in Sparse Random Graphs,” Carsten Witt. **Mathematical Reviews 2891566,** 2012.

[169] Review of “Energy Generation by the Cells in the Leaves of the Plant Due to Sunlight Intensity Variation,” G. C. E. Mbah and O. H. Adagba. **Mathematical Reviews 2917879,** 2012.

[170] Review of “Domination When the Stars are Out,” Danny Hermelin, Matthias Mnich, Erik Jan van Leeuwen, and Gerhard J. Woeginger. **Mathematical Reviews 2874128,** 2012.

[171] Review of “Modeling the Early Steps of Cytoplasmic Trafficking in Viral Infection and Gene Delivery,” C. Amoruso, T. Lagache, and D. Holcman. **Mathematical Reviews 2873271,** 2012.

[172] Review of “Fast Analytical Methods for Macroscopic Electrostatic Models in Biomolecular Simulations,” Zhenli Xu and Wei Cai. **Mathematical Reviews 2861263,** 2012.

[173] Review of “Solving a Generalized Distance Geometry Problem for Protein Structure Determination,” Atilla Sit and Zhijun Wu. **Mathematical Reviews 2855193,** 2012.

[174] Review of “Liquid State Machines: Motivation, Theory, and Applications,” Wolfgang Maass. **Mathematical Reviews 2857081,** 2012.

[175] Review of “Scaffold-Mediated Nucleation of Protein Signaling Complexes: Elementary Principles,” Jin Yang and William S. Hlavacek. **Mathematical Reviews 2849212,** 2012.

[176] Review of “Searching a Bitstream in Linear Time for the Longest Substring of Any Given Density,” Benjamin A. Burton. **Mathematical Reviews 2824996,** 2011.

[177] Review of “Popular Mixed Matchings,” Telikepalli Kavitha, Julián Mestre, and Meghana Nasre. **Mathematical Reviews 2828343,** 2011.

[178] Review of “Complexity of Graph Self-assembly in Accretive Systems and Self-destructible Systems,” John H. Reif, Sudheer Sahu, and Peng Yin. **Mathematical Reviews 2807667,** 2011.

[179] Review of "Parameter Identifiability in a Class of Random Graph Mixture Models," Elizabeth S. Allman, Catherine Matias, and John A. Rhodes. **Mathematical Reviews 2763202,** 2011.

[180] Review of "Static and Dynamic Routing under Disjoint Dominant Extreme Demands," A. Frangioni, F. Pascali, and M. G. Scutellà. **Mathematical Reviews 2748712,** 2011.

[181] Review of "Causal Inference Using the Algorithmic Markov Condition," Dominik Janzing and Bernhard Schölkopf. **Mathematical Reviews 2808671,** 2011.

[182] Review of "Hyperbolicity of the Fixed Point Set for the Simple Genetic Algorithm," Christina Hayes and Tomáš Gedeon. **Mathematical Reviews 2664115,** 2011.

[183] Review of "An Optimal Algorithm for the k-fixed-endpoint Path Cover on Proper Interval Graphs," George B. Mertzios and Walter Unger. **Mathematical Reviews 2596252,** 2011.

[184] Review of "Minimum Degree Orderings," Hiroshi Nagamochi. **Mathematical Reviews 2576532,** 2011.

[185] Review of "On the Pagenumber of k-trees," Jennifer Vandenbussche, Douglas B. West, and Gexin Yu. **Mathematical Reviews 2556542,** 2011.

[186] Review of "Constrained Markovian Dynamics of Random Graphs," A. C. C. Coolen, A. De Martino, and A. Annibale. **Mathematical Reviews 2550395,** 2011.

[187] Review of "Evolvability," Leslie G. Valiant. **Mathematical Reviews 2541337,** 2010.

[188] Review of "From Balls and Bins to Points and Vertices," Ralf Klasing, Zvi Lotker, Alfredo Navarra, and Stéphane Pérennes. **Mathematical Reviews 2540842,** 2010.

[189] Review of "A New Approach to Graph Recognition and Applications to Distance-hereditary Graphs," Shin-ichi Nakano, Ryuhei Uehara, and Takeaki Uno. **Mathematical Reviews 2510080,** 2010.

[190] Review of "Volume Requirements of 3D Upward Drawings," by Emilio Di Giacomo, Giuseppe Liotta, Henk Meijer, and Stephen K. Wismath. **Mathematical Reviews 2509356,** 2010.

[191] Review of "The Optimal Statistical Median of a Convex Set of Arrays," by Stefano Benati and Romeo Rizzi. **Mathematical Reviews 2496067,** 2010.

[192] Review of "State-Dependent Computation Using Coupled Recurrent Networks," by Ueli Rutishauser and Rodney J. Douglas. **Mathematical Reviews 2477868,** 2010.

[193] Review of "Learning Bounded Treewidth Bayesian Networks," by Gal Elidan and Stephen Gould. **Mathematical Reviews 2469507,** 2010.

[194] Review of "Interval Completion is Fixed Parameter Tractable," by Yngve Villanger, Pinar Heggernes, Christophe Paul, and Jan Arne Tell. **Mathematical Reviews 2476284,** 2010.

[195] Review of “On Representable Graphs,” by Sergey Kitaev and Artem Pyatkin. **Mathematical Reviews 2467435,** 2010.

[196] Review of “Stochastic Networks in Nanoscale Biophysics: Modeling Enzymatic Reaction of a Single Protein,” by S. C. Kou. **Mathematical Reviews 2462886,** 2010.

[197] Review of “Analysis of a Modification of Gusfield’s Recursive Algorithm for Reconstructing Ultrametric Trees,” by Volker Heun. **Mathematical Reviews 2457929,** 2010.

[198] Review of “Maximal Rank Distance for Binary Sequences,” by Liviu P. Dinu and Andrea Sgarro. **Mathematical Reviews 2426790,** 2010.

[199] Review of “Bounded List Injective Homomorphism for Comparative Analysis of Protein-Protein Interaction Graphs,” by Isabelle Fagnot, Gaëlle Lelandais, and Stéphane Vialette. **Mathematical Reviews 2418976,** 2009.

[200] Review of “Locally Strong Endomorphisms of Paths,” by Sr. Arworn, U. Knauer, and S. Leeratanavalee. **Mathematical Reviews 2410458,** 2009.

[201] Review of “Inferring (Biological) Signal Transduction Networks Via Transitive Reductions of Directed Graphs,” by Réka Albert, Bhaskar DasGupta, Riccardo Dondi, and Eduardo Sontag. **Mathematical Reviews 2399124,** 2009.

[202] Review of “Small Deviations, JIT Sequencing and Symmetric Case of Fraenkel’s Conjecture,” by N. Brauner and V. Jost. **Mathematical Reviews 2404563,** 2009.

[203] Review of “A Practical Shortest Path Algorithm With Linear Expected Time,” by Andrew V. Goldberg. **Mathematical Reviews 2386284,** 2008.

[204] Review of “Edit Distance and Its Computation,” by József Balogh and Ryan Martin. **Mathematical Reviews 2383440,** 2008.

[205] Review of “Motif Patterns in 2D,” by Alberto Apostolico, Laxmi Parida, and Simona E. Rombo. **Mathematical Reviews 2380949,** 2008.

[206] Review of “An Adaptive Memory Algorithm for the k-Coloring Problem,” by Philippe Galinier, Alain Hertz, and Nicolas Zufferey. **Mathematical Reviews 2378681,** 2008.

[207] Review of “A $2^{O(k)}\mathrm{poly}(n)$ Algorithm for the Parameterized Convex Recoloring Problem,” by Igor Razgon. **Mathematical Reviews 2343265,** 2008.

[208] Review of “Graph Treewidth and Geometric Thickness Parameters,” by Vida Dujmović and David R. Wood. **Mathematical Reviews 2321747,** 2008.

[209] Review of “Edit Distance with Move Operations,” by Dana Shapira and James A. Storer. **Mathematical Reviews 2317039,** 2008.

[210] Review of “No-three-in-line-in-3D,” by Attlia Pór and David R. Wood, **Mathematical Reviews 2304992,** 2008.

[211] Review of “Applicability of Loop Recombination in Ciliates Using the Breakpoint Graph,” by Robert Brijder, Hendrik Jan Hoogeboom, and Michael Muskulus. **Mathematical Reviews 2279312,** 2007.

[212] Review of “The Effect of Faults on Network Expansion,” by Amitabha Bagchi, Ankur Bhargava, Amitabh Chaudhary, David Eppstein, and Christian Scheideler. **Mathematical Reviews 2279081,** 2007.

[213] Review of “The Degree Distribution of the Generalized Duplication Model,” by G. Bebek, P. Berenbrink, C. Cooper, T. Friedetzky, J. Nadeau, and S. C. Sahinalp. **Mathematical Reviews 2277572,** 2007.

[214] Review of “Combinatorial Aspects of the Sensor Location Problem,” by Lucio Bianco, Giuseppe Confessore, and Monica Gentili. **Mathematical Reviews 2257909,** 2007.

[215] Review of “Extended Skew Partition Problem,” by Simone Dantas, Celina M. H. de Figueiredo, Sylvain Gravier, and Sulamita Klein. **Mathematical Reviews 2261910,** 2007.

[216] Review of “Fast Algorithms for Comparison of Similar Unordered Trees,” by Daiji Fukagawa and Tatsuya Akutsu. **Mathematical Reviews 2234808,** 2007.

[217] Review of “Algorithms for Combining Rooted Triplets Into a Galled Phylogenetic Network,” by Jesper Jansson, Nguyen Bao Nguyen, and Wing-Kin Sung. **Mathematical Reviews 2217139,** 2007.

[218] Review of “A Note on Mean-Field Theory for Scale-Free Random Networks,” by Jin-li Guo and Yan-qin Bai. **Mathematical Reviews 2208503,** 2007.

[219] Review of “A Brief Introduction to Scale-Free Networks,” by William J. Reed. **Mathematical Reviews 2216129,** 2006.

[220] Review of “Computing Radial Drawings on the Minimum Number of Circles,” by Emilio Di Giacomo, Walter Didimo, Giuseppe Liotta, Henk Meijer. **Mathematical Reviews 2212343,** 2006.

[221] Review of “Queue Layouts of Graph Products and Powers,” by David R. Wood. **Mathematical Reviews 2183176,** 2006.

[222] Review of “Estimating All Pairs Shortest Paths in Restricted Graph Families: A Unified Approach,” by Feodor F. Dragan. **Mathematical Reviews 2167165,** 2006.

[223] Review of “Stacks, Queues and Tracks: Layouts of Graph Subdivisions,” by Vida Dujmović and David R. Wood. **Mathematical Reviews 2164064,** 2006.

[224] Review of “Spectral Reordering of a Range-Dependent Weighted Random Graph,” by Desmond J. Higham. **Mathematical Reviews 2153742,** 2006.

[225] Review of “On Absorbing Cycles in Min-Max Digraphs,” by Harald Günzel and Hubertus Th. Jongen. **Mathematical Reviews 2141125,** 2006.

[226] Review of “Computing the Maximum Agreement of Phylogenetic Networks,” by Charles Choy Jesper Jansson, Kunihiko Sadakane, and Wing-Kin Sung. **Mathematical Reviews 2136632,** 2006.

[227] Review of "A Combined Evolutionary Search and Multilevel Optimisation Approach to Graph-Partitioning," by A. J. Soper, C. Walshaw, and M. Cross. **Mathematical Reviews 2092958,** 2005.

[228] Review of "Taming the Complexity of Biochemical Models Through Bisimulation and Collapsing: Theory and Practice," by M. Antoniotti, C. Piazza, A. Policriti, M. Simeoni, and Bud Mishra. **Mathematical Reviews 2085104,** 2006.

[229] Review of "Graph Compression and the Zeros of Polynomials," by B. Litow and N. Deo. **Mathematical Reviews 2085620,** 2005.

[230] Review of "The Complexity of Checking Consistency of Pedigree Information and Related Problems," by Luca Aceto, Jens A. Hansen, Anna Ingólfsdóttir, Jacob Johnsen, and John Knudsen. **Mathematical Reviews 2055903,** 2005.

[231] Review of "Approximate Location of Relevant Variables Under the Crossover Distribution," by Peter Damaschke. **Mathematical Reviews 2042577,** 2005.

[232] Review of "Computing the Similarity of Two Sequences with Nested Arc Annotations," by Jochen Alber, Jens Gramm, Jiong Guo, and Rolf Niedermeier. **Mathematical Reviews 2028939,** 2004.

[233] Review of "On the Complexity of Graph Tree Partition Problems," by Roberto Cordone and Francesco Maffioli. **Mathematical Reviews 2019490,** 2004.

[234] Review of "Emergence of Scaling in Complex Networks," by Albert-László Barabási. **Mathematical Reviews 2016119,** 2004.

[235] Review of "The Reconstruction of Doubled Genomes," by Nadia El-Mabrouk and David Sankoff. **Mathematical Reviews 2001754,** 2004.

[236] Review of "Optimal Mappings with Minimum Number of Connected Components in Tree-to-Tree Comparison Problems," by Pascal Ferraro and Christophe Godin. **Mathematical Reviews 1957860,** 2004.

[237] Review of "Approximating Node Connectivity Problems Via Set Covers," by Guy Kortsarz and Zeev Nutov. **Mathematical Reviews 1993247,** 2004.

[238] Review of "An Infinite Family of 4-Tight Optimal Double Loop Networks," by Junming Xu and Qi Liu. **Mathematical Reviews 1977974,** 2003.

[239] Review of "Towards an Analytic Framework for Analysing the Computation Time of Evolutionary Algorithms," by Jun He and Xin Yao. **Mathematical Reviews 1971685,** 2003.

[240] Review of "An Edit Distance Between Quotiented Trees," by Pascal Ferraro and Christophe Godin. **Mathematical Reviews 1957860,** 2003.

[241] Review of "A Heuristic for Computing Repeats with a Factor Oracle: Application to Biological Sequences," by Arnaud Lefebvre and Thierry Lecroq. **Mathematical Reviews 1950937,** 2003.

[242] Review of "On the Robustness of Interconnections in Random Graphs: A Symbolic Approach," by P. Flajolet, K. Hatzis, S. Nikoletseas, and P. Spirakis. **Mathematical Reviews 1930233,** 2003.

[243] Review of "Max- and Min-Neighborhood Monopolies," by Kazuhisa Makino, Masafumi Yamashita, and Tiko Kameda. **Mathematical Reviews 1920301,** 2003.

[244] Review of "Level planar embedding in linear time," by Michael Jünger and Sebastian Leipert. **Mathematical Reviews 1898203,** 2003.

[245] Review of "A Framework for Solving VLSI Graph Layout Problems," by Sandeep N. Bhatt and Frank Thomson Leighton. Review by Lenwood S. Heath, **Mathematical Reviews 86g,** July, 1986, p. 3228.

WORKSHOPS

[1] **Gordon Conference on Plant Molecular Biology,** poster presenter, Holderness School, Plymouth, New Hampshire, July 16–21, 2000.

[2] **Computational Challenges of the Post Genomic Age,** participant, San Francisco, California, May 11–13, 2000.

[3] **DIMACS Workshop on Combinatorial Structures in Molecular Biology,** participant, Rutgers, New Brunswick, New Jersey, November 4, 1994.

[4] **DIMACS Workshop on Graph Embeddings and Parallel Architectures,** invited participant, Rutgers, New Brunswick, New Jersey, January 13–15, 1992.

REPORTS

[1] "Variant Evolution Graph: Can We Infer How SARS-CoV-2 Variants are Evolving?," Badhan Das and Lenwood S. Heath. bioRxiv, 2024. https://www.biorxiv.org/content/10.1101/2024.09.13.612805v1.

[2] "Genotypic and Phenotypic Analyses Show *Ralstonia solanacearum* Cool Virulence is a Quantitative Trait Not Restricted to 'Race 3 biovar 2'," Ronnie J. Dewberry, Parul Sharma, Jessica L. Prom, Noah A. Kinscherf, Tiffany Lowe-Power, Reza Mazloom, Xuemei Zhang, Mohammad Arif, Michael Stulberg, Lenwood S. Heath, Kellye Eversole, Gwyn A. Beattie, Boris Vinatzer, and Caitilyn Allen. arXiv, 2024. https://www.biorxiv.org/content/10.1101/2024.06.13.598915v1.

[3] "Standardizing Methods with QA/QC Standards for Investigating the Occurrence and Removal of Antibiotic Resistant Bacteria/Antibiotic Resistance Genes (ARB/ARGs) in Surface Water, Wastewater, and Recycled Water," Liguori, K., I. Keenum, B. Davis, E. Milligan, L. S. Heath, A. Pruden, J. Calarco, and V. J. Harwood. Project 5052. Denver, CO: The Water Research Foundation. 2023, 239 pages.

[4] "Could a Focus on the "Why" of Taxonomy Help Taxonomy Better Respond to the Needs of Science and Society?" Leighton Pritchard, C. Titus Brown, Bailey Harrington, Lenwood S. Heath, N. Tessa Pierce-Ward, and Boris Vinatzer. preprints.org, 2022, 6 pages. https://www.preprints.org/manuscript/202203.0069/v1.

[5] "EnTrance: Exploration of Entropy Scaling Ball Cover Search in Protein Sequences," Yoonjin Kim, Zhen Guo, Jeffrey A. Robertson, Benjamin Reidys, Ziyan Zhang, and Lenwood S. Heath. bioRxiv, 2021. DOI: https://doi.org/10.1101/2021.05.31.446458.

[6] "Systematic Auditing is Essential to Debiasing Machine Learning in Biology," Fatma-Elzahraa Eid, Haitham Elmarakeby, Yujia Alina Chan, Nadine Fornelos Martins, Mahmoud Elhefnawi, Eliezer Van Allen, Lenwood S. Heath, and Kasper Lage. bioRxiv, 2020. DOI: https://doi.org/10.1101/2020.05.08.085183.

[7] "MetaMLP: A Fast Word Embedding Based Classifier to Profile Target Gene Databases in Metagenomic Samples," Gustavo Arango-Argoty, Lenwood S. Heath, Amy Pruden, Peter Vikesland, and Liqing Zhang. bioRxiv, 2019. DOI: https://doi.org/10.1101/569970.

[8] "LINbase: A Web Service for Genome-based Identification of Microbes as Members of Crowdsourced Taxa," Long Tian, Chengjie Huang, Lenwood S. Heath, and Boris A. Vinatzer. bioRxiv, 2019. DOI: https://doi.org/10.1101/752212.

[9] "Comparing Time Series Transcriptome Data Between Plants Using A Network Module Finding Algorithm," Jiyoung Lee, Lenwood S. Heath, Ruth Grene, Song Li. bioRxiv, 2019. DOI: https://doi.org/10.1101/564286.

[10] "Strain-level Identification of Bacterial Tomato Pathogens Directly from Metagenomic Sequences," Marco E. Mechan Llontop, Parul Sharma, Marcela Aguilera Flores, Shu Yang, Jill Pollock, Long Tian, Chenjie Huang, Steve Rideout, Lenwood S. Heath, Song Li, and Boris A. Vinatzer. bioRxiv, 2019. DOI: https://doi.org/10.1101/777706.

[11] "New Methods to Generate Massive Synthetic Networks," Malay Chakrabarti, Lenwood S. Heath, and Naren Ramakrishnan. arXiv, 2017. https://arxiv.org/abs/1705.08473.

[12] "The Poset Cover Problem," Lenwood S. Heath and Ajit Kumar Nema, Technical Report TR-12-17, Department of Computer Science, Virginia Polytechnic Institute and State University, 2012.

[13] "GridWeaver: A Fully-Automatic System for Microarray Image Analysis Using Fast Fourier Transforms," John Paul Vergara, Lenwood S. Heath, Ruth Grene, Naren Ramakrishnan, Layne T. Watson, Technical Report TR-08-05, Computer Science, Virginia Tech, 2008.

[14] "Algorithms for Feature Selection in Rank-Order Spaces," Douglas J. Slotta, John Paul Vergara, Naren Ramakrishnan, and Lenwood S. Heath, Technical Report TR-05-08, Computer Science, Virginia Tech, 2005.

[15] "The Expresso Microarray Experiment Management System: The Functional Genomics of Stress Responses in Loblolly Pine," Lenwood S. Heath, Naren Ramakrishnan, Ronald R. Sederoff, Ross W. Whetten, Boris I. Chevone, Craig A. Struble, Vincent Y. Jouenne, Dawei Chen, Leonel van Zyl, and Ruth G. Alscher. arXiv, 2001. arXiv:cs/0110047.

[16] "Sorting by Short Swaps," Lenwood S. Heath and John Paul C. Vergara, Technical Report TR 99-07 (originally, TR 99-2), Department of Computer Science, Virginia Polytechnic Institute and State University, 1999.

[17] "Derandomized Vector Sorting," Lenwood S. Heath and Gabriel Mateescu, Technical Report TR 98-19, Department of Computer Science, Virginia Polytechnic Institute and State University, 1998.

[18] "New Algorithms for Generating Conway Polynomials over Finite Fields," Lenwood S. Heath and Nicholas A. Loehr, Technical Report TR 98-14, Department of Computer Science, Virginia Polytechnic Institute and State University, 1998.

[19] "Sorting by Short Block-Moves," Lenwood S. Heath and John Paul C. Vergara, Technical Report TR 98-03, Department of Computer Science, Virginia Polytechnic Institute and State University, 1998.

[20] "Subsequence and Run Heuristics for Sorting by Transpositions," Scott A. Guyer, Lenwood S. Heath, and John Paul C. Vergara, Technical Report TR 97-20, Department of Computer Science, Virginia Polytechnic Institute and State University, 1997.

[21] "Sorting by Bounded Block-Moves," Lenwood S. Heath and John Paul C. Vergara, Technical Report TR 97-09, Department of Computer Science, Virginia Polytechnic Institute and State University, 1997.

[22] "Edge-Packing Planar Graphs by Cyclic Graphs," Lenwood S. Heath and John Paul C. Vergara, Technical Report TR 96-15, Department of Computer Science, Virginia Polytechnic Institute and State University, 1996.

[23] "Stack and Queue Layouts of Directed Acyclic Graphs: Part I," Lenwood S. Heath, Sriram V. Pemmaraju, and Ann Trenk, Technical Report TR-95-03, Department of Computer Science, University of Iowa, 1995.

[24] "Stack and Queue Layouts of Directed Acyclic Graphs: Part II," Lenwood S. Heath and Sriram V. Pemmaraju, Technical Report TR-95-06, Department of Computer Science, University of Iowa, 1995.

[25] "Edge-Packing in Planar Graphs," Lenwood S. Heath and John Paul C. Vergara, Technical Report TR 95-18, Department of Computer Science, Virginia Polytechnic Institute and State University, 1995.

[26] "The Pagenumber of k-Trees is $O(k)$," Joseph L. Ganley and Lenwood S. Heath, Technical Report TR 95-17, Department of Computer Science, Virginia Polytechnic Institute and State University, 1995.

[27] "Some Experiments on the Sorting by Reversals Problem," Lenwood S. Heath and John Paul C. Vergara, Technical Report TR 95-16, Department of Computer Science, Virginia Polytechnic Institute and State University, 1995.

[28] "Queue Layouts and Staircase Covers of Matrices," Lenwood S. Heath and Sriram V. Pemmaraju, Technical Report TR 94-22, Department of Computer Science, Virginia Polytechnic Institute and State University, 1994.

[29] "Seeing Things Your Way: Information Visualization for a User-Centered Database of Computer Science Literature," Lucy T. Nowell, Edward A. Fox, Lenwood S. Heath, Deborah Hix, William C. Wake, and Eric A. Labow, Technical Report TR 94-06, Department of Computer Science, Virginia Polytechnic Institute and State University, 1994.

[30] "Sparse Matrix-Vector Multiplication on a Small Linear Array," Lenwood S. Heath, Sriram V. Pemmaraju, and Calvin J. Ribbens, Technical Report 93-11, Department of Computer Science, University of Iowa, 1993.

[31] "Graph Embeddings and Simplicial Maps," Lenwood S. Heath, Technical Report TR 93-40, Department of Computer Science, Virginia Polytechnic Institute and State University, 1993.

[32] "Local Search for the Retrieval Layout Problem," Lenwood S. Heath and Joseph W. Lavinus, Technical Report TR 93-28, Department of Computer Science, Virginia Polytechnic Institute and State University, 1993.

[33] "Heuristics for Laying Out Information Graphs," Lenwood S. Heath and Joseph W. Lavinus, Technical Report TR 93-27, Department of Computer Science, Virginia Polytechnic Institute and State University, 1993.

[34] "Optimal and Random Partitions of Random Graphs," Lenwood S. Heath and Joseph W. Lavinus, Technical Report TR 93-24, Department of Computer Science, Virginia Polytechnic Institute and State University, 1993.

[35] "Stack and Queue Layouts of Posets," Lenwood S. Heath and Sriram V. Pemmaraju, Technical Report 93-06, Department of Computer Science, University of Iowa, 1993.

[36] "What If There Was Desktop Access to the Computer Science Literature," Dennis J. Brueni, Edward A. Fox, Lenwood S. Heath, Deborah Hix, Lucy T. Nowell, and William C. Wake, Technical Report TR 92-42, Department of Computer Science, Virginia Polytechnic Institute and State University, 1992.

[37] "Stack and Queue Layouts of Posets," Lenwood S. Heath and Sriram V. Pemmaraju, Technical Report TR 92-31, Department of Computer Science, Virginia Polytechnic Institute and State University, 1992.

[38] "New Results for the Minimum Weight Triangulation Problem," Lenwood S. Heath and Sriram V. Pemmaraju, Technical Report TR 92-30, Department of Computer Science, Virginia Polytechnic Institute and State University, 1992.

[39] "Representing Polyhedra: Faces are Better than Vertices," Lenwood S. Heath, Praveen K. Paripati, and John W. Roach, Technical Report TR 92-20, Department of Computer Science, Virginia Polytechnic Institute and State University, 1992.

[40] "LEND and Faster Algorithms for Constructing Minimal Perfect Hash Functions," Edward A. Fox, Qi Fan Chen, and Lenwood S. Heath, Technical Report TR 92-02, Department of Computer Science, Virginia Polytechnic Institute and State University, 1992.

[41] "Edge Coloring Planar Graphs with Two Outerplanar Subgraphs," Lenwood S. Heath, Technical Report TR 91-34, Department of Computer Science, Virginia Polytechnic Institute and State University, 1991.

[42] "Edge-Packing by Isomorphic Subgraphs," John Paul C. Vergara and Lenwood S. Heath, Technical Report TR 91-3, Department of Computer Science, Virginia Polytechnic Institute and State University, 1991.

[43] "Order Preserving Minimal Perfect Hash Functions and Information Retrieval," Edward A. Fox, Qi Fan Chen, Amjad M. Daoud, and Lenwood S. Heath, Technical Report TR 91-1, Department of Computer Science Virginia Polytechnic Institute and State University, 1991.

[44] "Improved Algorithms for the Minimum Weight Triangulation Problem," Lenwood S. Heath and Sriram Pemmaraju, Technical Report TR 90-65, Department of Computer Science, Virginia Polytechnic Institute and State University, 1990.

[45] "Polyhedra: Faces are Better than Vertices," Lenwood S. Heath, Praveen K. Paripati, and John W. Roach, Technical Report TR 90-64, Department of Computer Science, Virginia Polytechnic Institute and State University, 1990.

[46] "Comparing Queues and Stacks as Mechanisms for Laying Out Graphs," Lenwood S. Heath, Frank Thomson Leighton, and Arnold L. Rosenberg, COINS Technical Report 90-105, Computer and Information Science, University of Massachusetts at Amherst, 1990.

[47] "Laying Out Graphs Using Queues," Lenwood S. Heath and Arnold L. Rosenberg, COINS Technical Report 90-75, Computer and Information Science, University of Massachusetts at Amherst, 1990.

[48] "Practical Minimal Perfect Hash Functions for Large Databases," Edward A. Fox, Lenwood S. Heath, Qi Fan Chen, and Amjad M. Daoud, Technical Report TR 90-41, Department of Computer Science, Virginia Polytechnic Institute and State University, 1990.

[49] "The Pagenumber of Genus g Graphs is $O(g)$," Lenwood S. Heath and Sorin Istrail, Technical Report TR 90-21, Department of Computer Science, Virginia Polytechnic Institute and State University, 1990.

[50] "Graph Layout Using Queues," Lenwood S. Heath and Arnold L. Rosenberg, Technical Report TR 89-45, Department of Computer Science, Virginia Polytechnic Institute and State University, 1989.

[51] "Development of New Heuristics for the Euclidean Traveling Salesman Problem," Lenwood S. Heath and T. W. Tunnell, Technical Report TR 89-30, Department of Computer Science, Virginia Polytechnic Institute and State University, 1989.

[52] "Covering a Set with Arithmetic Progressions is NP-Complete," Lenwood S. Heath, Technical Report TR 89-25, Department of Computer Science, Virginia Polytechnic Institute and State University, 1989.

[53] "A Generalized Comparison of Quadtree and Bintree Storage Requirements," Clifford A. Shaffer, Ramana Juvvadi, and Lenwood S. Heath, Technical Report TR 89-23, Department of Computer Science, Virginia Polytechnic Institute and State University, 1989.

[54] "An $O(n \log n)$ Algorithm for Finding Minimal Perfect Hash Functions," Edward A. Fox, Lenwood S. Heath, and Qi Fan Chen, Technical Report TR 89-10, Department of Computer Science, Virginia Polytechnic Institute and State University, 1989.

[55] "Optimal Embeddings of Butterfly-Like Graphs in the Hypercube," David S. Greenberg, Lenwood S. Heath, and Arnold L. Rosenberg, COINS Technical Report 88-103, Computer and Information Science, University of Massachusetts at Amherst, 1988.

[56] "Optimal Embeddings of the FFT Graph in the Hypercube," David S. Greenberg, Lenwood S. Heath, and Arnold L. Rosenberg, COINS Technical Report 88-23, Computer and Information Science, University of Massachusetts at Amherst, 1988.

[57] "A More Cost Effective Algorithm for Finding Perfect Hash Functions," Edward A. Fox, Qi Fan Chen, Lenwood S. Heath, and Sanjeev Datta, Technical Report TR 88-30, Department of Computer Science, Virginia Polytechnic Institute and State University, 1988.

[58] "An Optimal Mapping of the FFT Algorithm onto the Hypercube Architecture," Lenwood S. Heath and Arnold L. Rosenberg, COINS Technical Report 87-19, Computer and Information Science, University of Massachusetts at Amherst, 1987.

[59] "Algorithms for Embedding Graphs in Books," Lenwood S. Heath, Doctoral Dissertation, Technical Report 85-028, University of North Carolina, Chapel Hill, 1985.

[60] "Multi-layer Circuit Layouts," Lenwood S. Heath, abstract in Proceedings of the First Microelectronics Center of North Carolina Semi-Annual Research Review, 1984.

[61] "Final Technical Report, SRC Contract 82-11-003, Transfer of Software Methodology to VLSI Design," Frederick P. Brooks, Jr., with Richard R. Gross and Lenwood S. Heath, University of North Carolina, Chapel Hill, 1984.

[62] "Multi-Layer Channel Routing," Lenwood S. Heath, in Course Projects on VLSI Algorithmics: 1983, Microelectronics Center of North Carolina Technical Report 83-06, 1983.

Presentations

[1] "Networks in Bioinformatics," Keynote Speaker, **International Symposium on Parallel Architectures, Algorithms, and Networks (I-SPAN 2002),** Makati City, Metro Manila, Philippines, May 23, 2002.

[2] "Functional Genomics and Bioinformatics Applied to Understanding Oxidative Stress Resistance in Plants," with Ruth Grene, Department of Computer Science at the University of Maryland, College Park, Maryland, December 14, 2001,

[3] "Some Biology that Computer Scientists Need for Bioinformatics," Department of Computer Science at the University of Maryland, College Park, Maryland, December 14, 2001.

[4] "Functional Genomics and Bioinformatics Applied to Understanding Oxidative Stress Resistance in Plants," with Ruth Grene and Naren Ramakrishnan, National Science Foundation, December 6, 2001.

[5] "Opportunities in Bioinformatics for Computer Science," Department of Computer Science at the University of Iowa, November 16, 2001,

[6] "Expresso: A System for Microarray Design, Management, and Data Analysis," Bioinformatics Research Center, the Medical College of Wisconsin, November 15, 2001,

[7] "Modeling and Understanding Stress Response Mechanisms with Expresso," with Ruth Grene, National Science Foundation site visit for the NSF Pine Genome award. North Carolina State University, Raleigh, North Carolina, July 12, 2001.

[8] "Modeling and Understanding Stress Response Mechanisms with Expresso," with Ruth Grene and Naren Ramakrishnan, **ORNL (Oak Ridge National Laboratories) Workshop on Genomics,** Duke University, Durham, North Carolina, May 1, 2001.

[9] "Towards an Understanding of Stress Response Mechanisms in Loblolly Pine: A First Generation Stress Chip," with Ruth Grene, **Interdepartmental Plant Physiology Seminar Series,** Blacksburg, Virginia, March 1, 2001.

[10] "Biology and Theoretical Computer Science," **Bioinformatics'99,** Blacksburg, Virginia, October 8, 1999.

[11] "Efficient Algorithms for Finding Conway Polynomials," **Tenth Annual ACM-SIAM Symposium on Discrete Algorithms,** Baltimore, Maryland, January 18, 1999.

[12] "New Algorithms for Generating Conway Polynomials over Finite Fields," invited presentation, University of Iowa, Iowa City, Iowa, June 29, 1998.

[13] "Recognizing Undirected and Directed Leveled-Planar Graphs," **903rd Meeting of the American Mathematical Society,** Boston, Massachusetts, October 7, 1995.

[14] "Recognizing Leveled-Planar Dags in Linear Time," **Graph Drawing '95,** Passau, Germany, September 21, 1995.

[15] "SWAN—A Data Structure Visualization System," **Graph Drawing '95,** Passau, Germany, September 20, 1995. Paper presentation and system demonstration.

[16] "Open Problems in Stack and Queue Layouts," **Seventh SIAM Conference on Discrete Mathematics,** Albuquerque, New Mexico, June 22, 1994. Also, organizer of **Minisymposium on Stack and Queue Layouts of Directed Graphs,** of which this presentation was a part.

[17] "The PMU Placement Problem," **Seventh SIAM Conference on Discrete Mathematics,** Albuquerque, New Mexico, June 23, 1994.

[18] "Graph Embeddings and Simplicial Maps," **Seventh SIAM Conference on Discrete Mathematics,** Albuquerque, New Mexico, June 24, 1994.

[19] "Graph Embeddings and Simplicial Maps," invited presentation, University of Iowa, Iowa City, Iowa, April 29, 1994.

[20] "Lower Bounds for Graph Embeddings Via Algebraic Topology," **Fifth Annual ACM Symposium on Parallel Algorithms and Architectures,** Velen, Germany, July 2, 1993.

[21] "Edge Coloring Planar Graphs with Two Outerplanar Subgraphs," **Second ACM-SIAM Symposium on Discrete Algorithms,** San Francisco, California, January 29, 1991.

[22] "Polyhedra: Faces are Better than Vertices," **Second Canadian Conference in Computational Geometry,** Ottawa, Ontario, Canada, August 8, 1990.

[23] "Improved Algorithms for the Minimum Weight Triangulation Problem," **Fifth SIAM Conference on Discrete Mathematics,** Atlanta, Georgia, June 11, 1990. Also, session chair.

[24] "Algorithms for Embedding Graphs in Books," Minisymposium on Book Embeddings, **Third SIAM Conference on Discrete Mathematics,** Clemson, South Carolina, May 15, 1986.

[25] "Algorithms for Embedding Graphs in Books," invited presentation, Wesleyan University, Middletown, Connecticut, December 13, 1985.

[26] "Embedding Planar Graphs in Seven Pages," **25th Annual IEEE Symposium on Foundations of Computer Science,** Singer Island, Florida, October 24, 1984.

[27] "Multi-Layer Circuit Layouts," Lenwood S. Heath, **First Microelectronics Center of North Carolina Semi-Annual Research Review,** Research Triangle Park, North Carolina, October 23, 1984.

FUNDING

Current

[1] USDA NIFA 1030077: *Expanding an Established Genome-based Identification Resource to Surveillance of Fungal Pathogens,* $650,000. 07-01-2023 - 06-30-2026. PI: Boris A. Vinatzer. Co-PIs: Lenwood S. Heath, David C. Haak. Personal share: 25%.

[2] NSF 2243691: *Collaborative Research: RESEARCH-PGR: Unraveling the Origin of Vegetative Desiccation Tolerance in Vascular Plants,* $2,000,000. 03/01/2023 – 02/28/2027. PI: Luis R Herrera-Estrella (Texas Tech University). Co-PI: John C Cushman (University of Nevada, Reno). Virginia Tech PI: Lenwood S. Heath. Virginia Tech funding share: $370,704. Personal share: 100% of VT share.

[3] National Science Foundation 2125798: *NRT-HDR: Convergence at the Interfaces of Policy, Data Science, Environmental Science and Engineering to Combat the Spread of Antibiotic Resistance,* $3,000,000. 09/01/2021 - 08/31/2026. PI: Amy Pruden. Co-PIs: Liqing Zhang, Leigh Anne Krometis, Todd Schenk, Tiffany Drape. Senior Personnel: Lenwood S. Heath et al. Personal share: 8%.

[4] National Science Foundation 1918656: *Collaborative Research: Expeditions: Global Pervasive Computational Epidemiology,* $10,000,000. 04/01/2020 - 03/31/2026. PI: Madhav V. Marathe. VT share: $1,587,064. VT PI: Naren Ramakrishnan. VT co-PIs: Lenwood S. Heath et al. Personal share of VT share: 14%.

Declined

[5] USDA: *Genome Similarity-based Classification of Xylella fastidiosa for Improved Detection of Emerging and Exotic Strains,* $120,006. 08-01-2023 - 07-31-2024. PI: Boris A. Vinatzer. Co-PIs: Lenwood S. Heath, Elizabeth A. Bush. Personal share: 30%.

[6] NSF: *EDGE FGT: ARGnet: Developing a Comprehensive Resource for Identification, Curation, and Surveillance of Novel Antibiotic Resistance Genes,* $1,344,979. 10/01/23 - 09/30/26. PI: Liqing Zhang. Co-PIs: Anne Brown, Amy Pruden, Peter Vikesland, Lenwood S. Heath. Personal share: 10%.

[7] NSF: *Collaborative Research: IntBIO: A Predictive, Biologically-aware Framework for Horizontal Gene Transfer Dynamics in Wastewater Microbiomes,* $1,030,092. 08/16/23 - 08/15/26. Lead PI: Allison Lopatkin, University of Rochester. VT PI: Lenwood S. Heath. Co-PIs: Amy Pruden, Peter Vikesland, Liqing Zhang. Personal share: 40%.

[8] NSF: *PIPP Phase I: Predictive Intelligence for Atmospheric Incursions of Plant Pandemics,* $1,000,000. 04/15/22 - 10/14/23. PI: David Schmale. Co-PIs: Boris A. Vinatzer, Shane David Ross. Senior Personnel: Lenwood S. Heath et al. Personal share: 1%.

[9] USDA: *Cattle CARTS: A Coordinated, Auditable, Robust, Traceability System for Beef Industry Data,* $650,000. 06/01/2022 - 05/30/2026. PI: Robin White. Co-PIs: Vitor Mercadante, Thang Hoang, and Lenwood S. Heath. Personal share: 10%.

[10] NSF: *URoL-EN: Structure-function-metabolism of Microbial N-cycle Communities and Networks in Engineered Wastewater Treatment Plants,* $3,000,000. 01/01/2023 - 12/31/2028. PI: Kartik Chandra (Columbia University). Co-PIs: Allison Lopatkin (Barnard University) and Lenwood S. Heath. VT share: $704,169. Personal share of subcontract: 100%.

[11] NSF: *Collaborative Research: IntBIO: Predicting Resistomes: Machine Learning-enabled Mechanism Discovery of Plasmid Prevalence in Microbial Communities in Drinking Water,* $1,560,611. 08/16/22 - 08/15/25. Lead PI: Allison Lopatkin, Barnard College. VT PI: Lenwood S. Heath. Co-PIs: Amy Pruden, Marc A. Edwards, Liqing Zhang. Personal share: 40%.

[12] National Science Foundation: *EDGE FGT: ARGnet: Developing a Comprehensive Data and Tool Resource for Identification of Novel and Rare Antibiotic Resistance Genes,* $1,288,785. 10/01/2021 - 09/30/2024. PI: Liqing Zhang. Co-PIs: Anne M. Brown, Lenwood S. Heath, Amy Pruden, and Peter J. Vikesland. Personal share: 20%. Declined.

[13] National Science Foundation: *Collaborative Research: MIM: Predicting Resistomes: Incorporating Horizontal Gene Transfer into Microbiome Theory using Phylogenetic Networks,* $2,198,275 (VT share). 10/01/2021 - 09/30/2026. PI: Lenwood S. Heath. Co-PIs: Amy Pruden, Liqing Zhang, and Allison Lopatkin (Barnard College). Personal share: 40%. Declined.

[14] National Institutes of Health: *Viral Genome Comparison, Identification, Naming, and Transmission Paths for Epidemiology,* $400,778. 04/01/2021 - 03/31/2023. PI: Lenwood S. Heath. Co-PI: Boris Vinatzer. Personal share: 50%. Declined.

[15] National Science Foundation: *Collaborative Research: MTM 2: Predicting Resistomes: Incorporating Horizontal Gene Transfer into Microbiome Theory using Phylogenetic Networks,* $2,021,134 (VT share). 11/01/2020 - 10/31/2025. PI: Lenwood S. Heath. Co-PIs: Amy Pruden, Liqing Zhang, and Allison Lopatkin (Barnard College). Personal share: 40%. Declined.

[16] National Science Foundation: *AI Institute: Precision Agriculture for Animal Welfare,* $20,000,000. 08/02/20 - 07/31/25. PI: Prasenjit Mitra, Penn State. VT PI: Naren Ramakrishnan. VT Co-PIs: Erica N. Feuerbacher, Lenwood S. Heath, Bert Huang, Leonie Jacobs, Brian B. Mayer, Srijan Sengupta, Robin White. VT share: $5,996,818. Personal share: 10%. Declined.

[17] NSF: *TRTech-PGR Transcovery: Identifying Conserved Stress-Responsive Genes and Cis-regulatory Modules in Plants,* $2,197,403. 09/01/2019 - 08/31/2023. PI: Song Li. Co-PIs: Christopher Franck, Takeshi Fukao, Lenwood S. Heath, Sushma Naithani. Personal share: 20%. Declined.

[18] VT ICTAS Targeted Opportunity for Proposals: *Connecting Genomes to Taxonomy, the Literature, and Online Media,* $75,000. 07/01/2019 - 06/30/2020. PI: Lenwood S. Heath. Co-PIs: Naren Ramakrishnan, Boris A. Vinatzer. Declined.

[19] VT: *Prokaryotic Networks from DNA Sequencing for the Benefit of Human Well-being,* $30,000. 01/01/2019 - 06/30/2019. A proposal submitted in response to the 2018 Request for Concepts of the Data and Decisions Destination Area of Virginia Tech. PI: Lenwood S. Heath. Co-PIs: Frank Aylward, Liqing Zhang. Declined.

[20] NSF: *Reconciling the Tree of Life and Web of Life with Evolutionary Networks.* Two-page NSF Convergence research idea submitted 2018. PIs: Frank Aylward, Lenwood S. Heath, Liqing Zhang. Declined.

[21] NSF EAGER: *Collaborative Research: GenomeRxiv, a Preprint Server for Genomes,* $199,521. 08/01/2018 - 07/31/2020. PI: Boris A. Vinatzer. Co-PI: Lenwood S. Heath. Personal share: 50%. Declined.

[22] IARPA: *Cryptic and Apparent Genetic Engineering in Mosquitoes and Prokayotes,* $13,566,152. 02/01/2018 - 07/31/2021. PI: Madhav V. Marathe. Research scientist: Lenwood S. Heath. Personal share: 8%. Declined.

[23] National Science Foundation: *ECA-PGR: Inference, Comparison and Visualization of Stress Response Transcriptome and Regulatory Networks Across Plant Species,* $1,128,233. 06/01/18 - 05/31/22. PI: Song Li. Co-PIs: Ruth Grene, Lenwood S. Heath. Personal share: 25%. Declined.

[24] National Science Foundation: *TRIPODS: Institute for Data, Models, and Algorithms Across Scales,* $1,498,424. 10/01/17 - 09/30/20. PI: Mark Embree. Research Scientist: Lenwood S. Heath. Personal share: 6%. Declined.

[25] ICTAS: *Maternal Influence on Colostrum Composition: Novel Use of Machine Learning Tools to Integrate "-omics" Technology,* $79,341. 07/01/17 - 06/30/19. PI: Rebecca Cockrum. Co-PI: Lenwood S. Heath. Personal share: 20%. Declined.

[26] Worldwide Cancer Research: *Understanding Checkpoint Failures that Lead to Cancer,* $257,456. 01/01/17 - 12/31/19. PI: Silke Hauf. Co-PI: Lenwood S. Heath. Personal share: 17%. Withdrawn.

[27] National Institutes of Health: *The Mitotic Checkpoint: Linking Gene Expression Control to Function,* $1,912,212. 09/01/16 - 08/31/21. PI: Silke Hauf. Co-PI: Lenwood S. Heath. Personal share: 13%. Declined.

[28] Qatar National Research Fund: *Predicting Novel Molecular Biomarkers for Cancer,* $300,000 (subcontract). 05/16/16 - 05/15/18. PI: Lenwood S. Heath. Personal share: 100%. Declined.

[29] National Science Foundation: *RAPID: Evolution of Ebola Genomes: Identification, Naming, and Transmission Paths,* $200,000. 08/10/15 - 08/09/16. PI: Lenwood S. Heath. Co-PI: Boris A. Vinatzer. Personal share: 60%. Withdrawn.

[30] National Science Foundation: *ABI Development: MetaStorm: A System for the Metagenomics of Built Environment/National Environment Interfaces,* $1,364,244. 05/16/16 - 05/15/20. PI: Lenwood S. Heath. Co-PIs: Amy J. Pruden-Bagchi, Liqing Zhang. Personal share: 40%. Declined.

[31] National Science Foundation: *Preliminary Proposal: A Genome-Similarity Based Framework for the Phylogenetic Description of Bacterial Diversity,* amount TBD. PI: Boris A. Vinatzer. Co-PIs: Lenwood S. Heath, Jeff Newman. Personal share: 30%. Declined.

[32] National Science Foundation: *III: Small: New Algorithmic Tools for Information Cartography,* $500,000. PI: Naren Ramakrishnan. Co-PIs: Lenwood S. Heath, Bert Huang. Personal share: 30%. Declined.

[33] Qatar National Research Fund: *Predicting Novel Molecular Biomarkers for Cancer,* $315,000. LPI: Lenwood S. Heath. Co-LPI: Jihad Mohamad Jaam (Qatar University). Personal share: 100%. Declined.

[34] DARPA: *Scaling Up the Assembly and Comprehension of Complex Mechanisms Using Causal Mechanistic Models,* $8,353,225. PI: Naren Ramakrishnan. Co-PIs: Lenwood S. Heath, T. M. Murali, John J. Tyson. Personal share: 10%. Declined.

[35] Department of Energy: *Genomic Networks Underlying Intraspecific Adaptation to Drought in Poplar: A Systems Biology Approach,* $1,495,769. PI: Jason A. Holliday. Co-PIs: Dhruv Batra, Ruth Grene, Lenwood S. Heath, Erik T. Nilsen. Personal share: 20%. Declined.

Completed

[36] National Science Foundation DBI-2018522: *BBSRC-NSF/BIO:Collaborative Research: CIBR: genomeRxiv: A Microbial Whole-genome Database and Diagnostic Marker Design Resource for Classification, Identification, and Data Sharing,* $653,114. 08/01/20 - 07/31/24. PI: Boris A. Vinatzer. Co-PI: Lenwood S. Heath. Personal share: 50%.

[37] USDA 2017-68003-26498: *Developing Computational Tools to Identify Critical Control Points for Mitigating the Spread of Antibiotic Resistance in Agro-ecosystem,* $1,200,000. 05/16/17 - 05/15/23. PI: Amy J. Pruden-Bagchi. Co-PIs: Lenwood S. Heath, Katharine F. Knowlton, Kang Xia, Liqing Zhang. Personal share: 25%.

[38] Water Research Foundation: *Standardizing Methods with QA/QC Standards for Investigating the Occurrence and Removal of Antibiotic Resistant Bacteria/Antibiotic Resistance Genes (ARB/ARGs) in Surface Water, Wastewater, and Recycled Water,* $200,000. 09/01/2020 - 12/01/2022. PI: Amy Pruden. Co-PIs: Valerie J. Harwood, Lenwood S. Heath. Personal share: 20%.

[39] Virginia Tech ICTAS EFO Seed Grant Award: *A Unified, Natural, and Computationally Efficient Genome-Based Classification System for All Microbes,* $10,000. 10/17/2022 - 06/30/2023. PI: Lenwood S. Heath. Co-PI: Boris A. Vinatzer. Personal share: 50%.

[40] Water Research Foundation: *The Use of Next Generation Sequencing (NGS) Technologies and Metagenomics Approaches to Evaluate Water and Wastewater Quality Monitoring and Treatment Technologies,* $300,000. 10/01/2019 - 09/30/2021. PI: Amy Pruden. Co-PIs: Emily Garner, Peter Vikesland, Linsey Marr, Liqing Zhang. Senior personnel: Lenwood S. Heath, et al. Personal share: 10%.

[41] USDA Animal and Plant Health Inspection Service (APHIS): *Genome-based Circumscription and Phenotyping of Regulated Microbes, Especially the Select Agent Ralstonia solanacearum,* $261,207. 08/01/19 - 08/01/21. PI: Kellye Eversole. Co-PIs: Caitilyn Allen, Mohammad Arif, Gwyn Beattie, Lenwood S. Heath, Michael Stulberg (USDA-APHIS), Boris A. Vinatzer (VT-SPES). VT share: $129,210. Personal share: 50% of VT share.

[42] IARPA: *Integrative Genomics Approach to Computational Assessment of Threats (IGA-CAT),* $12,622,546. 03/01/17 - 05/31/20. PI: Stephen Eubank. Research Scientist: Lenwood S. Heath. Personal share: 4%.

[43] National Science Foundation 1545756: *PIRE: Halting Environmental Antimicrobial Resistance Dissemination (HEARD),* $3,333,000. 10/01/15 - 09/30/20. PI: Peter Vikesland. Co-PIs: Pedro Alvarez, Diana Aga, Amy Pruden, Krista Wigginton. Senior Personnel: Lenwood S. Heath, Liqing Zhang, *et al.* Personal share: 0%.

[44] Virginia Tech Microbiology at the Nexus of Food, Energy, Water, and Health Systems (MicroFEWHS) concept area: *Continued Development and Enhancement of DeepARG, a Web Service for Accurate Annotation of Antibiotic Resistance Genes,* $3,725. 12/01/2019 - 05/15/2020. PI: Liqing Zhang. Co-PIs: Lenwood S. Heath. Personal share: 50%.

[45] Virginia Tech Microbiology at the Nexus of Food, Energy, Water, and Health Systems (MicroFEWHS) concept area: *Developing ARGminer, a Powerful Web Platform for Crowdsourcing-based Curation of Antibiotic Resistance Genes,* $3,000. 12/01/2018 - 05/15/2019. PI: Liqing Zhang. Co-PIs: Lenwood S. Heath. Personal share: 50%.

[46] Virginia Tech College of Agriculture and Life Sciences (CALS): *Identifying Select Agents Using a Nanopore Sequencing and Secure Cyberphysical System,* $20,000. 05/15/2018 - 12/31/2018. PI: Song Li. Co-PIs: Lenwood S. Heath, Boris Vinatzer. Personal share: 25%.

[47] National Science Foundation 1238057: *GEPR-Evolutionary Gain and Loss of Function in Parasitic Plant Genomes,* $3,406,833. 08/01/13 - 07/31/18. PI: James H. Westwood. Co-PIs: Eva Collakova, Claude W. dePamphilis, Lenwood S. Heath, Aaron Mackey, Michael P. Timko, John I. Yoder. Personal share: 10%. VT share: $934,389.

[48] National Science Foundation DBI-1062472: *ABI Development: Representation, Visualization, and Modeling of Signaling Pathways in Higher Plants,* Advances in Biological Informatics (ABI), $1,057,337. 04/15/11 - 03/31/17. PI: Lenwood S. Heath. Co-PIs: Ruth Grene, Andy Pereira. Personal share: 37%.

[49] National Institutes of Health Grant 1 R25 GM066354-06: *VT Post Baccalaureate Research and Education,* National Institute of General Medical Sciences. First year: $275,603; second year: $276,635; third year: $277,689; fourth year: $278,793. 03/01/2009 - 01/31/2013. PI: Edward J. Smith; Research Mentor: Lenwood S. Heath, *et al.*

[50] National Science Foundation ITR-0428344: *ITR-(NHS)-(sim): Computational Models for Gene Silencing: Elucidating a Pervasive Biological Defensive Response,* Information Technology Research (ITR), $1,500,000. 09/01/04 - 8/31/10. PI: Lenwood S. Heath. Co-PIs: Richard F. Helm, Alexey Onufriev, Malcolm Potts, Naren Ramakrishnan.

[51] National Institutes of Health Grant 1 R25 GM066354-01A1: *VT Post Baccalaureate Research and Education,* National Institute of General Medical Sciences. First year: $254,871; second year: $411,184; third year: $413,757; fourth year: $416,407; fifth year: $419,135. 08/04/2003 - 07/31/2008. PI: Edward J. Smith; Research Mentor: Lenwood S. Heath, *et al.*

[52] Department of Defense Multidisciplinary University Research Initiative (MURI), Defense Advanced Research Projects Agency Grant N00014-01-1-0852: *Dryophile Genes to Engineer Stasis-Recovery of Human Cells,* $4,532,622: $2,602,790 (basic 3-year) plus $1,929,832 (2-year option), 05/01/2001 – 05/31/2007. Principal investigator: Malcolm Potts. Senior Personnel: Lenwood S. Heath, Richard F. Helm, Naren Ramakrishnan, Thomas O. Sitz (Virginia Tech), Frederic Bloom, Paul Price (Life Technologies), and John Battista (Louisiana State University).

[53] National Science Foundation Grant ITR-0219322: *ITR: Understanding Stress Resistance Mechanisms in Plants: Multimodal Models Integrating Experimental Data, Databases, and the Literature,* Division of Integrative Biology and Neuroscience (BIO/IBN) — ITR Small grants, $499,973. 09/15/2002 - 08/31/2005. PI: Lenwood S. Heath; Co-PIs: Ruth G. Alscher, Boris I. Chevone, Naren Ramakrishnan, and Layne T. Watson. Supplemental funding of $70,705 received February, 2005; expiration extended until 12/31/2006.

[54] National Science Foundation Grant EIA-01903660: *A Microarray Experiment Management System,* $600,000. 8/01/2001 – 8/31/2004. Principal investigators: Naren Ramakrishnan, Lenwood S. Heath, Layne T. Watson, Ruth G. Alscher, and Jennifer W. Weller (VBI).

[55] Virginia Tobacco Settlement Foundation (VTSF): *Using Molecular Genetics to Target "High Risk" Youth Smokers.* Initial participation with the Virginia Tobacco Prevention Research Consortium, in particular, research in furthering the Expresso project and applying it to the needs of the consortium. $96,000. 3/16/2002 – 3/15/2002. Principal investigators: Naren Ramakrishnan, Lenwood S. Heath.

[56] National Science Foundation Grant INT-0000424: *U.S.-Brazil Cooperative Research: The Fine Algebraic Structure of Derivations and Hochschild Cohomology.* $24,900, 9/1/00–8/31/03. Principal investigators: Daniel R. Farkas, Edward L. Green, and Lenwood S. Heath.

[57] National Science Foundation Grant CCR-9732068: *A System for Symbolic Computation in Hopf Algebras.* $180,000, 8/16/98–8/31/01. Principal investigators: Edward L. Green and Lenwood S. Heath.

[58] Arts and Sciences Pilot Research Project Grant: *Experimenting With Algorithms for Difficult, Non-numeric Problems.* $3,000, 12/96–12/98.

[59] National Science Foundation Grant IRI-9116991: *A User-Centered Database from the Computer Science Literature (REU Supplement).* $8,000, 5/15/92–5/15/93. Principal investigator. Funding to pay two undergraduates to participate in research.

[60] National Science Foundation Grant IRI-9116991: *A User-Centered Database from the Computer Science Literature.* $443,391, 9/15/91–2/28/95. Equipment supplement $29,941, 1992. Principal investigators: Edward A. Fox, Lenwood S. Heath, and Deborah Hix.

[61] National Science Foundation Grant CCR-9009953: *Analyzing Parallel Architectures With Algebraic Topology.* $40,000, 7/15/90–12/31/92. Principal investigator.

Doctoral Students Supervised

[1] Xiao Liang, "Computational Insights into Evolutionary Dynamics of Human and Primate Genes," 2024.

[2] Parul Sharma, "Bacterial Plant Pathogen Identification using Genomics and Metagenomics," 2023.

[3] Reem Aldaihani, "Identifying The Structure Of Genomic Islands In Prokaryotes," 2022.

[4] Siddharth Krishnan, "Seeing the Forest for the Trees: New Approaches to Characterizing and Forecasting Cascades," 2018.

[5] Hanaa A. Torkey, "Machine Learning Approaches for Identifying microRNA Targets and Conserved Protein Complexes," 2017.

[6] Fatma Elzahraa Sobhy Eid, "Predicting the Interactions of Viral and Human Proteins," 2017.

[7] Doaa Abdelsalam Ahmed Mohamed Altarawy, "DeTangle: A Framework for Interactive Prediction and Visualization of Gene Regulatory Networks," 2017.

[8] Haitham Abdulrahman Elmarakeby, "Deep Learning for Biological Problems," 2017.

[9] Andrew Scott Warren, "Methods for Analysis of Prokaryotic Genome Architecture," 2017.

[10] Eman Badr, "Identifying Splicing Regulatory Elements with de Bruijn Graphs," 2015.

[11] Kuan Yang, "Ancestral Genome Reconstruction in Bacteria," 2012. Ph.D. in Genetics, Bioinformatics, and Computational Biology. Co-advisor with João C. Setubal of the Virginia Bioinformatics Institute.

[12] Nahla A. Belal, "Two Problems in Computational Genomics," 2011.

[13] Amrita Pati, "Graph-Based Genomic Signatures," 2008.

[14] Allan A. Sioson, "Multimodal Networks in Biology," 2005.

[15] Douglas J. Slotta, “Evalutating Biological Data Using Rank Correlation Methods,” 2005.

[16] Craig A. Struble, “Analysis and Implementation of Algorithms for Noncommutative Algebra,” 2000. Co-advisor with Edward L. Green of the Department of Mathematics.

[17] John Paul A. Vergara, “Sorting by Bounded Rearrangements,” 1997.

[18] Benjamin J. Keller, “Algorithms and Orders for Finding Noncommutative Gröbner Bases,” 1997. Co-advisor with Edward L. Green of the Department of Mathematics.

[19] Ramana R. Juvvadi, “Perfect Hashing and Some Related Problems,” 1993.

[20] Sriram V. Pemmaraju, “Exploring the Powers of Stacks and Queues via Graph Layouts,” 1992.

Masters Thesis Students Supervised

[1] Atul Bharadwaj, “COVID-19 Variant Analyzer through Genomic Sequences and Jaccard Similarities,” 2025.

[2] Chandra Sekhar Nerella, “Comparative Analysis of Genomic Similarity Tools in Species Identification,” 2024.

[3] Sahar Heidari, “Studying Co-occurrences of Eukaryotic Linear Motifs and Point Mutations to Identify Cases of Viral Mimicry in SARs-CoV-2,” co-supervisor, University of Bologna, Italy, 2022.

[4] Aarathi Raghuraman, “Predicting Mutational Pathways of Influenza A H1N1 Virus using Q-learning,” 2021.

[5] Ashkan Nazari, “Machine Learning Application in Energy Storage System’s State Estimation: State of Health (SOH),” 2021.

[6] Jeffrey A. Robertson, “Entropy Measurements and Ball Cover Construction for Biological Sequences,” 2018.

[7] Yanshen Yang, “MCAT: Motif Combining and Association Tool,” 2018.

[8] Rathna Senthil, “IDLE: A Novel Approach to Improving Overlapping Community Detection in Complex Networks,” 2016.

[9] Ying Ni, “A Machine Learning Approach to Predict Gene Regulatory Networks in Seed Development in Arabidopsis Using Time Series Gene Expression Data,” 2016.

[10] Deepti Aggarwal, “Inferring Signal Transduction Pathways from Gene Expression Data using Prior Knowledge,” 2015.

[11] Nidhi Kiranbhai Parikh, “Generating Random Graphs with Tunable Clustering Coefficient,” 2011.

[12] Amrita Pati, “Modeling and Analysis of Regulatory Elements in *Arabidopsis thaliana* from Annotated Genomes and Gene Expression Data,” 2005.

[13] Maulik Shukla, “GeneSieve: A Probe Selection Strategy for cDNA Microarrays,” 2004.

[14] Harsha K. Rajasimha, “PathMeld: A Methodology for The Unification of Metabolic Pathway Databases,” 2004.

[15] Guillermo Averboch, “A System for Document Analysis, Translation, and Automatic Hypertext Linking,” 1995.

[16] Fred L. Drake, Jr., “odb/Tools Project Report,” 1995.

[17] Dennis J. Brueni, “Minimal PMU Placement for Graph Observability: A Decomposition Approach,” 1993.

[18] John Paul A. Vergara, “Edge-packing by Isomorphic Subgraphs,” 1990.

[19] Thurman W. Tunnell, “Development of New Heuristics for the Euclidean Traveling Salesman Problem,” 1989.

Professional Organizations

Association of Computing Machinery, Member
    ACM Special Interest Group on Algorithms and Computation Theory

Institute of Electrical and Electronics Engineers (IEEE), Lifetime Senior Member

IEEE Computer Society, Lifetime Member

Models of Infectious Disease Agent Study (MIDAS) Network, Member

Society for Industrial and Applied Mathematics (SIAM), Lifetime Member
    SIAM Activity Group on Discrete Mathematics

Professional Service

2021 Program Committee Member, IEEE International Conference on Bioinformatics and Biomedicine (BIBM), 2021.

2020 Program Committee Member, IEEE International Conference on Bioinformatics and Biomedicine (BIBM), 2020.

2017–20 Associate Editor, Mathematical Foundations of Computing (MFOC).

2017–25 Managing Editor, Journal of Interconnection Networks (JOIN).

2017 Guest editor-in-chief of the **Special Issue of the Proceedings of the IEEE on Bioinformatics of DNA,** March, 2017. Other guest editors are Hector Corrada Bravo, Mario Caccamo, and Michael Schatz. “Scanning the Issue: Bioinformatics of DNA,” Lenwood S. Heath, Hector Corrada Bravo, Mario Caccamo, and Michael Schatz. Guest editor introduction. Proceedings of the IEEE 105, 2017, 419–421.

2013–17 Editor, New Journal of Science.

2011–14 Editor, ISRN Computational Mathematics

2011 Member of program committee of **First IEEE Conference on Healthcare Informatics, Imaging, and Systems Biology (HISB) 2011.**

2010 Member of program committee of **33rd Annual ACM SIGIR Conference 2010.**

2005 Member of program committee of **Brazilian Symposium on Bioinformatics 2005.**

Moderator for panel on systems biology at the Biomedical Engineering Research and Science Conference, March 4, 2005. Sponsored by the Virginia Tech National Capital Region and College of Engineering and by the Wake Forest University School of Medicine.

2003–16 Editor, Journal of Interconnection Networks (JOIN).

2002 Guest editor, with Naren Ramakrishnan, of the **Special Issue of IEEE Computer on Bioinformatics Software,** July, 2002.

Member of program committee of **High Performance Computing Symposium 2002 (HPC 2002),** accepted six papers for two tracks on Bioinformatics Applications.

1995–2000

ACM Special Interest Group on Automata and Computability Theory (SIGACT) Theory Calendar. Maintained WWW calendar of conferences and other events of interest to the theory community. Calendar also appeared as a column four times a year in **SIGACT News.**

Reviewer

ACM Computing Surveys

ACM Transactions on Algorithms (TALG)

ACM Transactions on Information Systems

ACM Transactions on Modeling and Computer Simulation

ACM-SIAM Symposium on Discrete Algorithms (SODA)

Algorithmica

Algorithms

Algorithms for Molecular Biology

American Mathematical Monthly

Applied Mathematics Letters

Artificial Intelligence in Medicine

Bioinformatics

BMC Bioinformatics

BMC Genomics

Canadian Foundation for Innovation

Chemometrics

Cogen Mathematics and Statistics

Combinatorica

Communications in Algebra

Communications of the ACM

Computers in Biology and Medicine

Conference on Information and Knowledge Management

Digital Libraries '94

Discrete and Computational Geometry

Discrete Applied Mathematics

Discrete Mathematics

Electronic Journal of Combinatorics

Foundations of Software Technology & Theoretical Computer Science

Frontiers in Genetics

Frontiers in Molecular Biosciences

Fund for Scientific Research (F.R.S.-FNRS), Belgium

Genetics

IEEE Access

IEEE/ACM Transactions on Computational Biology and Bioinformatics

IEEE Computer

IEEE Transactions on Computers

IEEE Transactions on Knowledge and Data Engineering

IEEE Transactions on Parallel and Distributed Systems

IEICE

Information and Computation

Information and Control

Information Sciences

International Journal of Computational Geometry and Applications

International Journal of Computer Science and Applications

International Parallel Processing Symposium and Symposium on Parallel and Distributed Processing

Information Processing Letters

ISRN Computational Mathematics

Joint Summer Research Conferences

Journal of Algorithms

Journal of the ACM

Journal of Combinatorial Optimization

Journal of Combinatorial Theory

Journal of Complexity

Journal of Computational Biology

Journal of Computer and System Sciences

Journal of Computer Science & Systems Biology

Journal of Graph Algorithms and Applications

Journal of Graph Theory

Journal of Interconnection Networks (JOIN)

Journal of Parallel and Distributed Computing

Journal of Supercomputing

Journal of Universal Computer Science

Management Science

Mathematical Systems Theory

Mathematics of Operations Research

National Institutes of Health

National Science Foundation

Netherlands Organization for Scientific Research (NWO)

NETWORKS

Parallel Processing Letters

Philippine Journal of Science

PLOS Computational Biology

PLOS ONE

SIAM Journal on Computing

SIAM Journal on Discrete Mathematics

SIAM Journal on Mathematics of Data Science

SIGIR Conference

Symposium on Applied Computing

Theoretical Computer Science

Transactions on Algorithms

United States Department of Agriculture

University of Queensland, Australia

HONORS AND AWARDS

Department of Computer Science, Virginia Tech, Outstanding Department Contributor Award for Exemplary Faculty Service, 2019

Institute of Electrical and Electronics Engineers, Lifetime Senior Member, 2018

Institute of Electrical and Electronics Engineers, Senior Member, 1999

Sigma Xi, The Scientific Research Honor Society, 1991

Board of Governor's Fellowship in Science and Technology, University of North Carolina, Chapel Hill, 1984

Archibald Henderson Prize for Outstanding Undergraduate in Mathematics, University of North Carolina, Chapel Hill, 1975

Phi Beta Kappa, University of North Carolina, Chapel Hill, 1973

Jackson Tuition Scholarship, University of North Carolina, Chapel Hill, 1971

National Merit Scholarship, 1971

Westinghouse Science Talent Search winner, 1971

National Science Foundation Student Science Training Program, University of North Carolina, Chapel Hill, Summer 1970; first in mathematics class

Governor's School, Winston-Salem, NC, Summer, 1969