**CURRICULUM VITAE**

**University of Pittsburgh**

**School of Medicine**

**BIOGRAPHICAL**

## Name: Vanathi Gopalakrishnan Business Address: The Offices at Baum

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Suite #530

## Pittsburgh, PA 15206

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**EDUCATION and TRAINING**

##### Undergraduate

**Dates Attended Name and Location Degree Received Major Study of Institution & year**

1983 *–* 88 B.M.S. College of Engineering, B.E., 1988 Computer Engineering

Bangalore, India & Technology

**Graduate**

**Dates Attended Name and Location Degree Received Major Study**

**of Institution & year**

# 1989 – 91 University of Pittsburgh

# Pittsburgh, Pennsylvania M.S., 1991 Computer Science

# 1991 – 96, University of Pittsburgh Ph.D., 1999 Computer Science

# 1998 – 99 Pittsburgh, Pennsylvania Thesis - Supervisor:

# Prof. Bruce G. Buchanan

**APPOINTMENTS and POSITIONS**

**Academic**

**Current**

|  |  |  |
| --- | --- | --- |
| **Years Inclusive** | **Name and Location of Institution** | **Rank/Title** |
| 2011-present | Biomedical Informatics, Dept of Biomedical Informatics, University of Pittsburgh | Associate Professor (Tenured) |
| 2011-present | Computational Biology, Dept of Computational Biology, University of Pittsburgh | Associate Professor |
| 2018-present | Bioengineering, Department of Bioengineering, University of Pittsburgh | Associate Professor |
| 2019-present | Clinical and Translational Science, University of Pittsburgh | Associate Professor |
| 2024-present | School of Medicine, University of Pittsburgh | Longitudinal Educator |
| **Past** |  |  |
| 2000-2002 | Dept of Medicine, Univ of Pittsburgh, University of Pittsburgh | Visiting Assistant Professor |
| 2000-2002 | Intelligent Systems Program, University of Pittsburgh | Visiting Assistant Professor |
| 2002-2006 | Dept of Medicine, University of Pittsburgh | Assistant Professor |
| 2002-2011 | Intelligent Systems Programs, University of Pittsburgh | Assistant Professor |
| 2006-2011 | Dept of Biomedical Informatics, University of Pittsburgh | Assistant Professor |
| 2006-2011  2011-2022 | Dept of Computational Biology, University of Pittsburgh  Intelligent Systems Program, University of Pittsburgh | Assistant Professor  Associate Professor |
| 2018-2020 | Intelligent Systems Program, School of Computing and Information, University of Pittsburgh | Co-Director (elected) |
| 2020-2022 | Intelligent Systems Program, School of Computing and Information, University of Pittsburgh | Director (elected) |
| **Non-Academic** |  |  |
| 1988-1989 | Wipro Information Technology, Ltd, Bangalore, India | Systems Executive |
| 1989-1997 | Dept of Computer Science, Univ of Pittsburgh | Research and Teaching Assistant |
| 1991 | Systems Modeling Corp. Sewickley, PA | Software Engineer |
| 1996-1998 | Intelligent Systems, M.D., L.C., Clearwater, FL (now nucleus of NASDAQ:ICAD) | Co-founder |

#### MEMBERSHIPS held in PROFESSIONAL and SCIENTIFIC SOCIETIES

The International Society for Computational Biology 2000-

Association for Computing Machinery (ACM) 2002-

American Association for Advancement of Science (AAAS) 2002-

American Association for Artificial Intelligence (AAAI) 2002-

American Medical Informatics Association (AMIA) 2002-

Internal Advisory Board, Genomics and Proteomics Core Laboratories, UPSOM 2002-2004

Center for ALS Research 2004-2010

UPCI Lung and Thoracic Malignancies Program 2011-2016

#### HONORS

Best Trainee Award, WIPRO Information Technology, Ltd, India 1988

W.M. Keck Fellowship in Computational Biology 1994

Pitt Innovator Award 2006

AMIA TBI Distinguished Paper Award (Senior Author) 2011

AMIA TBI Marco Ramoni Distinguished Paper Award (Senior Author) 2015

Listed in the Marquis Who’s Who in America Platinum Edition

via external nomination. 2016

Nominated, interviewed, offered and declined the “Honorary Knowledge &

Discovery Award” by The American Health Council. 2016

General Chair (1 of 3), The 16th International Conference on

Information Technology, ICIT 2017

Keynote Speaker, ICIT 2017, Bhubaneswar, Odisha, India, 12/21-12/22/2017

Pitt Innovator Award 2018

Distinguished Alumni, B.M.S. College of Engineering,

CSE (Computer Science & Engineering) 2020

Invited MDPI Information Journal Editorial Board Member 10/2022 – 9/2024

#### PUBLICATIONS

#### Refereed

1. **Gopalakrishnan V,** Buchanan B. Determining the Effectiveness of Using Expert Systems to Enable Rapid Response During Emergencies. Proceedings of the World Congress on Expert Systems. 1991; :1983-1991.
2. **Gopalakrishnan, V**., Hennessy, D., Buchanan, B., Subramanian, D. The Crystallographer's Assistant. In: Proceedings of the Twelfth National Conference on Artificial Intelligence. 1994;:1451.
3. Hennessy D, **Gopalakrishnan V,** Buchanan BG, Subramanian D, Rosenberg JM. Induction of Rules for Biological Macromolecule Crystallization. In: Proceedings of the Second International Conference on Intelligent Systems for Molecular Biology. 1994; :179-87.
4. **Gopalakrishnan, V**. Inducing design biases that characterize successful experimentation in weak-theory domains: TIPS. In: Proceedings of the Thirteenth National Conference on Artificial Intelligence. 1996; 1391.
5. **Gopalakrishnan V,** Buchanan B. Representing and Learning Temporal Relationships among Experimental Variables. In: Proceedings of the Fifth International Workshop on Temporal Representation and Reasoning (TIME-98). 1998; :148-55.
6. **Gopalakrishnan V,** Buchanan BG, Rosenberg JM. Intelligent Aids for Parallel Experiment Planning and Macromolecular Crystallization. In: Proceedings of the Eight International Conference on Intelligent Systems for Molecular Biology. 2000; :171-80.
7. Ma C, **Gopalakrishnan V,** Peters DG, Ferrell. RE. Decision-Tree Learning Based Characterization of the Global Effects of Cocaine Abuse on Gene Expression in the Rat Brain. Annual Advancing Pathology Imaging, Informatics and the Internet (APIII) Conference Proceedings. Best Brief Report Award. 2002.
8. **Gopalakrishnan V,** Buchanan BG, Rosenberg JM. A Simple Simulator of Protein Crystallization. Journal of Applied Crystallography. 2002; 35(6):727-33.
9. Li F, Yang Y, Anderson G, Seetharaman JK, Jitendar V, **Gopalakrishnan V.** Constructing Genetic Networks from Microarray Data Using Recursive Ridge Regression (RRR). Biological Language Modeling Conference Proceedings, Carnegie Mellon University. 2003.
10. Liu Y, Carbonell J, Seetharaman JK, **Gopalakrishnan V.** Prediction of Parallel and Antiparallel-sheets using Conditional Random Fields. Biological Language Modeling Conference Proceedings, Carnegie Mellon University. 2003.
11. Liu Y, Carbonell J, Seetharaman JK, **Gopalakrishnan V.** Context Sensitive Vocabulary and its Application in Protein Secondary Structure Prediction. In: Proceedings of the 27th annual ACM Conference on Research and Development in Information Retrieval (ACM SIGIR 2004). 2004; :538-539.
12. **Gopalakrishnan V,** Williams E, Ranganathan S, Bowser R, Cudkowic ME, Novelli M, Lattazi W, Gambotto A, Day BW. Proteomic Data Mining Challenges in Identification of Disease-Specific Biomarkers from Variable Resolution Mass Spectra. In: Proceedings of Bioinformatics Workshop, SIAM Data Mining 2004, Eds. Obradovic, J. and Komorowski, J. 2004; :1-10.
13. Lu X, Zhai C, **Gopalakrishnan V,** Buchanan BG. [Automatic annotation of protein motif function with Gene Ontology terms.](https://www.ncbi.nlm.nih.gov/pubmed/15345032/)BMC Bioinformatics. 2004 Sep 2;5:122. doi: 10.1186/1471-2105-5-122. PubMed PMID: 15345032; PubMed Central PMCID: PMC517493.
14. **Gopalakrishnan V,** Livingston G, Hennessy D, Buchanan B, Rosenberg JM. [Machine-learning techniques for macromolecular crystallization data.](https://www.ncbi.nlm.nih.gov/pubmed/15388916/)Acta Crystallogr D Biol Crystallogr. 2004 Oct;60(Pt 10):1705-16. doi: 10.1107/S090744490401683X. Epub 2004 Sep 23. PubMed PMID: 15388916.
15. Liu Y, Carbonell J, Klein-Seetharaman J, **Gopalakrishnan V.** [Comparison of probabilistic combination methods for protein secondary structure prediction.](https://www.ncbi.nlm.nih.gov/pubmed/15217817/)Bioinformatics. 2004 Nov 22;20(17):3099-107. doi: 10.1093/bioinformatics/bth370. Epub 2004 Jun 24. PubMed PMID: 15217817
16. Bowser R, Ranganathan S, Ganchev P, **Gopalakrishnan V.** Cudkowicz M, Brown RH. Diagnostic biomarkers for amyotrophic lateral sclerosis (ALS. FASEB Journal. 2005; 19(5):A1511.
17. Liu Y, Carbonell J, Weigele P, **Gopalakrishnan V.** Segmentation Conditional Random Fields (SCRFs): A New Approach for Protein Fold Recognition. Springer Lecture Notes in Computer Science. RECOMB. 2005; 408-22.
18. Ranganathan S, Williams E, Ganchev P, **Gopalakrishnan V,** Lacomis D, Urbinelli L, Newhall K, Cudkowicz ME, Brown RH Jr, Bowser R. [Proteomic profiling of cerebrospinal fluid identifies biomarkers for amyotrophic lateral sclerosis.](https://www.ncbi.nlm.nih.gov/pubmed/16313519/)J Neurochem. 2005 Dec;95(5):1461-71. doi: 10.1111/j.1471-4159.2005.03478.x. PubMed PMID: 16313519; PubMed Central PMCID: PMC1540444. (HIGHLY CITED PAPER: 253 citations on google scholar as of August 2022).
19. Paige L, Bowser R., Lutka F, An J, Ganchev P, **Gopalakrishnan V**, Newhall K, Kruczek K, E Welsh E, Kaddurah-Daouk R, Brown RH, Cudkowicz ME. Identification of metabolic and protein biomarkers for amyotrophic lateral sclerosis. NEUROLOGY. 2006; 66(5): A386.
20. Mitra PS, **Gopalakrishnan V,** McNamee RL. Segmentation of MRI Data by Maximization of Region Contrast. In: Proceedings of Computer Vision and Pattern Recognition Workshop (CVPRW'06). 2006; 88.
21. **Gopalakrishnan V,** Ganchev P, Ranganathan S, Bowser R. Rule Learning for Disease-specific Biomarker Discovery from Clinical Proteomic Mass Spectra. In BioDM 2006, Lecture Notes in Bioinformatics (LNBI) 3916, J. Li et al. (Eds.) Springer-Verlag, Berlin, Heidelberg. 2006; :93-105.
22. Liu Y, Carbonell J, Weigele P, **Gopalakrishnan V.** [Protein fold recognition using segmentation conditional random fields (SCRFs).](https://www.ncbi.nlm.nih.gov/pubmed/16597248/)J Comput Biol. 2006 Mar;13(2):394-406. doi: 10.1089/cmb.2006.13.394. PubMed PMID: 16597248.
23. Liu Y, Carbonell J, **Gopalakrishnan V,** Weigele P. Discriminative Graphical Models for Protein Quaternary Structure Motif Detection. In: Proceedings of International Conference on Machine Learning (ICML)-07 Workshop on Constrained Optimization and Structured Output Space. 2007.
24. Liu Y, Carbonell J, **Gopalakrishnan V,** Weigele P. Protein Quaternary Fold Recognition using Conditional Graphical Models. In: Proceedings of the Twentieth Joint International Conference on Artificial Intelligence (IJCAI-07). 2007; :937-43.
25. **Gopalakrishnan V.** Prior Knowledge for Discovery Proteomics Data Interpretation. The Eleventh Annual International Conference on Research in Computational Molecular Biology (RECOMB); 2007.
26. Grover H, Lustgarten JL, Visweswaran S, **Gopalakrishnan V.** Improving Peptide Identification via Validation with Intensity-based Modeling of Tandem Mass Spectra. In Proceedings of the International Conference on Bioinformatics, Computational Biology, Genomics and Chemoinformatics (BCBGC-08). 2008; :56-63.
27. Lustgarten JL, **Gopalakrishnan V,** Malehorn D, Bigbee W. Assigning Putative Protein Identifications to Selected Lung Cancer Biomarkers from Surface-Enhanced Laser Desorption/Ionization Time-of-Flight Mass Spectrometry of Blood Serum. Presented at the Annual Advancing Pathology Imaging, Informatics and the Internet (APIII) conference Honorable Mention Award. 2008.
28. Lustgarten JL, Visweswaran S, Grover H, **Gopalakrishnan V.** An Evaluation of Discretization Methods for Learning Rules from Biomedical Datasets. In Proceedings of the International Conference on Bioinformatics and Computational Biology (BIOCOMP'08). 2008; :527-32.
29. Lustgarten JL, **Gopalakrishnan V,** Grover H, Visweswaran S. Improving a Knowledge Base for Use in Proteomic Data Analysis. In Proceedings of Intelligent Data Analysis in bioMedicine And Pharmacology (IDAMAP-08). 2008; :87-9.
30. Lustgarten JL, Visweswaran S, Grover H, Kimmel CP, Ryberg H, Bowser RP, **Gopalakrishnan V,** Hogan WR. [Using a novel resource to decrease proteomic biomarker identification time.](https://www.ncbi.nlm.nih.gov/pubmed/18999243/)AMIA Annu Symp Proc. 2008 Nov 6;:1033. PubMed PMID: 18999243.
31. Lustgarten JL, **Gopalakrishnan V,** Grover H, Visweswaran S. [Improving classification performance with discretization on biomedical datasets.](https://www.ncbi.nlm.nih.gov/pubmed/18999186/)AMIA Annu Symp Proc. 2008 Nov 6;:445-9. PubMed PMID: 18999186; PubMed Central PMCID: PMC2656082.
32. **Gopalakrishnan V.** Computer Aided Knowledge Discovery in Biomedicine. In: Daskalaki A, editor. Handbook of Research on Systems Biology Applications in Medicine Hershey PA: IGI Global; 2009. Chapter 007; p.126-141.
33. Mitra P, **Gopalakrishnan V,** McNamee R. Utilization of Spatial Coherence in Functional Neuroimage-based Classification. Proceedings of the Third International Conference on Bioinformatics and Biomedical Engineering. 2009.
34. Liu Y, Carbonell J, **Gopalakrishnan V,** Weigele P. [Conditional graphical models for protein structural motif recognition.](https://www.ncbi.nlm.nih.gov/pubmed/19432536/)J Comput Biol. 2009 May;16(5):639-57. doi: 10.1089/cmb.2008.0176. PubMed PMID: 19432536.
35. Lustgarten JL, Visweswaran S, Bowser RP, Hogan WR, **Gopalakrishnan V.** [Knowledge-based variable selection for learning rules from proteomic data.](https://www.ncbi.nlm.nih.gov/pubmed/19761570/)BMC Bioinformatics. 2009 Sep 17;10 Suppl 9:S16. doi: 10.1186/1471-2105-10-S9-S16. PubMed PMID: 19761570; PubMed Central PMCID: PMC2745687
36. Lustgarten JL, **Gopalakrishnan V,** Visweswaran S. [Measuring stability of feature selection in biomedical datasets.](https://www.ncbi.nlm.nih.gov/pubmed/20351889/)AMIA Annu Symp Proc. 2009 Nov 14;2009:406-10. PubMed PMID: 20351889; PubMed Central PMCID: PMC2815476.
37. **Gopalakrishnan V,** Lustgarten JL, Visweswaran S, Cooper GF. [Bayesian rule learning for biomedical data mining.](https://www.ncbi.nlm.nih.gov/pubmed/20080512/)Bioinformatics. 2010 Mar 1;26(5):668-75. doi: 10.1093/bioinformatics/btq005. Epub 2010 Jan 14. PubMed PMID: 20080512; PubMed Central PMCID: PMC2852212.
38. Ryberg H, An J, Darko S, Lustgarten JL, Jaffa M, **Gopalakrishnan V,** Lacomis D, Cudkowicz M, Bowser R. [Discovery and verification of amyotrophic lateral sclerosis biomarkers by proteomics.](https://www.ncbi.nlm.nih.gov/pubmed/20583124/)Muscle Nerve. 2010 Jul;42(1):104-11. doi: 10.1002/mus.21683. PubMed PMID: 20583124; PubMed Central PMCID: PMC2975276.
39. Ganchev P, Malehorn D, Bigbee,W, L,, **Gopalakrishnan V.** Transfer Rule Learning for Biomarker Discovery and Verification from Molecular Profiling Studies. AMIA 2011 Translational Bioinformatics Summit. 2011; San Francisco, CA, Winner of Distinguished Paper Award.
40. Zeng X, Hood BL, Zhao T, Conrads TP, Sun M, **Gopalakrishnan V,** Grover H, Day RS, Weissfeld JL, Wilson DO, Siegfried JM, Bigbee WL. [Lung cancer serum biomarker discovery using label-free liquid chromatography-tandem mass spectrometry.](https://www.ncbi.nlm.nih.gov/pubmed/21304412/)J Thorac Oncol. 2011 Apr;6(4):725-34. doi: 10.1097/JTO.0b013e31820c312e. PubMed PMID: 21304412; PubMed Central PMCID: PMC3104087.
41. Lustgarten JL, Visweswaran S, **Gopalakrishnan V,** Cooper GF. [Application of an efficient Bayesian discretization method to biomedical data.](https://www.ncbi.nlm.nih.gov/pubmed/21798039/)BMC Bioinformatics. 2011 Jul 28;12:309. doi: 10.1186/1471-2105-12-309. PubMed PMID: 21798039; PubMed Central PMCID: PMC3162539.
42. Li X, LeBlanc J, Truong A, Vuthoori R, Chen SS, Lustgarten JL, Roth B, Allard J, Ippoliti A, Presley LL, Borneman J, Bigbee WL, **Gopalakrishnan V,** Graeber TG, Elashoff D, Braun J, Goodglick L. [A metaproteomic approach to study human-microbial ecosystems at the mucosal luminal interface.](https://www.ncbi.nlm.nih.gov/pubmed/22132074/)PLoS One. 2011;6(11):e26542. doi: 10.1371/journal.pone.0026542. Epub 2011 Nov 21. PubMed PMID: 22132074; PubMed Central PMCID: PMC3221670.
43. Ganchev P, Malehorn D, Bigbee WL, **Gopalakrishnan V.** [Transfer learning of classification rules for biomarker discovery and verification from molecular profiling studies.](https://www.ncbi.nlm.nih.gov/pubmed/21571094/)J Biomed Inform. 2011 Dec;44 Suppl 1:S17-S23. doi: 10.1016/j.jbi.2011.04.009. Epub 2011 May 6. PubMed PMID: 21571094; PubMed Central PMCID: PMC3706089.
44. LaRusch J, **Gopalakrishnan V,** Whitcomb,D.C. Using Rule Based Models to Predict Disease Status and Identify Novel Risk Combinations in Chronic Pancreatitis. Annual Biomedical Informatics Training Program Student Retreat. 2012; Pittsburgh, PA, Best Student Paper, 3rd Place Award.
45. Grover H, **Gopalakrishnan V.** [Efficient Processing of Models for Large-scale Shotgun Proteomics Data.](https://www.ncbi.nlm.nih.gov/pubmed/25309967/)Int Conf Collab Comput. 2012;2012:591-596. doi: 10.4108/icst.collaboratecom.2012.250716. PubMed PMID: 25309967; PubMed Central PMCID: PMC4190677.
46. Liu G, Kong L, **Gopalakrishnan V.** [A Partitioning Based Adaptive Method for Robust Removal of Irrelevant Features from High-dimensional Biomedical Datasets.](https://www.ncbi.nlm.nih.gov/pubmed/22779051/)AMIA Jt Summits Transl Sci Proc. 2012;2012:52-61. Epub 2012 Mar 19. PubMed PMID: 22779051; PubMed Central PMCID: PMC3392052.
47. Bigbee WL, **Gopalakrishnan V,** Weissfeld JL, Wilson DO, Dacic S, Lokshin AE, Siegfried JM. [A multiplexed serum biomarker immunoassay panel discriminates clinical lung cancer patients from high-risk individuals found to be cancer-free by CT screening.](https://www.ncbi.nlm.nih.gov/pubmed/22425918/)J Thorac Oncol. 2012 Apr;7(4):698-708. doi: 10.1097/JTO.0b013e31824ab6b0. PubMed PMID: 22425918; PubMed Central PMCID: PMC3308353.
48. Grover H, Wallstrom G, Wu CC, **Gopalakrishnan V.** [Context-sensitive markov models for peptide scoring and identification from tandem mass spectrometry.](https://www.ncbi.nlm.nih.gov/pubmed/23289783/)OMICS. 2013 Feb;17(2):94-105. doi: 10.1089/omi.2012.0073. Epub 2013 Jan 5. PubMed PMID: 23289783; PubMed Central PMCID: PMC3567622.
49. Floudas CS, Balasubramanian JB, Romkes M, **Gopalakrishnan V.** [An empirical workflow for genome-wide single nucleotide polymorphism-based predictive modeling.](https://www.ncbi.nlm.nih.gov/pubmed/24303297/)AMIA Jt Summits Transl Sci Proc. 2013;2013:53-7. eCollection 2013. PubMed PMID: 24303297; PubMed Central PMCID: PMC3814469.
50. Menon PG, Morris L, Staines M, Lima J, Lee DC, **Gopalakrishnan V.** [Novel MRI-derived quantitative biomarker for cardiac function applied to classifying ischemic cardiomyopathy within a Bayesian rule learning framework.](https://www.ncbi.nlm.nih.gov/pubmed/26005248/)Proc SPIE Int Soc Opt Eng. 2014 Feb 15;9034. doi: 10.1117/12.2042118. PubMed PMID: 26005248; PubMed Central PMCID: PMC4440803.
51. Dutta-Moscato J, **Gopalakrishnan V,** Lotze MT, Becich MJ. [Creating a pipeline of talent for informatics: STEM initiative for high school students in computer science, biology, and biomedical informatics.](https://www.ncbi.nlm.nih.gov/pubmed/24860688/)J Pathol Inform. 2014;5(1):12. doi: 10.4103/2153-3539.129448. eCollection 2014. PubMed PMID: 24860688; PubMed Central PMCID: PMC4030307.
52. **Gopalakrishnan V,** Menon PG, Madan S. A novel framework to enhance scientific knowledge of cardiovascular MRI biomarkers and their application to pediatric cardiomyopathy classification. Proceedings of the Second International Work-Conference on Bioinformatics and Biomedical Engineering (IWBBIO 2014). 2014 April; :798-809.
53. Balasubramanian JB, Visweswaran S, Cooper GF, **Gopalakrishnan V.** [Selective model averaging with bayesian rule learning for predictive biomedicine.](https://www.ncbi.nlm.nih.gov/pubmed/25717394/)AMIA Jt Summits Transl Sci Proc. 2014;2014:17-22. eCollection 2014. PubMed PMID: 25717394; PubMed Central PMCID: PMC4333697.
54. Shi L, Grover H, Balasubramanian JB, Kolli K, Shriver C, **Gopalakrishnan V.** A Flexible Feature Selection Framework for Improving Breast Cancer Classification from Sparse Spectral Count Proteomic Data. Proceedings of The 2014 International Conference on Data Mining, DMIN'14. 2014 July.
55. Jordan R, Visweswaran S, **Gopalakrishnan V.** [Semi-automated literature mining to identify putative biomarkers of disease from multiple biofluids.](https://www.ncbi.nlm.nih.gov/pubmed/25379168/)J Clin Bioinforma. 2014;4:13. doi: 10.1186/2043-9113-4-13. eCollection 2014. PubMed PMID: 25379168; PubMed Central PMCID: PMC4215335.
56. Avali VR, Cooper GF, **Gopalakrishnan V.** [Application of Bayesian logistic regression to mining biomedical data.](https://www.ncbi.nlm.nih.gov/pubmed/25954328/)AMIA Annu Symp Proc. 2014;2014:266-73. eCollection 2014. PubMed PMID: 25954328; PubMed Central PMCID: PMC4419893.
57. Zaidi AH, **Gopalakrishnan V,** Kasi PM, Zeng X, Malhotra U, Balasubramanian J, Visweswaran S, Sun M, Flint MS, Davison JM, Hood BL, Conrads TP, Bergman JJ, Bigbee WL, Jobe BA. [Evaluation of a 4-protein serum biomarker panel-biglycan, annexin-A6, myeloperoxidase, and protein S100-A9 (B-AMP)-for the detection of esophageal adenocarcinoma.](https://www.ncbi.nlm.nih.gov/pubmed/25100294/)Cancer. 2014 Dec 15;120(24):3902-13. doi: 10.1002/cncr.28963. Epub 2014 Aug 5. PubMed PMID: 25100294; PubMed Central PMCID: PMC4441619.
58. Pineda,A.L., **Gopalakrishnan V.** Novel Application of Junction Trees to the Interpretation of Epigenetic Differences among Lung Cancer Subtypes. AMIA Joint Summits on Translational Science. 2015; San Francisco, CA, Winner of the 2015 Marco Ramoni Distinguished Paper Award in Translational Bioinformatics.
59. Liu Y, **Gopalakrishnan V,** Madan S. Quantitative clinical guidelines for imaging use in evaluation of pediatric cardiomyopathy. Washington, DC, USA: IEEE International Conference on Bioinformatics and Biomedicine (BIBM); 2015. 7 pages. Available from: https://www.computer.org/csdl/proceedings/bibm/2015/6799/00/07359910.pdf. DOI: doi:10.1109/BIBM.2015.7359910.
60. Ceschin R, Panigrahy A, **Gopalakrishnan V.** [Open-Source Software for Temporal Analysis and Visualization of Brain Tumor Diffusion MR Using Serial Functional Diffusion Mapping.](https://www.ncbi.nlm.nih.gov/pubmed/25673970/)Cancer Inform. 2015;14(Suppl 2):1-9. doi: 10.4137/CIN.S17293. eCollection 2015. PubMed PMID: 25673970; PubMed Central PMCID: PMC4315050.
61. Pineda AL, **Gopalakrishnan V.** [Novel Application of Junction Trees to the Interpretation of Epigenetic Differences among Lung Cancer Subtypes.](https://www.ncbi.nlm.nih.gov/pubmed/26306226/)AMIA Jt Summits Transl Sci Proc. 2015;2015:31-5. eCollection 2015. PubMed PMID: 26306226; PubMed Central PMCID: PMC4525224.
62. Ogoe HA, Visweswaran S, Lu X, **Gopalakrishnan V.** [Knowledge transfer via classification rules using functional mapping for integrative modeling of gene expression data.](https://www.ncbi.nlm.nih.gov/pubmed/26202217/)BMC Bioinformatics. 2015 Jul 23;16:226. doi: 10.1186/s12859-015-0643-8. PubMed PMID: 26202217; PubMed Central PMCID: PMC4512094.
63. **Gopalakrishnan V,** Menon PG, Madan S. [cMRI-BED: A novel informatics framework for cardiac MRI biomarker extraction and discovery applied to pediatric cardiomyopathy classification.](https://www.ncbi.nlm.nih.gov/pubmed/26329721/)Biomed Eng Online. 2015;14 Suppl 2:S7. doi: 10.1186/1475-925X-14-S2-S7. Epub 2015 Aug 13. PubMed PMID: 26329721; PubMed Central PMCID: PMC4547147.
64. Pineda AL, Ogoe HA, Balasubramanian JB, Rangel Escareño C, Visweswaran S, Herman JG, **Gopalakrishnan V.** [On Predicting lung cancer subtypes using 'omic' data from tumor and tumor-adjacent histologically-normal tissue.](https://www.ncbi.nlm.nih.gov/pubmed/26944944/)BMC Cancer. 2016 Mar 4;16:184. doi: 10.1186/s12885-016-2223-3. PubMed PMID: 26944944; PubMed Central PMCID: PMC4778315.
65. Torbati ME, Mitreva M, **Gopalakrishnan V.** [Application of Taxonomic Modeling to Microbiota Data Mining for Detection of Helminth Infection in Global Populations.](https://www.ncbi.nlm.nih.gov/pubmed/28239609/)Data (Basel). 2016 Dec;1(3). doi: 10.3390/data1030019. Epub 2016 Dec 13. PubMed PMID: 28239609; PubMed Central PMCID: PMC5325162.
66. Liu Y, **Gopalakrishnan V.** [An Overview and Evaluation of Recent Machine Learning Imputation Methods Using Cardiac Imaging Data.](https://www.ncbi.nlm.nih.gov/pubmed/28243594/)Data (Basel). 2017 Mar;2(1). doi: 10.3390/data2010008. Epub 2017 Jan 25. PubMed PMID: 28243594; PubMed Central PMCID: PMC5325161.
67. Lustgarten JL, Balasubramanian JB, Visweswaran S, **Gopalakrishnan V.** [Learning Parsimonious Classification Rules from Gene Expression Data Using Bayesian Networks with Local Structure.](https://www.ncbi.nlm.nih.gov/pubmed/28331847/)Data (Basel). 2017 Mar;2(1). doi: 10.3390/data2010005. Epub 2017 Jan 18. PubMed PMID: 28331847; PubMed Central PMCID: PMC5358670.
68. Ceschin R, Zahner A, Reynolds W, Gaesser J, Zuccoli G, Lo CW, **Gopalakrishnan V,** Panigrahy A. [A computational framework for the detection of subcortical brain dysmaturation in neonatal MRI using 3D Convolutional Neural Networks.](https://www.ncbi.nlm.nih.gov/pubmed/29793060/)Neuroimage. 2018 Sep;178:183-197. doi: 10.1016/j.neuroimage.2018.05.049. Epub 2018 May 21. PubMed PMID: 29793060; PubMed Central PMCID: PMC6503677
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72. Mani G, Chen F, Cross S, Kalil T, **Gopalakrishnan V,** Rossi F, Stanley K. Artificial Intelligence’s Grand Challenges: Past, Present, and Future. AI Magazine. 2021 April; 42(1):61-75.
73. **Gopalakrishnan V,** Balasubramanian J, Kip K, Reis S. Towards learning clinically relevant explainable models via Bayesian Rule Learning with utilities. [Print]. Porto, Portugal: Proceedings of the 12th International Workshop on Knowledge Representation for Health Care (KR4HC 2021); 2021 June. 14 pages (41-54).
74. Adduri, R.S.,Vasireddy R, Mroz MM, Bhakta A, Li Y, Chen Z, Miller JW, Velasco-Alzate KY, **Gopalakrishnan V,** Maier LA, Li L, Konduru NV. [Realistic biomarkers from plasma extracellular vesicles for detection of beryllium exposure.](https://www.ncbi.nlm.nih.gov/pubmed/35551477/)Int Arch Occup Environ Health. 2022 May 12;. doi: 10.1007/s00420-022-01871-7. [Epub ahead of print] PubMed PMID: 35551477.
75. Firdous, A., **Gopalakrishnan, V.,** Vo, N., Sowa, G. Challenges and opportunities for omics‑based precision medicine in chronic low back pain. European Spine Journal <https://doi.org/10.1007/s00586-022-07457-8> December 2022. Springer.
76. **Gopalakrishnan, V.** Global Chronic Disease Burden Can Be Reduced by Taking Care of Our Mitochondria. Open Acc Biostat Bioinform. 3(5). OABB.000573. 2024. DOI: [10.31031/OABB.2024.03.000573](https://crimsonpublishers.com/oabb/fulltext/OABB.000573.php)
77. Samayamuthu, M.J., Kravchenko, O., Lo-Ciganic, W.H., Sadhu, E.M., Yang, S., Visweswaran, S., **Gopalakrishnan, V.** Trends in Postpartum Hemorrhage Prevalence and Comorbidity Burden: Insights from the ENACT Network Aggregated Electronic Health Record Data. Under Review at npj Digital Medicine (2023 Impact Factor =12.4). Preprint located on Research Square: DOI: <https://doi.org/10.21203/rs.3.rs-5041092/v1> (September 25, 2024).

**Proceedings of Conference and Symposia (Abstracts presented as Posters)**

1. Buchanan, B., **Gopalakrishnan, V**. A Distributed Problem-Solving Model for Emergency Response. In: Presentation, Proceedings of the Second IEEE Symposium on Parallel and Distributed Processing. (Dallas, TX, December, 1990) (Poster).
2. **Gopalakrishnan, V**.**,** Hennessy, D. The Crystallographer's Assistant. In: Proceedings of the Fourth Keck Symposium on Computational Biology. (Pittsburgh, Pennsylvania, 1993) (Abstract).
3. **Gopalakrishnan, V**., Buchanan, B.G., Rosenberg, J.M. An approximate physical model for simulating protein crystallization*.* Pacific Symposium on Biocomputing (PSB 2002).
4. Dougall, D.S., **Gopalakrishnan, V**., Rosenberg, J.M. Protein Solubility Modeling*.* Science 2002 – Synergy in Science. Sponsored by the University of Pittsburgh. (Pittsburgh, PA. September 18-20, 2002).
5. **Gopalakrishnan, V**., Post, A. Temporal Pattern Detection in Gene Expression Data. 68th Symposium of Human Genome. (Cold Spring Harbor Laboratory. May, 2003).
6. Dougall, D.S., **Gopalakrishnan, V**., Rosenberg, J.M. A Bioinformatics Approach to Protein Crystallography. Science 2003 – Improving the Human Condition. Sponsored by University of Pittsburgh. (Pittsburgh, PA. September 24-26, 2003).
7. Jitendar, V., Anderson, G., Seetharaman, J.K., **Gopalakrishnan, V**. A Bioinformatics Tool for Verification of Gene-Gene Interactions. Annual Advancing Pathology Imaging, Informatics and the Internet (APIII) conference. (October 2003).
8. Hennessy, D., Dougall, D., **Gopalakrishnan, V**., Buchanan, B.G., Rosenberg, J.M. An objective approach to experimental design in protein crystallization. Predicting the Future. Sponsored by the University of Pittsburgh. (Pittsburgh, PA, December 9, 2003).
9. Dougall, D.S., **Gopalakrishnan, V**, Hennessy, D., Rosenberg, J.M. Mining the PDB for Information Leading to Successful Protein Crystallization Experimental Design. ISMB-ECCB 2004. (Glasgow, Scotland, July 31 – August 4, 2004).
10. Lustgarten, J., Williams, E., Ranganathan, S., An, J., Bowser, R., Day, B.W., **Gopalakrishnan, V**. Preliminary studies comparing MALDI- and SELDI-TOF-mass spectral profiling of cerebrospinal fluid from patients with Amyotrophic Lateral Sclerosis. Science 2004. (Pittsburgh, PA. October 6-8, 2004).
11. Dougall, D.S., **Gopalakrishnan, V**., Hennessy, D., Rosenberg, J.M. A Protein’s Estimated Net Charge/kDa can be used as a Predictor of the Solution pH for Crystallization. American Crystallographic Association (ACA) 2005 Annual Meeting. (Orlando, FL. May 28–June 2, 2005).
12. **Gopalakrishnan, V**., Ganchev, P., Williams, E., Ranganathan, S., Cudkowic, M.E., Bowser, R., Day, B.W. Proteomic Data Mining for Disease Biomarkers. Keystone Symposia: Proteomics and Bioinformatics, Systems and Biology. (Keystone, CO, April 8–13, 2005).
13. **Gopalakrishnan, V**, Day, B.W., Cooper, G.F. Intelligent Computational Aids for Clinical Proteomic Data Mining. CHI’s Beyond Genome. (San Francisco, CA, June 2005).
14. Grover, H., **Gopalakrishnan, V**., Day, B.W. Automated Methods for Identification of Peptide Cross-links from Tandem MS. Science2006: Feel the Power. (Pittsburgh PA. October 2006).
15. Guo, Z., Zheng, L., Benos, T., **Gopalakrishnan, V**. Feature Evaluation and Prediction of DNaseI Hypersensitive Sites from Human Genomic Sequences. ISMB 2008.
16. Kolli, V. S. K., Seth, B., Weaver, L., Lustgarten, J. L., **Gopalakrishnan, V**., Malehorn, D., Bigbee, B, Mural, R. J., Shriver, C.D. MALDI-TOF Profiling of Breast Cancer Sera for Pattern Analysis. Human Proteome Organization HUPO 2009 Proceedings.
17. Zeng, X., Hood, B.L., Zhao, T., Conrads, T.P., Sun, M., Day, R.S., **Gopalakrishnan, V**., Grover, H., Weissfeld, J.L., Siegfried, J.M., Bigbee W.L. Lung Cancer Serum Biomarker Discovery Using Label Free LC-MS/MS. In AACR 101st Annual Meeting 2010 Proceedings.
18. Bigbee, W.L., **Gopalakrishnan, V**., Dacic., S. Hauskrecht, M., Weissfeld, J.L., Wilson, D.O., Siegfried, J.M., Lokshin, A.E. A Multiplexed Serum Biomarker Immunoassay Panel Discriminates Clinical Lung Cancer Patients from Cancer-Free High-Risk Subjects in a CT-Screened Cohort. AACR 2010. Late Breaking Abstract in AACR 101st Annual Meeting 2010 Proceedings.
19. **Gopalakrishnan, V**. Model Validity and Verification in the Context of Learning Classification Rules from Biomedical Data. In Proceedings of the 2011 National Conference on Epistemology of Modeling & Simulation. April 2011.
20. Nash, N, **Gopalakrishnan, V**. Testing the Effect of Transfer Rule Learning using Simulated ‘Omic’ Datasets. In Proceedings of the Third Annual University of Pittsburgh Cancer Institute Summer Academy. August 12, 2011. **“Best Poster Presentation Award”** at the Computational and Systems Biology/Biomedical Informatics Academy of the UPCI Summer Academy 2011.
21. Kedia, R., Menon, P.G., **Gopalakrishnan, V**. Simulated Volumetric Slicing: A novel approach to generating averaged anatomical surfaces. In Proceedings of the Fourth Annual University of Pittsburgh Cancer Institute Summer CoSBBI Academy, August 10, 2012
22. Jordan, R., Harkema, H., **Gopalakrishnan, V**. Quantitative Evaluation of Negative Abstract Sets in Text Mining Based Identification of Potential Biomarkers for Lung Cancer. Pittsburgh International Lung Conference Personalized Medicine of Lung Disease, Oct 28-29, 2011.
23. Pineda, A. L., Visweswaran, S., Cooper, G. F., **Gopalakrishnan, V**. Machine Learning Classification of Non-Small Cell Lung Cancer Subtypes from Gene Methylation Data. Great Lakes Bioinformatics Conference. May14-16, 2013, Pittsburgh, PA, USA.
24. Ogoe, H. A., Lu, X., **Gopalakrishnan, V**. Transfer learning of classification rules through functional modules. Great Lakes Bioinformatics Conference. May 14-16, 2013, Pittsburgh, PA, USA.
25. McMillan A, Visweswaran S, **Gopalakrishnan V.** Machine Learning for Biomarker-based Classification of Alzheimer’s Disease Progression Journal of Pathology Informatics. 2014
26. Staines M, Morris L, Menon PG, Lima J, Lee DC, **Gopalakrishnan V.** Discovering Biomarkers for Cardiovascular Disease Using Rule Learning. Journal of Pathology Informatics. 2014.
27. Zaidi AH, **Gopalakrishnan V**, Kasi PM, Malhotra U, Balasubramanian J, Visweswaran S, et al.. Evaluation of a four-protein biomarker panel (biglycan, annexin-A6, myeloperoxidase and protein S100-A9; B-AMP ©) for detection of esophageal adenocarcinoma. DDW2014 Digestive Disease Week; 2014; McCormick Place, Chicago, Illinois.
28. Porubcin, E., Khatri, S. Liu, Y., **Gopalakrishnan, V**. Identifying Capabilities of Bayesian Network Search Algorithms for Recovering Gene Network Data. UPCI Summer CoSBBI High School scholar presentation. 2016 August.
29. Khatri, S. Liu, Y., **Gopalakrishnan, V**. Discovery of genes linked to breast cancer progression using Bayesian network modeling. AMIA 2016 High School Scholars Abstract Accepted for Presentation.
30. Boone DN, **Gopalakrishnan V,** Becich MJ, Hochheiser H. Interactive Panel: A STEM Pipeline for Biomedical Informatics: Five-year progress report for Pittsburgh. American Medical Informatics Association Inspire 2017 meeting. Panel. June 2017.
31. Campos, P., Balasubramanian, J.B., Torbati, M. E., Kip, K. E., Reis, S. E., **Gopalakrishnan, V**. Improving Risk Prediction of Major Adverse Cardiac Events with Biomarkers. Abstract to be presented at poster competition to be held at: The 16th annual American Medical Association Research Symposium at the Gaylord National Resort & Convention Center in National Harbor, MD. Nov 9, 2018.
32. Mina, A. **Gopalakrishnan, V**. 3R Microbiome: A Web-Based Tool for the Analysis of Microbiome Count Datasets. Presented at the Medical Scientist Training Program Retreat. University of Pittsburgh, Pittsburgh, PA. August, 2018.
33. Alvarez-Rios, M. E., Senathirajah, Y., **Gopalakrishnan, V**. Analysis and modeling of treatment trajectories for patients presenting with Dyspnea to the ICU. Poster presentation. iBRIC 2019. Duquesne University, Pittsburgh, PA. August 2019.
34. Campos, P. and **Gopalakrishnan, V** (Mentor). Polygenic Risk Scores for Cardiovascular Disease. Longitudinal Research Project Study. Dean’s Summer Research Program Report and Poster presentation. School of Medicine, University of Pittsburgh, Pittsburgh, PA. April 2021.
35. Wojda, T.R., Mani, S.S., **Gopalakrishnan, V.**The Human-AI Interface: Unveiling Novel Qualitative Strategies for Enhancing OUD Treatment Decisions. Video Poster Presentation. BUPE2024 Virtual Conference on Buprenorphine in Medicine: Clinical and Public Policy Implications. August 5, 2024.
36. Gomez, B.S., Annanya, L.N.U., **Gopalakrishnan, V.** Enhancing Artery Segmentation in Placental Analysis with Hyperspectral Imaging and Wavelet U-Net. Accepted for Poster Presentation at the 2024 Annual Biomedical Research Conference for Minoritized Scientists (ABRCMS) to be held from Nov. 13-16 in Pittsburgh, PA.

**Dissertation and Other Publications (Technical Reports)**

1. Gopalakrishnan, V., Hennessy, D., Buchanan, B., Subramanian, D., Wilcosz, P.A., Chandrasekhar, K., Rosenberg, J.M. Preliminary Tests of Machine Learning Tools for the Analysis of Biological Macromolecular Crystallization Data. Department of Computer Science, University of Pittsburgh, PA. 1994. Tech Report ISL-94-17.
2. **Gopalakrishnan, V**. Parallel Experiment Planning: Macromolecular Crystallization Case Study*.* Department of Computer Science, University of Pittsburgh, PA. 1999. (Dissertation)
3. Dash, D., **Gopalakrishnan, V**. Modeling DNA Splice Regions by Learning Bayesian Networks. Technical Report, Department of Biomedical Informatics, December 2001. DBMI-01-96.
4. Guo, Z., **Gopalakrishnan, V**. A bioinformatics approach to efficient identification of conserved motifs in the human inducible nitric oxide syntheses promoter with experimental evaluation.Department of Biomedical Informatics, University of Pittsburgh, PA. August 2003. Technical Report No. DBMI-03-230.
5. Dougall, D.S., **Gopalakrishnan, V**., Rosenberg, J.M. The use of molecular weight information for selecting parameters for protein crystallization. Department of Biomedical Informatics, University of Pittsburgh, PA. August 2003. Technical Report No. DBMI-04-256.
6. Ceschin, R., Zahner, A., **Gopalakrishnan, V.**, Panigrahy, NeBSS: Semi-Automated Parcellation of Neonatal Structural Brain MRI. Preprints 2016, 2016120060 (doi: 10.20944/preprints201612.0060.v1).
7. Balasubramanian, J.B., **Gopalakrishnan, V**. Subpopulation Pattern Mining using Bayesian Rule Learning with Structure Priors. Accepted without any revisions to ICIT 2017 conference. Withdrawn by authors. Submitted to AMIA 2018 Joint Informatics Summit (for better visibility).
8. Ogoe, H.A., Torbati, M.E., **Gopalakrishnan, V**. KARL: Knowledge Augmented Rule Learning for Biological Pattern Discovery. Preprints – online: [https://www.preprints.org/manuscript/201908.0100/v1](https://nam12.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.preprints.org%2Fmanuscript%2F201908.0100%2Fv1&data=05%7C01%7Clkm16%40pitt.edu%7C0a6a91fec9914a3f11fd08da7b901402%7C9ef9f489e0a04eeb87cc3a526112fd0d%7C1%7C0%7C637958155999259868%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=%2F6lxEhhde55No8HN%2BjZLwNwjC5hl%2F2KQrfVwPNsvh4M%3D&reserved=0) Preprints 2019, 2019080100 (doi: 10.20944/preprints201908.0100.v1).
9. Balasubramanian, J. B, Kip, K. E., Reis, S. E., **Gopalakrishnan, V**. Knowledge discovery with Bayesian Rule Learning for actionable biomedicine. Preprints 2019 – bioRxiv 785279; doi: https://doi.org/10.1101/785279;[https://www.biorxiv.org/content/10.1101/785279v1](https://nam12.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.biorxiv.org%2Fcontent%2F10.1101%2F785279v1&data=05%7C01%7Clkm16%40pitt.edu%7C0a6a91fec9914a3f11fd08da7b901402%7C9ef9f489e0a04eeb87cc3a526112fd0d%7C1%7C0%7C637958155999259868%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLCJXVCI6Mn0%3D%7C3000%7C%7C%7C&sdata=jsU2FHFYK%2BDgRLCzNj1Q3eg0qpZu%2BehszFKNOKjUX8c%3D&reserved=0)
10. Torbati, M. E., Reis, S. E., Kip, K. **Gopalakrishnan, V**. Improving Cardiovascular Risk Assessment Using Markers of Subclinical Atherosclerosis in the Heart SCORE Cohort.
11. **Gopalakrishnan, V.** A Simple Hidden Markov Model Could Prevent Physician Error in Failure To Diagnose Infectious Mononucleosis. Preprints.org **2023**, 2023040411. <https://doi.org/10.20944/preprints202304.0411.v2>.
12. **Gopalakrishnan, V.** Proposing the gross domestic health (GDH) index as a measure of regional and national wealth. September 28, 2023 <https://medium.com/@vanathigopalakrishnan/proposing-the-gross-domestic-health-gdh-as-a-measure-of-regional-and-national-wealth-a1789b884c1c>

**Books, Book Chapters and Monographs**

1. **Gopalakrishnan, V.** Computer Aided Knowledge Discovery in Biomedicine*.* Handbook of Research on Systems Biology Applications in Medicine. Daskalaki, A. (Ed.), (pp. 126-141). Hershey, PA: Medical Information Science Reference. doi:10.4018/978-1-60566-076-9.ch007 (Information Science Reference, January 2009).

**As Editor**

1. Weldsman, W. P., Christoffels, A. SNiPhunter: A SNP-Based Search Engine. Academic Editor: **Vanathi Gopalakrishnan.** Data 2016, 1(3), 17; doi:10.3390/data1030017. <http://www.mdpi.com/2306-5729/1/3/17>
2. Chattopadhyay, A.; Ganapathiraju, M.K. Demonstration Study: A Protocol to Combine Online Tools and Databases for Identifying Potentially Repurposable Drugs. Academic Editor: **Vanathi Gopalakrishnan.** *Data* **2017**, *2*, 15. https://doi.org/10.3390/data2020015
3. Rajaram, S.; Mitchell, C.S. Data Augmentation with Cross-Modal Variational Autoencoders (DACMVA) for Cancer Survival Prediction. Information 2024, 15, 7. https://doi.org/10.3390/ info15010007 Academic Editor: **Vanathi Gopalakrishnan**

<https://www.mdpi.com/journal/information/special_issues/WQ8X5HDU7M>

1. Ghosh, A.; Larrondo-Petrie, M.M.; Pavlovic, M. Revolutionizing Vaccine Development for COVID-19: A Review of AI-Based Approaches. Information 2023, 14, 665. https:// doi.org/10.3390/info14120665 Academic Editor: **Vanathi Gopalakrishnan**

<https://www.mdpi.com/journal/information/special_issues/WQ8X5HDU7M>

6. Chang YP, Yang Y-C, Yu S-N. Multiple Instance Bagging and Risk Histogram for Survival Time Analysis Based on Whole Slide Images of Brain Cancer Patients. *Information*. 2024; 15(12):750. [https://doi.org/10.3390/info15120750](file:///Users/vanathi/Downloads/Chang%20YP,%20Yang%20Y-C,%20Yu%20S-N.%20Multiple%20Instance%20Bagging%20and%20Risk%20Histogram%20for%20Survival%20Time%20Analysis%20Based%20on%20Whole%20Slide%20Images%20of%20Brain%20Cancer%20Patients.%20Information.%202024%3B%2015(12):750.%20https:/doi.org/10.3390/info15120750) Academic Editor: **Vanathi Gopalakrishnan**

#### PROFESSIONAL ACTIVITIES

**TEACHING:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Dates** | **Role** | **Title** | **Type of Learner** | **Number of learners** | **Number of sessions/**  **year** |
| 2000 – 2018 | Introduced, developed & taught | Foundations to Bioinformatics” that covers a breadth of topics and core concepts in Bioinformatics, University of Pittsburgh, Pittsburgh, Pennsylvania | **Graduate**  **Student** | **10-15** | **32/year** |
| 2001 - 2005 | Introduced | Lecture series in Bioinformatics (Bioinformatics@Pitt) as a colloquium class, University of Pittsburgh, Pittsburgh, Pennsylvania | **Graduate**  **Student** | **20-30** | **16/year** |
| 2004-2006 | Coordinator | Bioinformatics Journal Club, University of Pittsburgh, Pittsburgh, Pennsylvania | **Graduate**  **Student** | **20-30** | **16/year** |
| 2001-2008 | Introduced and taught | Laboratory Course in Sequence Analysis or Summer Directed Study, University of Pittsburgh, Pittsburgh, Pennsylvania | **Graduate**  **Student** | **10** | **32/year** |
| 2018-Present |  | Presenting core bioinformatics lectures within “Foundations of Biomedical Informatics 2,” Biomedical Informatics Training Program, University of Pittsburgh, Pittsburgh, Pennsylvania. | **Graduate**  **Student** | **10-20** | **6-16/year** |
| 2019-2022 |  | Topics in Intelligent Systems (Fall Term) and Advanced Topics in Intelligent Systems (Spring Term) sequence of required courses for Intelligent Systems Program graduate students, School of Computing and Information, University of Pittsburgh, Pittsburgh, Pennsylvania. | **Graduate**  **Student** | **35-40** | **32/year** |
| 2000-present | Instructor | Directed, Independent, and Dissertation Study – Research focused study every semester – including summer | **Graduate and Medical Students** | **5-10** | **96/year**  **per student** |
| 2023 and 2024 Spring Terms | Director and Instructor | Directed, the “Foundations of Biomedical Informatics II” course, and taught two of its 5 important modules “Machine Learning “ and “Bioinformatics” | **Graduate students** | **6** | **32/year** |
| 2023 | Guest Lecturer | "Data and Emerging Economies" in the "AI & Emerging Economies" course, Carnegie Mellon University, Pittsburgh, PA. October | **Graduate**  **Students** | **20** | **As invited**  **(2 to 3 times per year- various courses)** |
| 2024 –  present | Longitudinal Educator | 3RC Keystone Fundamentals,  Workshops, LAP, Longitudinal Research – throughout medical school year | **Medical Students** | **10** | **70+/year** |

**Advising**

Major Advisor of Doctoral Students (Chair for the following Doctoral Dissertations):

1. Pinaki Mitra, Ph.D. (obtained Biomedical Informatics) –

“Automated Knowledge Discovery from Functional Magnetic Resonance Images using Spatial Coherence”

2007 David Dougall, Ph.D. (obtained Biomedical Informatics) –

“Protein Sequence-Properties Evaluation Framework for Crystallization Screen

Design”

1. Jonathan Lustgarten (obtained Biomedical Informatics) –

“A Bayesian Rule Generation Framework for 'Omic' Biomedical Data Analysis”

1. Philip Ganchev (obtained Intelligent Systems Program-

“Transfer Rule Learning for Biomarker Discovery from Related Data Sets”

1. Himanshu Grover, MS (obtained Biomedical Informatics) – “Content

Sensitive Markov Models Peptide Scoring and Identification from Tandem Mass

Spectrometry”

1. Arturo Lopez Pineda (PhD- Biomedical Informatics) – “Bayesiam

Frameworks for Parsimonious Modeling of Molecular Cancer Data”

1. Rick Jordan, MS (Ph.D., Biomedical Informatics) – “Literature Mining

Sustains and Enhances Knowledge Discovery from OMIC Studies.”

1. Henry Ogoe, MS (PhD, Biomedical Informatics) – Transfer Rule Learning

with Functional Mapping

1. Kevin McDade (PhD, Biomedical Informatics) – “Enabling Data-Guided

Evaluation of Bioinformatics Workflow Quality.”

1. Rafael Ceschin (PhD, Biomedical Informatics) – “A Computational Framework

for Neonatal Brain MRI Structure Segmentation and Classification.”

2018 Yuzhe (Brian) Liu (PhD, Medical Scientist Training Program) – “Precision

Critical Care Management of Blood Pressure in Stroke Patients with Dynamic

Linear Models.”

2019 Jeya Balasubramanian (PhD, Intelligent Systems Program) – “Knowledge

discovery with Bayesian Rule Learning methods for actionable biomedicine.”

2024 Joy Roy (PhD, Biomedical Informatics) – “ Integrating Multimodal MRI Data with

(expected) Morphometric Similarity Networks to Model Brain Structure and Connectivity”

Research Advisor: Rafael Ceschin, PhD (Defense date: December 13, 2024)

2024 William Reynolds (PhD, Biomedical Informatics) – “Predicting Abnormal Fetal

(expected) Outcomes Within a Congential Heart Disease Cohort”

Research Advisor: Rafael Ceschin, PhD (Defense date: December 13, 2024)

2025 Aidan Laxman (PhD, Biomedical Informatics) – “Comparative Genomic Methods

(expected) to Reveal Functional Associations Among Proteins”

Research Advisor: Eric Wright, PhD

Postdoctoral Fellow Advisor:

2001-2003 Dr. Xinghua Lu, MD, PhD: Currently Professor of Biomedical Informatics, DBMI,

Pittsburgh, PA

2009-2011 Dr. Guodong Liu, PhD: Currently Associate Professor of Public Health Sciences in

the Health Services and Behavioral Research Division, with a joint appointment

as Associate Professor of Psychiatry in Department of Psychiatry and Behavioral Health, College of Medicine,

Penn State, Hershey, PA

2011-2012 Mari Mori, MD, MS: Medical Genetics, Currently working at Nationwide

Children’s Hospital, Columbus, OH

2013-2015 Viji R. Avali, PhD: Currently Informatics Consultant to Industry

Member of Doctoral Dissertation Committee (as Committee Member):

2002 Gerardina Hernandez, Ph.D - Intelligent Systems Program

2003 Denver Dash, Ph.D. - Intelligent Systems Program

2005 Chanqing Ma, M.D., Ph.D. - Interdisciplinary Biomedical Program

2006 Yan Liu, Ph.D. - Computer Science, CMU - ACM Doctoral Dissertation Award Honorable Mention 2007.

2006 Andrew Post, M.D., Ph. D. – Biomedical Informatics Program

2008 Jia Li, Ph.D., Biostatistics, University of Pittsburgh

2011 Richard Pelikan, Ph.D. – Intelligent Systems Program, University of Pittsburgh

2012 Chad Kimmel, BMI, Ph.D.

2016           Vicky Chen, Ph.D. – Biomedical Informatics, University of Pittsburgh

2017           Lucas Santa dos Santos, Ph.D. – Biomedical Informatics, University of Pittsburgh

2017           Kevin McDade, Ph.D. – Biomedical Informatics, University of Pittsburgh

2020           Jonathan Young, M.D., Ph.D. - Intelligent Systems Program, University of

Pittsburgh

2021           Lifan Liang, Ph.D. – Biomedical Informatics, University of Pittsburgh

2022 Mohammadamin Tajgardoon, PhD Candidate – Intelligent Systems Program,

University of Pittsburgh

2022 Mahbaneh Torbati, PhD Candidate – Intelligent Systems Program, University of

Pittsburgh

2023 William T. Reynolds, PhD Candidate – Biomedical Informatics Training Program

Major Advisor of Medical Informatics and Masters Degree Advisees & Certificate Students: (Completed)

2004 Pinaki Mitra, DBMI

2005 Yanhua Gao, DBMI (Certificate degree)

2006 Zhong Guo, M.D. - Department of Surgery, UPMC

2008 Himanshu Grover, DBMI

2009 Jonathan Lustgarten, DBMI

2009 A. Ian Wong, MS – Intelligent Systems Program, University of Pittsburgh

2011           Wei Wei, M.S. – Biomedical Informatics, University of Pittsburgh

2012 Mari Mori, MS, DBMI

2012 Charalampos S. Floudas, MD (MS obtained April 2012, Biomedical Informatics) – co-

advisor Dr. Visweswaran

2012 Jessica Larusch, PhD (Certificate obtained 2012 – mentoring her for a K-award

proposal)

2012 Arturo Lopex Pineda, M.S.- Biomedical Informatics, University of Pittsburgh (co-

advisor Shyam Visweswaran, MD, PHD)

2013 Henry Ogoe, MS- Biomedical Informatics, University of Pittsburgh

2014 Rafael Ceschin (MS, 2012) – BMI

2016 Yuzhe Liu, MS – Biomedical Informatics, University of Pittsburgh

2019 Mahbaneh Torbati, MS, ISP

Member of Master’s Committees:

2004           David Dougall, M.S. – Biomedical Informatics, University of Pittsburgh

2004           Venkatesh Jitender, M.S. – Biomedical Informatics, University of Pittsburgh

2012           Vicky Chen, M.S. – Biomedical Informatics, University of Pittsburgh

2012           Nara Um, M.D., M.S. – Biomedical Informatics, University of Pittsburgh

2017           Chandramouli Rathanam, M.S. - Biomedical Informatics, University of Pittsburgh

Comprehensive Examination Committees as Chair and Member for a number of both Masters and Doctoral Degree Pursuits, past and current.

Medical or MD, PhD degree advisor for Longitudinal Research Program and Dean’s Summer Research Program – Graduate Interns

2014 Brian Yuzhe Liu (during his Medical Scientist Training Program – refer to my PhD

students above)

2021-2022 Patricia Campos (2021 – got into her first choice program of Ophthalmology at

University of Pittsburgh)

2021-2022 Ayesha Firdous (2021-2022) Medical Student at Pitt

Undergraduate Summer Interns:

2013           Lailonny Morris (NLM T15 STTP, University of Pittsburgh)

2018           Christy Koerner (NLM T15 STTP, University of Pittsburgh)

**Awards to mentored students:**

Chanqing Ma - Best Brief Report - Annual Advancing Pathology Imaging, Informatics and the Internet (APIII) conference, October 2002.

Venkatesh Jitendar - Best Idea - Biological Language Modeling Workshop, Carnegie Mellon University, May 13-14, 2003.

Pinaki Mitra – Best Proposal Award for a Class Project (Personal Communication – Prof. Marek Drudzel, ISP), circa 2003.

Eric Williams, Philip Ganchev and Jon Lustgarten – Pitt Innovator Award 2006.

Jonathan Lustgarten – Research Honorable Mention - Annual Advancing Pathology Imaging, Informatics and the Internet (APIII) conference, October 2008.

Philip Ganchev – Outstanding Poster Award – GradExpo, University of Pittsburgh, March 2009.

* Distinguished Paper Award – AMIA TBI, San Francisco, March 2011.

Natalie Nash (High School Senior) – Best Poster Presentation Award, Computational and Systems Biology/Biomedical Informatics Academy, UPCI Summer Academy, Pittsburgh, PA 2011.

Jessica Larusch – Best Student Paper, 3rd Place, DBMI Student Retreat, Pittsburgh PA 2012.

Arturo Lopez Pineda – Best Paper Award at AMIA TBI 2015 – Winner of the 2015 Marco Ramoni Distinguished Paper Award in Translational Bioinformatics, AMIA Joint Summits on Translational Science, March 23-27, 2015. San Francisco, USA.

(This paper also won 2nd place in Student Paper competition BMI Training Program Annual Retreat, Pittsburgh PA. August 2015)

Rafael Ceschin – 1st place award. Student Paper Competition BMI Training Program Annual Retreat. Aug 2015. Ceschin R, Panigrahy A, Gopalakrishnan V. sfDM: Open-Source Software for Temporal Analysis and Visualization of Brain Tumor Diffusion MR Using Serial Functional Diffusion Mapping.

Shania Khatri, CoSBBI High School Scholar to UPCI, won full travel award to attend AMIA 2016 and make presentation of her summer mentored research.

Jeya Balaji Balasubramanian (PhD student): Hattie Becich Best Teaching Assistant Award, 2016

Andrew Mellon Pre-doctoral Fellowship from Arts and Science, 2017

Patricia Campos, Second year medical student, 2018: Certificate of Merit for Dean’s Summer Research Program (DSRP): Project title: Literature-based construction and evaluation of the Heart Risk Score for Cardiovascular Disease

Mahbaneh Torbati, Second year, Intelligent Systems Program: Provost Fellowship Award, 2019

Arun Balajiee Lekshmi Narayanan, Intelligent Systems Program: Provost Fellowship Award, 2022

Bamidele Ajisogun, Intelligent Systems Program: Diversity Recruitment Fellowship Award, 2022

**Current Grant Support**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Grant Number** | **Grant Title** | **Role in Project** | **Inclusive Years** | **Source**  **$ Amount** |
| 1U24 TR004111-01 (Reis and Visweswaran) | ENACT: Translating Health Informatics Tools to Research and Clinical Decision Making | Co-I | 01/23/23 - 05/31/27 | **NIH NCATS**  Total amount  (direct + indirect)  $277,940.28 |

**Pending Grant Support**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Grant Number** | **Grant Title** | **Role in Project** | **Inclusive Years** | **Source**  **$ Amount** |
| KUNO award for Applied Science | Digital Twinning for Inclusive Cardiometabolic Health | PI | 12/01/24 - 01/31/26 | S&R Evermay  Foundation  Total amount  (direct + indirect)  $100,000 |
| NIH – NLM  R21 | Exploring the Use of Digital Twinning for Health Forecasting | PI | 07/01/25- 30/06/26 | Total Amount  $432,310 |
| Pledge Agreement  Signed and with  Pitt --- Donor:  Vizzhy, Inc. | Vijayalakshmi Innovation Center in Women’s Health Analytics and Research (VIHAR) | PI | 07/01/25- 06/30/2029 | Total Amount  ($10,000,000)  First installment:  $4.4M |

**Prior Grant Support:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Grant Number** | **Grant Title** | **Role in Project** | **Inclusive Years** | **Source**  **$ Amount** |
| 1U19AR076725-01 (Sowa and Vo) | HEALing LBP3: Profiling Biological, Biomechanical, Behavioral Phenotypes | Co-I | 11/01/21-10/31-25 | **NIH HEAL**  Total amount  (direct + indirect)  $37,383.44 |
| 2R01GM100387-04 | Transfer Rule Learning with Functional Mapping for Integrative Modeling of Panomics Data | PI | 04/01/16 – 03/31/20 | **N**IH-NIGMS  Total amount  (direct + indirect)  $877,373 |
| **PHDA** | CADidME – Coronary Artery Disease intelligent detection via Metabolomic Expression | PI  (medical Co-PI: Dr. Steve E. Reis) | 04/01/18– 03/31/19 | Pittsburgh Health Data Alliance (PHDA) CCA/UPMCE  Total amount  (direct + indirect)  $531,705 |
| 1R01LM10950-1 | Bayesian Rule Learning Methods for Disease Prediction and Biomarker Discovery | PI | 08/15/11 – 06/30/14 | NIH-NLM  Total amount (direct + indirect)  $1,130,614 |
| 1R01GM100387-01A1 | Transfer Rule Learning for Knowledge Based Biomarker Discovery and Predictive Biomedicine | PI | 09/24/12 – 06/30/16 | NIH - NIGMS  Total amount (direct + indirect)  $901,746 |
| P50 CA0904440 07 | SPORE in Lung Cancer | PI: Siegfried  Co-director of Bioinformatics and Biostatistics CORE | 9/16/11 - 8/31/16 (the original project started in 2006 or so – total period was much probably ten years) | Total amount (direct + indirect) during entire  funding period for  entire project to the  PI: $12,000,000+  (first year directs $1,442,244) |  NOTE: this is not for  the CORE,  which received directs costs less than  100K per year based  On Analysis needs |
| RESOURCES GRANT | Markovian Models for Peptide Identification from Mass Spectrometry | PI | 2/16/11 – 2/16/12 | Pittsburgh Super  Computing Center  (TeraGrid allocations)  $1094.00 |
|  | Comprehensive Genomic Analysis of High-Risk  Compared to Low-Risk Non-Small Cell  Lung Tumors | PI: Siegfried  Role on Project: Integrative Data  Analyst | 7/1/11 –  6/30/12 | UPCI  $25,096 (direct)  $-0- indirects |
| K25 GM071951 | Intelligent Aids for Proteomic Data Mining | PI | 7/01/04 – 06/30/09 | NIH – NIGMS  Total amount (direct + indirect)  $636,830 |
| W81XWH-05-2-0066 | Proteomics and Bioinformatics Core Facilities | PI: Becich  Role on project: CoInvest | 7/1/05 – 8/31/09 | TATRC – DoD  Total amount (direct + indirect)  $4,438,507 |
| CeMines | Peptide Arrays for the Detection of Lung Cancer | Role on project: Bioinformatician/  Data Analysis PI | 02/01/09 - 08/01/09 | CeMines  Total amount:  $100,000 |
| EIA 0225656 | Computational Learning and Discovery in Biological Sequence, Structure and Function Mapping | PI: J. Klein  Role on project: Bioinformatics Consultant | 09/01/03 - 8/31/07 | NSF (grant awarded  to CMU)  Total amount (direct + indirect)  Total:     $5,001.00 |
| SomaLogic | SLaptamer-Based Array Technology for Discovery of Lung Cancer Serum Biomarkers | Co-Investigator | 07/01/09 - 06/30/10 | Sponsored Project: by SomaLogic, Inc.  Total amount (direct + indirect)  $234,750 |

**Other Research Related Activities:**

**Patent**

**Provisional patent and international patent application filing:** Zaidi AH, Jobe BA, Zeng X, Balasubramanian JB, **Gopalakrishnan V,** Bigbee WL, inventors; SERUM BIOMARKER PANEL FOR THE DETECTION OF ESOPHAGEAL ADENOCARCINOMA. United States Provisional Patent Application No. 61/922,665. 2013, Dec 31. PCT Application (University Ref. No. 03143) International Patent Application Filing (Dec 2014).

**Copyright and licensing**

Copyright and licensing of wrapper-based rule learning technology (RL-Wrap) to Knopp Neurosciences, Inc. – a Pittsburgh-based biomarker validation company interested in early diagnosis, monitoring and treatment of neurodegenerative diseases such as Amyotrophic Lateral Sclerosis (ALS).

**Gopalakrishnan, V**. and Reis, S. E. CADidME: Coronary Artery Disease Intelligent Detection via Metabolomic Expression. Invention Disclosure filed at University of Pittsburgh, OTM. December 2017.

Chou, S. H-Y., Liu, Y, **Gopalakrishnan, V**. Personalized Precision Blood Pressure Modeling to Guide

Management in Acute Stroke. Disclosure filed at University of Pittsburgh, OTM, August 2018.

**Gopalakrishnan V**, Boes R, Borromeo C, Shirey W. T.rex: A method to visually explore a knowledge base of rules with biomedical information. University of Pittsburgh, 2019. Pitt Ref No: 04849

**Gopalakrishnan V**, Balasubramanian JB, Torbati ME, Reis SE. Weighted Rule Learning Methods to Find Markers of Health and Adverse Cardiovascular Events. University of Pittsburgh, 2019. Pitt Ref No: 04889.

**Gopalakrishnan, V**. iHEAL: informed Health through Eating Awareness Learning. University of Pittsburgh, 2019. Pitt Ref No: 04911.

**Gopalakrishnan, V**. Algorithms for Healthy Aging. University of Pittsburgh, 2024. Pitt Ref No: 6965.

**International Patent Application Filing**

**Intellectual Property and Provisional Patent Filing –**

University of Pittsburgh, OTM: 2013 for a four-marker panel for detection of esophageal adenocarcinoma. Title: B-AMP serum biomarker panel for the detection of esophageal adenocarcinoma.

Zaidi AH, Jobe BA, Zeng X, Balasubramanian JB, Gopalakrishnan V, Bigbee WL, inventors; Methods for the detection of Esophageal Adenocarcinoma. PCT Application Filed by University of Pittsburgh (Dec 2014).

Journal Refereeing

Bioinformatics

BMC Bioinformatics

Methods of Information in Medicine

VLDBJ (Very Large DataBases Journal)

Dental Informatics Journal

Data and Knowledge Engineering

Algorithms for Molecular Biology

BMC Research Notes

Journal of the American Medical Informatics Association (JAMIA).

MDPI Information Journal

Guest Editor (or Editor-in-Chief) for Special Edition of Journal “Data” in “Biomedical Informatics”:

<http://www.mdpi.com/journal/data/special_issues/biomedical_informatics>

Editorial Board Member, MDPI Information Journal, Section Biomedical Information and Health – October 2022 to September 2024 <https://www.mdpi.com/journal/information/sectioneditors/biomedical_information_health>

Special Issue Editor in Information : "Multi-Modal Biomedical Data Science—Modeling and Analysis": <https://www.mdpi.com/journal/information/special_issues/WQ8X5HDU7M>

**Research-related service on study sections**

2009 NIH/NCRR SBIR Grants and Contract Review Study Section Member

2010 NIH/NCRR SBIR Grants and Contract Review Study Section Member

2011 NSF Review Panelist

2012 NSF BIG Data Review Panelist

2013 NIH P41 Special Review Panelist

2014 NIH – Several types of Peer Review Panels

2014 Expert Committee Review for the Canada Foundation for Innovation

(Integrating 'Big Data' for Health)

2015 NIH BDMA Winter Study Section Review Member

2015 NIH SBIB Special Emphasis Panel for Imaging and Biomarkers for Early Cancer

Detection

2015 NIH Academic Industrial Partnership (AIP) Study Section Review Member

2016 NIH SBIB Special Emphasis Panel for Imaging and Biomarkers for Early Cancer Detection

2017 NIH SBIB F59 Panel for Imaging and Biomarkers for Early Detection of Aggressive

Cancer

2018 NIH Reviewer for early-stage investigator’s R35 from the NIGMS (MIRA-ESI)

2018 NIH BDMA Winter study section reviewer

2019 NIH K99 Reviewer – NIGMS

2020 NIH S10 High-End/Shared Instrumentation Grant Reviewer

2020 Special Panel – NIH Rapid SARS-CoV2 Review

2020 Florida Department of Health Ed and Ethel Moore Alzheimer’s Disease Research

Program

2021 NSF Convergence Accelerator Review Panelist

2022 NIH MOSAIC K99/R00 Review Panel

2022 Florida Department of Health Biomedical Research Program 22-23

2023 NIH SBIR Review Data Science Tools for Infectious, Immune and Allergic Research

**List of Current Research Interests:**

Dr. Gopalakrishnan is a biomedical data scientist who is passionate about developing intelligent systems to reduce the burden of disease. Her primary research focus has been on the development of novel algorithms involving rule learning for the predictive and integrative modeling of biomedical data obtained from molecular profiling studies, radiologic imaging and clinical textual reports. She is fundamentally interested in technologies for data mining and discovery that allow incorporation of prior knowledge. Fundamental research areas of interest involve extensions to rule learning via the incorporation of (1) Bayesian Statistics, (2) prior rule models, and (3) knowledge obtained through mining of ontologies or the literature. Dr. Gopalakrishnan is generally interested in the design and development of computational methods for solving clinically relevant biological problems, such as the discovery and verification of biomarkers for disease state prediction. Her research over the past decade has focused on the development, application and evaluation of symbolic, probabilistic and hybrid machine learning methods to the modeling and analysis of high-dimensional, sparsely-populated biomedical datasets, particularly from proteomic profiling studies for early detection of disease. Her current research projects involve the study of novel variants of rule learning techniques for biomarker discovery, prediction and monitoring of diverse diseases including neurodegenerative and cardiovascular diseases, lung, breast and esophageal cancers, and parasitic infectious disease, with a focus on the analyses of data obtained from metabolomics and microbiome profiling. Her current research involves optimization of machine learning methods for multi-modal biomedical data mining and biomarker discovery, with a focus on diagnostic and prognostic modeling of data for chronic low back pain and age-associated intervertebral disc disease. More recently, she has begun investigating data from electronic health records in an effort to understand the treatment of type 2 diabetes and to test hypotheses regarding drug-outcome/adverse effects. She also works with the ENACT federated EHR team of investigators to discover recent trends in post-partum hemorrhage across diverse race/ethnicities as part of her interest in creating projects at the intersection of women’s health and data analytics research.

**Invited Seminars and Lectureships:**

### Regional/Local:

“Can Female Digital Health Twins improve equity of care for Women as they age?,” Invited Talk for Global Board of Directors, WHAMGlobal, June 3, 2024. See press coverage here: <https://whamglobal.org/news/whamglobal-presentation-offers-ah-ha-moments-on-healthy-aging-for-women>

“Data and Emerging Economies,” in course entitled: AI & Emerging Economies, Carnegie Mellon University, Pittsburgh, PA. October 10, 2023.

“Rapid AI Integrated Learning of Skills (RAILS) for Rehabilitation Science” Momentum Funds Invited Pitch, University of Pittsburgh, Jan 31, 2022.

“CHAI: Center for Humans and Artificial Intelligence,” DBMI Faculty Meeting Research Presentation, October 21, 2020, Pittsburgh, PA.

“PRoBE lab research leading to iHEAL: informed Health through Eating Awareness Learning.” September 7, 2018, DBMI Colloqium – BMI Lecture Series, Pittsburgh, PA.

“Journey into the PRoBE Lab to discover what you can do or Bioinformatics.” STEM Junction Symposium. November 15th, Fox Chapel Area High School.

“Parsimonious Modeling of Biomedical Data: Fact or Fiction?” Science 2016 – Game Changers, University of Pittsburgh, October 19-21, 2016.

Mining “Big” Biomedical Data for Actionable Knowledge, Department of Computer Science, April 10, 2012.

“Bioinformatics Overview”, UPCI Summer Academy, July 18 & 21, 2011.

“Bayesian Rule Learning for Mining Data from Biomarker Profiling Studies”, Spotlight Session Speaker in “Computational Advances”, Science2010 Transformations, University of Pittsburgh, October 7-8, 2010.

“Rule Learning Methods for Biomarker Discovery and Predictive Biomedicine.” DBMI External Advisory Board Meeting, September 2009.

“Data Mining Methods for Biomarker Discovery from Proteomic Profiling”, SomaLogic, Inc. April 2009.

“Bioinformatics Core Support”, UPCI Lung Cancer SPORE External Advisory Board Meeting, May, 2008.

“Data Mining for Biomedical Knowledge Discovery,” DBMI Colloqium, Department of Biomedical Informatics, University of Pittsburgh, 2008.

“Intelligent Aids for Clinically Relevant Biological Problems.” Computer Science Department, University of Pittsburgh, 2006.

“Bioinformatics: A Quick Introduction.” Heinz School, Carnegie Mellon University, 2005.

“Data mining of proteomic profiles.” Biological Sciences, University of Pittsburgh, 2004.

“Data mining of mass spectrometry-based clinical proteomic profiles using rule learning.” University of Pittsburgh, 2004.

“Symbolic machine learning techniques for proteomic data mining.” GSPH, Biostatistics Seminar, University of Pittsburgh, 2004.

“Temporal Pattern Detection in Gene Expression Data.” UPCI Seminar, 2003.

“Common Boundaries for Bioinformatics and Clinical Informatics Research.” Medical Students Journal Club Seminar University of Pittsburgh, 2003.

## “Analysis of Gene Expression Data from Affymetrix Probe Arrays.” Frontiers in Science Seminar Series jointly sponsored by University of Pittsburgh and Carnegie Mellon University, 2001.

“A Bioinformatics Challenge – Analyzing Gene Expression Data from Affymetrix Microarrays.” Invited talk at the PACCM Joint Collaborative Research Conference, UPMC Montefiore University Hospital, UPMC, 2001.

“Parallel Experiment Planning, Macromolecular Crystallization, and Computational Biology.” Jointly sponsored by the Center for Automated Learning and Discovery and the Language Technologies Institute at the Carnegie Mellon University, 2000.

National:

At the United Nations Side Events – Two separate talks in April 2024 and July 2024 respectively:

(1) “Recommendations for public goods to promote healthy aging and equity of care” at the

57th Session of Commission on Population and Development (CPD); Virtual Side Event on “Economic and Social Inclusion for Healthy Ageing: A Call for Global Action” (see: <https://www.youtube.com/watch?v=K1RH1Q7ALtk>) (starts at 1 hour mark into the video).

(2) “Artificial Intelligence in Medical Research and Education” at the 9th Multi-stakeholder Science, Technology and Innovation Virtual Side Event organized by the Women's Health and Education Center on “Artificial Intelligence Literacy in Health & Education Sectors” (see starting at 50 minutes into video: <https://www.youtube.com/watch?v=TpV2ybfwXLg>).

“Novel Biomarker Discovery Data to Knowledge Pipeline for Precision Medicine,” Genome Institute at Washington University, St. Louis, MO. May 4, 2015.

University of Southern California, Keck School of Medicine, Cardiology, Children’s Hospital of Los Angeles, Angeles, Los Angeles, CA. “Informatics of Large Datasets.” November 25, 2013.

“Mining Big Biomedical Data for Actionable Knowledge, “Stanford University, Palo Alto, CA. May 30, 2012.

“Classification Rules Modeling for Understanding Biomedical Data”, Cincinnati Children’s Hospital Medical Center, University of Cincinnati, Cincinnati, OH, April 6, 2012.

“Data Mining for Predictive Biomedicine”. University of California, San Diego, CA. March 26, 2012.

“Bayesian and Transfer Rule Learning Algorithms for Biomarker Discovery and Predictive Biomedicine.” Vanderbilt University, Nashville, TN, October 14, 2011.

Invited panelist for Health Informatics, Beyond Web 2.0, Futurtech Conference, University of Michigan, Ann Arbor, MI, 2009.

“From Data to Rules: Proteomic Mass Spectra to Biomarker Panels.” Windber Research Institute, Windber, PA, 2008.

“Clinical Proteomic Data Mining via Rule Induction.” Biological Language Modeling Conference, Pittsburgh, PA, USA, 2005.

“Intelligent Computational Aids for Clinical Proteomic Data Mining.” CHI’s Beyond Genome. San Francisco, CA, USA, 2005.

Keystone Symposia: Proteomics and Bioinformatics (2005). Proteomic Data Mining identifies Potential Biomarkers of Amyotrophic Lateral Sclerosis. Keystone, CO, USA. April 2005.

### International:

“Multimodal Data and AI for Health Forecasting,” Koita Center for Digital Health, Indian Institute of Technology, Mumbai, India. June 20, 2024.

“Health Data Modeling for Emerging Economies.” Carnegie Mellon University Africa, Kigali, Rwanda, Africa. September 25, 2023.

Invited Panelist: “AI and Emerging Economies: Unlocking Potential for Growth and Impact in Africa,” IEEE AFRICON 2023, Nairobi, Kenya, Africa. September 20, 2023.

<https://2023.ieee-africon.org/speakers/>

“AI in Biomedicine for Emerging Economies.” JIO Institute, Mumbai, India. September 15, 2023.

**Gopalakrishnan, V**., Balasubramanian, J., Kip, K., and Reis, S. Towards learning clinically relevant explainable models via Bayesian Rule Learning with utilities. The 12th International Workshop on Knowledge Representation for Health Care (KR4HC 2021), ONLINE. June 16, 2021. (Porto, Portugal event).

Keynote Talk: “Integrative AI-based Modeling of Biomedical Data for Precision Medicine.” The 16th International Conference on Information Technology, December 21-23rd, 2017. Bhubaneswar, Odisha, India.

Tutorial Session: “Machine Learning and Data Science Methods for Bioinformatics.” December 20, 2017. ICIT 2017, Bhubaneswar, Odisha, India. (160 attendees – faculty, postdocs, students). Part of educational service mission.

“Novel Methods for Integrative Modeling of Biomedical Data,” Fourth International Conference on Integrative Biology 2016, July 18-20, 2016, Berlin, Germany.

“A novel framework to enhance scientific knowledge of cardiovascular MRI biomarkers and their application to pediatric cardiomyopathy classification,” Granada, Spain, 2014.

“Utilization of Spatial Coherence in Functional Neuroimage-based Classification.” The Third *International Conference on Bioinformatics and Biomedical Engineering*, Beijing, China, 2009.

“Computer Aided Knowledge Discovery: Case Studies in Biomedicine.” Supercomputing Education and Research Center, Indian Institute of Science. Bangalore, India, 2008.

“Intelligent Aids for Macromolecular Crystallization and Proteomic Data Mining.” Indian Institute of Science. Bangalore, India, 2004.

“Symbolic Induction of Heuristics to Aid Macromolecular Crystallization.” Institute of Systems Science, National University of Singapore, National University of Singapore, 1995.

**National Conferences**

AMIA - 2012

AMIA TBI – 2011, 2012, 2013

MDS 2012

Collaborative Big Data - 2013

APIII 2003 - Reviewer for Scientific Abstracts - approximately 75 submitted were reviewed

Scientific Session Co-Chair - APIII 2003

Reviewer – Third International Conference on Bioinformatics and Bioengineering 2009

General Chair – The 16th International Conference on Information Technology, ICIT 2017, Bhubaneswar, India

**Service**

**University and Medical School.**

Training Program Core Faculty Committee – Oversee and vote on all matters pertaining to administration of BMITP. 2000 – present.

Admissions Committee – Biomedical Informatics Training Program: Evaluate applications and vote on incoming students. 2000 – present.

Evaluations Committee – Biomedical Informatics Training Program: Periodic evaluation of students and advisees.

2001 – 2005.

Training Needs Committee: Evaluate the computational courses offered within our training program and decide on course of action for ensuring that our incoming trainees will have sufficient background to do well in our program.

2001 – present.

Internal Advisory Board, Genomics and Proteomics Core Laboratories, University of Pittsburgh School of Medicine – 2002-2004.

Faculty in-charge of organizing the Biomedical Informatics Colloquium for Fall 2004 and Spring 2005 - Distinguished Lecture Series in Biomedical Informatics.

DBMI Doctoral Comprehensive Committee Examination Committee Coordinator, 2007 – 2016.

Training Program Assessment and Evaluation Committee, 2009 – present.

Chair, Biomedical Informatics Curriculum Committee: Oversee development, refinement & implementation of curriculum for Biomedical Informatics Training Program (BMITP). 2005 – 2009.

2009-present – Member, BMITP Curriculum Committee.

Executive Committee Member, BMITP, School of Medicine. 2021 - present

Director, Computational and Systems Biology/Biomedical Informatics (CoSBBI) Summer Training Program at the University of Pittsburgh Cancer Institute Summer Academy for High School Seniors. 2011 – 2014.

Co-director, BBI Area of Concentration for Medical Curriculum, School of Medicine, University of Pittsburgh. Approved March 2017.

Director, Intelligent Systems Program, School of Computing and Information, University of Pittsburgh (2018-2022).

Chair, Admissions Committee, Intelligent Systems Program, School of Computing, and Information. 2019 – 2022.

DBMI Internal Promotion Committee Member – 2023.

Member of –

NSF funded TEC/Reu Bio program that supports summer computational biology research (Past member of BBSI Summer Training funded by NIH).

Joint CMU-Pitt Program in Computational Biology since 2008.

Medical Scientist Training Program (MSTP), University of Pittsburgh, since 2013

Cardiovascular Bioengineering Training Program, University of Pittsburgh, since 2017.

Reviewer: Maryland Industrial Partnerships

Reviewer: AMIA Student Paper Competition 2020

Faculty Mentee –

UPCI Summer Academy

* Natalie Nash, Senior, Vincentian Academy, Pittsburgh, PA (2011)
* Raghav Kedia from Long Island, NY (2012).
* Mara Staines (2013)
* Amy McMillan (2013)
* Emilia Porubcin (2016)
* Shania Khatri (2016)

Summer Volunteer Intern - Skanda Koppula, Junior, North Allegheny Intermediate

High School (2011).

iBRiC Summer Undergraduate Program – DBMI

* Manuel Alvarez-Rios (2019) from Puerto Rico

Longitudinal Educator: 2024 - present

**Diversity, Equity, and Inclusion Activities**

1. Primary Research Advisor for PhD student in BMITP, SOM from August 2011 to August 2016:

<https://somgrad.pitt.edu/content/henry-ogoe>

<http://d-scholarship.pitt.edu/29428/>

One African American PhD student (Henry Ato Ogoe) mentored as per above.

1. Primary Research Advisor for Latin American PhD student in BMITP, SOM who graduated in 2015.

<http://d-scholarship.pitt.edu/26656/>

One PhD student from Latin America mentored as per above.

1. Mentored high school students in the Computer Science, Biology, and Biomedical Informatics, University of Pittsburgh Cancer Institute (CoSBBI UPCI) Program since 2011. My first high school student, Natalie Nash, won awards in both regional and national competitions.

Four female students I mentored participated in the CoSBBI UPCI program, one student organized the first-ever Bioinformatics symposium in her area high school that drew 300 students to learn more about the field.

Medical School - 2 female students (Patricia Campell, Ayesha Firdous)

Undergraduate summer intern – Mentored one under-represented student who is now working in Google before joining graduate school with joint Computer Science and Neuroscience type of programs in the future.

Have mentored several Master’s degree students in various training programs across Pitt and CMU who are from the minority or under-represented categories.

Currently advising three women minority students rotating in my PRoBE laboratory.

As Intelligent Systems Program (ISP) Director -

Recruited female faculty members to join so we could continue to retain our exceptionally reasonably well-balanced faculty as part of the tradition that past ISP directorship has followed.

Students - In 2022, we had 33% applicants to our Intelligent Systems Program PhD program who were females (out of 34 doctoral program applications) and 25% applicants were female (out of 50 or so Masters’ program applications), and one exceptional female candidate is of Latino origin. We continue to achieve diversity using social media channels in the School of Computing and Information.

**Extramural Activities:**

Consulting Panelist at Chatham University for curriculum development of degree programs or concentrations at the graduate and undergraduate level for Biomedical Data Science and Health Informatics. May/June 2015.

**Community Activities**

a. Organization of Conferences and Meetings:

1. Organizer of a National Conference- Biological Language Conference (BLC 2004), CMU.
2. Chair, DBMI-CS Mini-Retreat for Exploring the Cross-Cutting Challenges among Informatics Sub-disciplines. May 10, 2011, William Pitt Union Lower Lounge.
3. MDS-2012 Mining Data Semantics in Information Networks Workshop
4. CBig-2012 International Workshop on Collaborative Big Data
5. AMIA Translation Bioinformatics Conference 2013 – Scientific Program Committee Member
6. General Chair and Organizer of the 16th International Conference on Information Technology, ICIT 2017, Bhubaneswar, India.
7. Organized the SCI-DBMI-ISP Faculty Workshop – (Spring 2020) ---- attended by 45 faculty across 6 departments and 6 schools.

b. Consultant to Knopp Neurosciences, Inc. – December 2005 – March 2007

c. Classical Indian Dancing- Well trained performer of Bharatanatyam in the famous Kalakshetra style by world-renowned Guru Padma Shri Adyar K. Lakshman. Performed with other artistes to raise money for charities such as the Association for India’s Development (AID). I also train young students on foundational aspects as necessary.

d. Fundraising for School of Computing and Information (SCI) – Fall 2019 – Meeting with potential donors and following up to discuss plans.

e. Fundraising for VIHAR – Successfully pitched a new project combining AI for Women’s Health and Wellness to donor. Looking forward to directing this project with local, regional, and global colleagues.