Beiyu Lin

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Education

2016 - Present **Ph.D. Candidate in Computer Science** (focus on **data mining and machine learning**)
Washington State University, Pullman, WA. Dissertation Advisor: Diane J. Cook.
Topic: Population-level behavior analysis based on smart environment sensor data

2013 - 2015 **Master of Science in Mathematics**, *Washington State University*, Pullman, WA

2011-2013 **Master of Science in Applied Math**, *State University of New York*, Stony Brook, NY

2007-2011 **Bachelor of Science in Math and Applied Math**, *Shanghai Maritime University*, Shanghai, China

Professional Experience

Summer 2019 **Software Engineer Intern**, Dell EMC, Seattle, WA.
Wrote an analytic application of sensor data from cars in Brisbane, Australia. This application ingested streaming data, analyzed and predicted the traffic flow. The visualization is an hourly-based heat-map with location markers. When users click a marker, a bar chart will pop up with the predicted traffic flow.

Summer 2019 **Instructor**, School of Electrical Engineering and Computer Science, WSU.

2015 – Present **Graduate Research Assistant**, Electrical Engineering and Computer Science, WSU.

Summer 2018 **Software Engineer Intern**, Honeywell, Atlanta, GA.

Worked on the Honeywell Aerospace Development Team for Low Altitude Authorization and Notification Capability Unmanned Aircraft System Service Supplier. Used Python and JavaScript to develop Honeywell USS Product, including developing data/user interface and authorization service. Helped out other projects, including flight plane engine, edge to cloud, memory leak and dashboard.

Summer 2017 **Mentor**, Google Summer of Code, Anita Borg Institute.

2014 - 2015 **Instructor**, Department of Mathematics, WSU.

2013 - 2014 **Teaching Assistant**, Department of Mathematics, WSU.

Graduate Projects

2019- present **Understanding Behavior Differences Among Subpopulations Using Inverse Reinforcement Learning**
(Funded by National Institutes of Health (NIH))
With a strong relationship between behavior habits and health status, we utilize a data-drive approach to understand behavior patterns and study the dynamic between situations and actions. The findings may allow technology to help improve people's habits and health status.

2018 - 2019 **Constructing Markov Models of Human Routine Behaviors Based on Smart Home Sensor Data**
(Funded by National Science Foundation (NSF)) (collaborate with people from College of Nursing)
While pervasive computing technologies for observing human behavior are becoming mainstream, we construct stochastic models based on smart home sensor data among population subgroups as a purpose of discovering actionable routine strategies that are associated with better health status.

2017 - 2018 **Iterative Design of Visual Analytics for a Clinician-in-the-loop Smart Home**
(Funded by National Institutes of Health (NIH)) (collaborated with clinicians, psychologist and nurses)
With the increasing health needs of the coming "age wave", we design a clinician-in-the-loop visual interface, that provides clinicians with patient behavior patterns, derived from smart home data. The technology offers the potential to perform remote monitoring for supporting self-management.

2016 - 2018 **Designing an Ecologically-Valid Formal Model of Human Activity Patterns**
(Funded by National Science Foundation (NSF))
Formal modeling and analysis of human behavior is a popular topic in disciplines ranging from psychology to economics. We propose a formal model of indoor routine behavior based on automatically-sensed and recognized activities. These findings may be used to automate diagnoses and design customized behavioral interventions.

2015 - 2018 **Analyzing the relationship between human behavior and indoor air quality in smart homes**
(Funded by the US Department of Energy and the US Environmental Protection Agency Science To Achieve Results)
(collaborated with people from civil and environmental engineering, atmospheric research lab, and design and construction)
Because the quality of the air we experience inside and outside buildings may accompany behavior changes, we apply data science and machine learning technologies in smart home environments to understand the types of behavior that measurably impact indoor air quality.

Patent Issued

2014 James Glimm, Jimmie Goode, Beiyu Lin, Nicholas Pezolano, and Svetlozar Rachev, Real Time Evaluation of Financial Returns Based on Nearly Elliptical Models. US 2014/0214722 A1 Pub.Data: Jul.31, 2014.

Honors and Awards

2019 2nd Place, 3-Minute Thesis Competition for PhD Candidates, Voiland College of Engineering & Architecture
2019 The Computer Science Department Representative to Compete Three Minutes Thesis
2014 Award for Excellent Teaching Assistant (a university-wide), Graduate & Professional Students Association, WSU
2011 Award for Outstanding Undergraduate Thesis, Shanghai Maritime University

Scholarships

2020 Student Registration Award (funded by NSF and SIGKDD) to attend KDD 2020.
2020 Professional Development Grants (funded by graduate & professional student association at WSU).
2019 Grace Hopper Celebration of Women in Computing (registration fee is funded by GHC), Orlando, FL.
2019 ACM-IMS Interdisciplinary Summit on the Foundations of Data Science (funded by NSF), SF, CA.
2019 SIAM International Conference on Data Mining (funded by Intel and an NSF grant), Alberta, Canada.
2019 Strata Data Conference (funded by O'Reilly Media), San Francisco, CA.
2019 Analytics and Data Summit (registration fee is funded by Oracle Academy), Redwood Shores, CA.
2018 Google I/O, Mountain View, CA.
2017 Google Summer of Code Mentor Summit, Sunnyvale, CA.
2017 Grace Hopper Celebration of Women in Computing (funded by Computer Science Department at WSU), Orlando, FL.
2015 The Institute for Mathematics and its Applications: Workshop for Women in Analysis and PDE, MN.
2015 Mathematical Science Research Institute: Summer School on Incompressible Fluid Flows, Berkeley, CA.

Invited Talks

09/2020 Neuroscience Research Seminar, University of Texas Rio Grande Valley
01-04/2020 Population-level behavior analysis at Shandong University of Science and Technology (China), Zhejiang University at Ningbo (China), Merrimack College, Colby College, University of Texas Rio Grande Valley, University of New Haven, Dominican University.
03/2020 Society of Women Engineers, Undergraduate Research Mixer Event, WSU.
10/2019 Guest lecture, Machine Learning and its Applications for a class at School of Economic Sciences, WSU.
03/2019 Guest lecture, Support Vector Machine for the class Introduction to Machine Learning, WSU.
03/2019 Analysis of Sensor Data Using Oracle Advanced Analytics, Analytics and Data Summit, Redwood, CA.

Teaching Experience

Summer 2019 Instructor, Program Design and Development in C, WSU (10 students)
Summer 2015 Instructor, College Algebra, WSU (over 30 students)
Fall 14, Spring 15 Instructor, Mathematics for Business and Economics, WSU (over 90 students)

Volunteer and Mentor

Fall 2018 Mentor, ACM-W (for a student from a low socioeconomic family) at WSU
Summer 2018 Instructor, Black Girls CODE, Atlanta, GA
Summer 2018 Mentor, Honeywell STEM program for High School Teachers

Technical Skills

Languages Python, Java, Kafka, SQL, C/C++, JavaScript, R, PHP, HTML/XML, Shell Scripting
Software MATLAB, Visual Studio, Eclipse
Database Schema Design, UI Design, Tooling, Deployment

Media Coverage

07/2019 Journal of Biomedical and Health Informatics: Medical Informatics
06/2019 ScienceDaily: Researchers uncover indoor pollution hazards
06/2019 WSU Insider: Researchers uncover indoor pollution hazards
06/2019 Nexus Newsfeed: Researchers uncover indoor pollution hazards
07/2015 WSU Insider: Researchers look into a future life indoors

Professional Activities

Program Committee

Web Mining and Content Analysis track at WWW, 2021
International Workshop on Big Data Reduction, IEEE International Conference on Big Data, 2020
SmartStudents'19, a workshop of IEEE International Conference on Smart Computing 2019

Reviewer

Sensors
Remote Sensing
Applied Sciences Journal from MDPI
International Conference on Human-Computer Interaction – INTERACT 2019
DataKind: Reviewer for Google AI Impact Challenge
Journal of Scientific Research and Reports (Science Domain International)
IEEE Transactions on Big Data

Publications (Citations: 35)

Journal articles

J1. Lin, B., Cook, D., Schmitter-Edgecombe, M., 2019. Using Continuous Sensor Data to Formalize a Model of In-Home Activity Patterns. Journal of Ambient Intelligence and Smart Environments.
J2. Huangfu, Y., Lima, N.M., O'Keeffe, P.T., Kirk, W.M., Lamb, B.K., Pressley, S.N., Lin, B., Cook, D.J., Walden, V.P. and Jobson, B.T., 2019. Diel variation of formaldehyde levels and other VOCs in homes driven by temperature dependent infiltration and emission rates. Building and Environment, 159, p.106153.
J3. Ghods, A., Caffrey, K., Lin, B., Fraga, K., Fritz, R., Schmitter-Edgecombe, M., Hundhausen, C. and Cook, D.J., 2018. Iterative Design of Visual Analytics for a Clinician-in-the-loop Smart Home. IEEE Journal of Biomedical and Health Informatics.
J4. Kirk, W.M., Fuchs, M., Huangfu, Y., Lima, N., O'Keeffe, P., Lin, B., Jobson, T., Pressley, S., Walden, V., Cook, D. and Lamb, B.K., 2018. Indoor air quality and wildfire smoke impacts in the Pacific Northwest. Science and Technology for the Built Environment, 24(2), pp.149-159.
J5. Lin, B., Huangfu, Y., Lima, N., Jobson, B., Kirk, M., O'Keeffe, P., Pressley, S.N., Walden, V., Lamb, B. and Cook, D.J., 2017. Analyzing the relationship between human behavior and indoor air quality. Journal of Sensor and Actuator Networks, 6(3), p.13.
J6. Sheng, Z., Lin, B., and Zhang S., 2013. Testing Unit Roots of First-Order Autoregressive Process with Stable Distributions Errors (supported by National Natural Science Foundation of China (10901100)), Chinese Journal of Applied Probability and Statistics, 2013, Vol.29(4): 443-448.

Conference Proceedings

C1. A. Musser, B. Lin, D. Cook, B. Jobson, M. Kirk, N. Lima, P. O'Keeffe, S. Pressley, V. Walden, Y. Huangfu, and B. Lamb. 2018. Indoor air toxic gases levels in a net-zero energy house under multiple ventilation system settings, the 15th Conference of the International Society of Indoor Air Quality and Climate.

C2. A. Musser, B. Lin, D. Cook, B. Jobson, M. Kirk, N. Lima, P. O'Keeffe, S. Pressley, V. Walden, Y. Huangfu, and B. Lamb, 2018. The major role of temperature on indoor concentrations of air toxic VOCs in 9 houses based on in-situ high time resolution measurements, the 15th Conference of the International Society of Indoor Air Quality and Climate.

C3. A. Musser, B. Lin, D. Cook, B. Jobson, M. Kirk, N. Lima, P. O'Keeffe, S. Pressley, V. Walden, Y. Huangfu, and B. Lamb, 2018. Simulations of indoor air quality based on future climate conditions. Conference of the International Society of Indoor Air Quality and Climate.

Posters

P1. Lin, B., 2019. “Constructing an Ecologically-Valid Formal Markovian Model of Human Activity Patterns”, General Poster Session at Grace Hopper Celebration, Orlando, FL.

P2. Lin, B., 2019. “Population Level Behavior Analysis and Its Applications in Healthcare”, Ph.D. Forum at SIAM International Conference on Data Mining Doctoral Forum, Alberta, Canada.

P3. Lin, B., 2018 .“Identifying and modeling the patterns of human activity routines”, Research Exposition at Graduate and Professional Student Association, Pullman, WA.