

Arunkumar Bagavathi

Department of Computer Science
Oklahoma State University
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Experience

Oklahoma State University
Assistant Professor

Stillwater, OK
August 2019 - Present

Education

University of North Carolina – Charlotte
Ph.D. in Computer Science

Charlotte, NC
June 2019

- Research area: Actionable Pattern Discovery, Dynamics in Social Networks
- Advisors: Dr. Angelina A. Tzacheva and Dr. Zbigniew W. Ras
- Mentor: Dr. Siddharth Krishnan

University of North Carolina – Charlotte
MS in Computer Science

Charlotte, NC
May 2016

Anna University
BE in Computer Science and Engineering

Tamil Nadu, India
May 2014

Journal Publications

Safarnejad, L., Xu, Q., Ge, Y., Krishnan, S., **Bagavathi, A.** and Chen, S. "Contrasting Misinformation and Real-Information Dissemination Network Structures on Social Media During a Health Emergency" in *Revista Panamericana de Salud Publica= Pan American Journal of Public Health*, 2021, Vol. 45, pp.e61-e61.

Safarnejad, L., Xu, Q., Ge, Y., Krishnan, S., **Bagavathi, A.**, Chen, S., "Contrasting Misinformation and Real-Information Dissemination Network Structures on Social Media During a Health Emergency", *American Journal of Public Health*, 2020 Oct, Vol. 110(S3):S340-7

Safarnejad, L., Xu, Q., Ge, Y., **Bagavathi, A.**, Krishnan, S., and Chen, S., "Identifying Influential Factors in the Discussion Dynamics of Emerging Health Issues on Social Media: Computational Study", in *JMIR Public Health and Surveillance* journal, 2020, Vol. 6, No. 2: e17175

Tzacheva, A. A., Shankar, R. A., Ramachandran, S., and **Bagavathi, A.**, "Action Rules of Lowest Cost and Action Set Correlations", in *Fundamenta Informaticae Journal*, 2020, Vol. 172(4), pp. 399-412

Tzacheva, A. A., Ranganathan, J., and **Bagavathi, A.**, "Action Rules for Sentiment Analysis using Twitter", in *International Journal of Social Network Mining*, 2020, Vol. 3, No. 1, pp. 35-51

Chen S., Xu Q., Buchenberger J., **Bagavathi, A.**, Fair G., Shaikh, and S. Krishnan S., "Investigating the Dynamics of Health Agency Response and Public Engagement during Public Health Emergency: A Case Study of CDC Tweeting Pattern during 2016 Zika Epidemic in the U.S.", in *JMIR Public Health and Surveillance*, Vol. 4, No. 4, e10827, 2018. DOI: 10.2196/10827

Tzacheva, A.A., **Bagavathi, A.**, Datta, A.K., "In Search of Actionable Patterns of Lowest Cost – A Scalable Graph Method", in *International Journal of Database Management Systems (IJDMS)*, 2018, Vol. 10, No. 3, pp. 1-19

Ranganathan, J., Irudayaraj, A.S., **Bagavathi, A.**, Tzacheva, A.A., "Actionable Pattern Discovery for Sentiment Analysis on Twitter Data in clustered environment", in *Journal of Intelligent & Fuzzy Systems*, IOS Press, 2018, pp. 1-15

Tzacheva, A.A., **Bagavathi, A.**, and Ganesan, P. D., "MR - Random Forest Algorithm for Distributed Action Rules Discovery", in International Journal of Data Mining & Knowledge Management Process (IJDKP), 2016, Vol. 6, No. 5., pp.15-30

Conference Publications

Hajare, P., Kamal, S., Krishnan, S. and **Bagavathi, A.** "A Machine Learning Pipeline to Examine Political Bias with Congressional Speeches" in 20th IEEE International Conference on Machine Learning and Applications (ICMLA), 2021, pp. 239-243

Indla V, Indla V, Narayanan S, **Bagavathi A**, Laguduva V, Aakur SN. "Metagenome2Vec: Contextualized Representations for Real-World Metagenome Sequence Classification" in IEEE International Conference on Data Mining Workshops (ICDMW), 2021, pp. 500-507

Aakur, S.N., Narayanan, S., Indla, V., **Bagavathi, A.**, Laguduva Ramnath, V. and Ramachandran, A. "MG-NET: Leveraging Pseudo-imaging for Multi-modal Metagenome Analysis" in International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI), Springer, Cham, 2021, pp. 592-602

Indla, V., Indla, V., Narayanan, S., Ramachandran, A., **Bagavathi, A.**, Ramnath, V. L., Aakur, S. N. "Sim2Real for Metagenomes: Accelerating Animal Diagnostics with Adversarial Co-Training" in 25th Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD), Springer, vol. 12712, 2021, pp. 164 - 175 (**Acceptance Rate: 20%**)

Aakur, S. N. and **Bagavathi, A.**, "Unsupervised Gaze Prediction in Egocentric Videos by Energy-based Surprise Modeling", International Conference on Computer Vision Theory and Applications, 2021, pp. 935 - 942

Narayanan, S., Ramachandran, A., Aakur, S. N., and **Bagavathi, A.**, "Genome Sequence Classification for Animal Diagnostics with Graph Representations and Deep Neural Networks", *IEEE 19th International Conference on Machine Learning and Applications (ICMLA)*, 2020, pp. 1297 - 1303

Melton, J., **Bagavathi, A.**, Krishnan, S., "DeL-haTE: A Deep Learning Tunable Ensemble for Hate Speech Detection", *IEEE 19th International Conference on Machine Learning and Applications (ICMLA)*, 2020, pp. 1015 - 1022

Ridenhour, M., **Bagavathi, A.**, Raisi, E., and Krishnan, S., "Detecting Online Hate Speech: Approaches Using Weak Supervision and Network Embedding Models", in International Conference on Social Computing, Behavioral-Cultural Modeling & Prediction and Behavior Representation in Modeling and Simulation (SBP-BRiMS), 2020, pp. 202-212

Bagavathi, A., Krishnan, S., Subrahmanyam, S., and Narasimhan, S. L., "ragamAI: A Network Based Recommender System to Arrange an Indian Classical Music Concert", in *IEEE 18th International Conference on Machine Learning and Applications (ICMLA)*, Boca Raton, FL, USA, December 16-19, 2019, pp. 1517-1522

Wooley, S., Edmonds, A., **Bagavathi, A.**, Krishnan, S., "Extracting Cryptocurrency Price Movements from the Reddit Community Network", in IEEE 18th International Conference on Machine Learning and Applications, Boca Raton, Florida, December 16-19, 2019, pp. 500-505 (**Acceptance Rate: 18.6%**)

Bagavathi, A., Bashiri, P., Reid, S., Phillips, M., Krishnan, S., "Examining Untempered Social Media: Analyzing Cascades of Polarized Conversations", in IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining, Vancouver, BC, Canada, August 27-30, 2019, pp. 625-632 (**Acceptance Rate: <20%**)

Bagavathi, A., Tzacheva, A. A., "Scalable Action Mining for Recommendations to Reduce Hospital Readmission", in IEEE 20th International Conference on Information Reuse and

Integration for Data Science, Los Angeles, CA, USA, July 30-August 1, 2019, pp. 159-166
(**Acceptance Rate:** 23.1%)

Bagavathi, A., Krishnan, S., "Multi-Net: A Scalable Multiplex Network Embedding Framework", in 7th International Conference on Complex Networks and Their Applications, Cambridge, UK, Dec. 11-13 2018, published by Springer Cham, pp. 119-131 (**Acceptance Rate:** 21%)

Bagavathi, A., Tripathi A., Tzacheva A.A., Ras, Z.W., "Actionable Pattern Mining - a Scalable Data Distribution Method based on information granules", in IEEE 17th International Conference on Machine Learning and Applications, Orlando, Florida, Dec. 17-20, 2018, pp. 32-39
(**Acceptance Rate:** 31%)

Bagavathi, A., Rao V., Tzacheva A.A., "Data distribution method for scalable actionable pattern mining", In Proceedings of the First International Conference on Data Science, E-learning and Information Systems (DATA '18), Madrid, Spain, Oct. 1-3, 2018, ACM, Article 3, 7 pages. DOI: <https://doi.org/10.1145/3279996.3279999>

Tzacheva A.A., **Bagavathi A.**, Suryanarayanaprasad C.B., "In Search of Actionable Patterns of Lowest Cost - a Scalable Action Graph Method", in IEEE 1st International Conference on Artificial Intelligence and Knowledge Engineering, Santa Ana, CA, Sept. 26-28, 2018, pp. 119-125

Bagavathi, A., Krishnan, S., "Social Sensors: Early Detection of Contagious Outbreaks in Social Media", in the 9th International Conference on Applied Human Factors and Ergonomics (AHFE), Orlando, FL, Springer, Cham, 2018, pp. 400-407

Bagavathi, A., Mummoju, P., Tarnowska, K., Tzacheva, A. A., Ras, Z.W., "SARGS method for Distributed Actionable Pattern Mining using Spark", in IEEE International Conference of Big Data, Boston, MA, USA, 2017, pp. 4272-4281

Tzacheva, A. A., **Bagavathi, A.**, Ayila, L., "Discovery of Action Rules at Lowest Cost in Spark", in Proceedings of 2017 International Conference of Data Mining Workshops (ICDMW'17) on 5th International Workshop on Data Science and Big Data Analytics Workshop, November 18-21, 2017, New Orleans, USA, pp. 87-94

Bagavathi, A., and Tzacheva, A. A., "Rule Based Systems in a Distributed Environment: Survey", in Proceedings of International Conference on Cloud Computing and Applications (CCA17), 3rd World Congress on Electrical Engineering and Computer Systems and Science (EECSS'17), June 4-6, 2017 Rome, Italy, pp. 1-17

Miscellaneous Works

Reid, S. E., Valasik, M., **Bagavathi, A.**, "Examining the physical manifestation of alt-right gangs: From online trolling to street fighting", In Gangs in the Era of Internet and Social Media 2020 (pp. 105-134). Springer, Cham

Phillips, M., **Bagavathi, A.**, E. Reid, S., Valasik, M., and Krishnan, S., "The daily use of Gab is climbing: Which talker might become as violent as the Pittsburgh Synagogue Gunman?", in Washington Post Monkey Cage, November 29, 2018

Research Experience

University of North Carolina – Charlotte

Charlotte, NC

Ph.D. Candidate

Actionable Pattern Discovery

2016 – Present

- Designing an algorithm that distribute the big data and extract low cost actionable patterns with minimum loss in the discovered knowledge using distributed computing frameworks like MapReduce and Spark
- Creating network-based approaches to search low cost actionable patterns

Network Analysis

2017 - Present

- Designing algorithmic ideas to represent large scale and dynamic multiplex networks in a low dimensional feature vector space using deep learning techniques. We validated the network representations over applications like *network construction*, *node classification* and *community detection*
- Analysis of hate speech and echo chambers in gab.com user communities. We also model the hate speech detection and influential user communities for hate in the social media

Other Research

- Dark web analysis - identifying nefarious activities in dark web that are threat to US border control
- Health informatics - a study on information spread during the Zika virus contagion

Academic Experience

Oklahoma State University Assistant Professor

Stillwater, OK
2019 – Present

- Courses: Cloud Computing and Distributed Systems (Spring 2020, 2021, 2022), Big Data Analytics (Fall 2020, 2021)
- Research Interests: Data mining, Network science, Cloud computing, Computational social science, and Computational Biology

University of North Carolina – Charlotte Research Assistant

Charlotte, NC
2018 – 2019

- Instructor: Dr. Siddharth Krishnan
- Research focus: Develop an embedding framework for multiplex networks, and study the evolution of conversations in untempered social media

University of North Carolina – Charlotte Teaching Assistant

Charlotte, NC
2016 – 2018

- Instructor: Dr. Angelina A. Tzacheva
- Courses: Knowledge Discovery in Databases (ITCS 6190/8190), Cloud Computing for Data Analysis (DSBA/ITCS 6190/8190)
- Job: Creating assignments, activities and grading assignments and exams along with Dr. Tzacheva and motivating students with their assignments and projects

Awards

Summer School on Computational Social Science - USC
Honorable Project Award

Los Angeles, CA
2018

University of North Carolina – Charlotte
Graduate Travel Support

Charlotte, NC
2017 – 2019

University of North Carolina – Charlotte
Graduate Assistant Support Plan (GASP)

Charlotte, NC
2016 – 2019

University of North Carolina – Chapel Hill
Best use of IBM Bluemix Award

Chapel Hill, NC
Nov 2015

Extramural Funding

- United State Department of Agriculture (USDA); National Animal Health Laboratory Network (NAHLN) Enhancement Proposal; Collaborative Research: Deep Learning Computational Algorithms for Disease Diagnosis by Genome Sequences; 01/01/2020 – 12/31/2021; \$158,136 (with Akhilesh Ramachandran, PI)

- NSF; Research Experiences for Teachers (RET) Site: Research Experiences in Big Data and Machine/Deep Learning for Oklahoma STEM Teachers; 05/01/2021 – 04/30/2023; \$397,669 (with Johnson Thomas, PI)

Internal Funding

- Oklahoma State University; College of Arts and Science Research (ASR) Seed grant; Independent Research: Deep Learning Computational Algorithms for Disease Diagnosis by Genome Sequences; 07/01/2021 – 06/30/2022; \$10,000 (PI)

Professional Activities

1) Student Advising

- Advisor:** Sadia Kamal (Spring 2021 - Present), Prasad Hajare (Fall 2020 – Spring 2021), Jade Gullic (Summer 2021 - Present), and Brenner Little (Fall 2021 - Present)
- Mentor:** Pierre Lilly (Summer 2022), Jimmy Hartford (Spring 2022), Emily Hyde (Summer 2022), Jeremy Willis (Summer 2022), Josh Melton (Spring 2020 - Present), and Michael Ridenhour (Spring 2019 - Present)

2) Department Service

- Facilities Committee of the Department of Computer Science, Oklahoma State University
- Student and Faculty office allocations
- Thesis committee member for Master's and Ph.D. students
- Active committee member of department's cloud cluster organization and maintenance

3) Reviewing and Program Committee

- Guest editor of **Natural Language Engineering** journal (2021-Present)
- Reviewer of **SNAM** (2022), **Entropy** (2022), **Frontiers of Big Data** (2021), **IEEE Access** journal (2020-Present), **NLE** (2021-Present), **International Journal of Big Data** (2020-Present), **Information Processing and Management** (IPM) journal (2020-Present), **PLOS ONE** journal (2019-Present), **International Journal of Social Network Mining** (2018-2021), **Journal of Intelligent Information Systems** (2018-Present)
- Program Committee of **IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining** - ASONAM (2021, 2022)
- Program Committee of **AAAI ICWSM**, 2022
- Program Committee of **International Symposium on Methodologies for Intelligent Systems (ISMIS)**, 2020-Present
- Program Committee of **17th and 18th IEEE International Conference on Machine Learning and Applications**
- Program Committee of **KDD-UG**, 2022
- Reviewer of International Conference of Big Data and Internet of Things (**BDIOT2017**)

4) Organizing Committee

- Organizer of Special Session on Machine Learning for Graphs (**ML4Graphs**) at International Conference on Machine Learning and Applications (2020, 21, 22)

5) Invited Lectures

- **Network Science (ITIS 6520/8520)** - Survey of network representation techniques
- **Cloud Computing for Data Analysis (ITCS 6190/8190)** – Introduction to Spark
- **Applied Machine Learning (DSBA 6156)** – Basics of Python for Data Science

6) Conference Presentations

- “Sim2Real for Metagenomes: Accelerating Animal Diagnostics with Adversarial Co-Training” at 25th Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD), 2021

- "Genome Sequence Classification for Animal Diagnostics with Graph Representations and Deep Neural Networks" at IEEE 19th International Conference on Machine Learning and Applications, 2020
- "Examining Untempered Social Media: Analyzing Cascades of Polarized Conversations" at IEEE/ACM International Conference on Advances in Social Network Analysis and Mining, 2019
- "In Search of Actionable Patterns of Lowest Cost - a Scalable Action Graph Method" at IEEE International Conference on Artificial Intelligence and Knowledge Engineering, 2018
- "Social Sensors: Early Detection of Contagious Outbreaks in Social Media" at the International Conference on Applied Human Factors and Ergonomics, 2018
- "SARGS method for Distributed Actionable Pattern Mining using Spark" at IEEE International Conference on Big Data, 2017

7) Others

- Participant of **2nd Summer School on Computational Social Science**, Information Sciences Institute, University of Southern California (**Acceptance Rate: 13%**)

Technical Skills

Programming Languages: Java, Scala, Python3

Distributed Frameworks: Hadoop, Scala-Spark, PySpark

Database Management Tools: MySQL, SparkSQL

Large Scale Graph Libraries: Spark GraphX, networkX and graph-tool