Arianna Bunnell

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Education

PhD in Computer Science August 2023 -*Present*
Department of Information & Computer Sciences, University of Hawai'i at Mānoa

Master's of Science in Computer Science Awarded May 2023
Department of Information & Computer Sciences, University of Hawai'i at Mānoa
Thesis Title: Early Breast Cancer Diagnosis via Breast Ultrasound and Deep Learning

Bachelor's of Science in Statistics Awarded May 2021
Department of Mathematics & Statistics, Utah State University

Bachelor's of Science in Computer Science Awarded May 2021
Department of Computer Science, Utah State University

Research Experience

Graduate Research Assistant August 2021-*Present*
Perform original research under the supervision of Dr. Peter Sadowski (Information and Computer Sciences) and Dr. John Shepherd (Cancer Epidemiology) in the Information and Computer Sciences Department at the University of Hawai'i at Mānoa. Current projects include developing deep learning algorithms to predict breast cancer risk and density from portable ultrasound machines in underserved communities.

Undergraduate Research Assistant April 2020 - July 2021
Assisted Dr. John Stevens in the Mathematics and Statistics Department at Utah State University in his research in developing an adjustment to the Stuart-Maxwell test of marginal homogeneity for ordinal classes.

Fellowships & Awards

Sarah Ann Martin ARCS Award in Information and Computer Science May 2024
I received a biannual endowed award from the Honolulu ARCS Chapter. Students are nominated by the graduate committee in their department and present their research to the ARCS Chapter members and the public as part of their award.

Google Computer Science Research Mentorship Program Fellow August 2023 - December 2023

Hawai'i Data Science Institute Fellow August 2023 - July 2024
Worked on projects related to health in Hawai'i under my faculty mentor, Dr. John Shepherd. Also led public-facing workshops about data science topics, including building a professional portfolio in data science and working with high-performance computing systems.

NIH AIM AHEAD 2023 Health Equity Data Challenge 3rd Place Winner August 2023
I led a team of graduate students in the Information & Computer Sciences and Math departments at the University of Hawai'i at Mānoa (myself, Zain Jabbar, and Armin Soltan). We developed a solution for breast cancer stage prediction from whole-slide histology imaging based on a ResNet-50 backbone.

NIH AIM AHEAD HEART Fellow/Graduate Mentor November 2022 - May 2023
Mentored two biology-focused undergraduate students in pursuing their own projects at the intersection of health equity and data science. Participated in data science training and development of seminars and online modules.

Publications

A. Bunnell, K. Hung, J. A. Shepherd and P. Sadowski. (2024). BUSClean: Open-source software for breast ultrasound image pre-processing and knowledge extraction for medical AI. *PLOS ONE*, 19(12), p.e0315434.

A. Bunnell, Y. Glaser, D. Valdez, T. Wolfgruber, A. Altamirano, C. Zamora Gonzalez, B. Y. Hernandez, P. Sadowski, J. A. Shepherd. Learning a Clinically-Relevant Concept Bottleneck for Lesion Detection in Breast Ultrasound. *International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI);* Cham: Springer Nature Switzerland, 2024.

D. Valdez, **A. Bunnell,** S. Lim, P. Sadowski, & J. A. Shepherd. (2024). Performance of progressive generations of GPT on an exam designed for certifying physicians as Certified Clinical Densitometrists. *Journal of Clinical Densitometry*, 27(2), 101480.

N. Z. Zemi*, **A. Bunnell*,** D. Valdez, & J. A. Shepherd, (2024, May). Assessing the feasibility of AI-enhanced portable ultrasound for improved early detection of breast cancer in remote areas. in *17th International Workshop on Breast Imaging (IWBI 2024)* (Vol. 13174, pp. 88-94). SPIE. *Co-first author

A. Bunnell and S. Rowe. The Effect of AI-Enhanced Breast Imaging on the Caring Radiologist-Patient Relationship. in *Pacific Symposium on Biocomputing*. 2023: Kohala Coast, Hawaii, USA, 3–7 January 2023. 2022. World Scientific.

Presentations

A. Bunnell, Y. Glaser, D. Valdez, T. Wolfgruber, A. Altamirano, C. Zamora Gonzalez, B. Y. Hernandez, P. Sadowski, J. A. Shepherd. Learning a Clinically-Relevant Concept Bottleneck for Lesion Detection in Breast Ultrasound [oral presentation]. *International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI)*. Oct 2024.

C. Kane, **A. Bunnell**, P. Sadowski and J. A. Shepherd. Customization of AI-Based Breast Cancer Risk Models for Validation in AANHPI Women [oral presentation]. *Summer Undergraduate Research Experience Symposium*. Aug 2024.

A. Bunnell, D. Cataldi, Y. Glaser, T. Wolfgruber, P. Sadowski and J. A. Shepherd. Fiducial Point Placement on Total-Body DXA Scans with Deep Learning [oral presentation]. *Biomedical Sciences & Health Disparities Symposium*. Apr 2024.

A. Bunnell, D. Valdez, F. Strand, Y. Glaser, P. Sadowski, & J. A. Shepherd. Is AI-enhanced breast ultrasound ready for breast cancer screening in low-resource environments? A systematic review [poster presentation]. *AACR Annual Meeting*. Apr 2024.

K. Hung, **A. Bunnell**, P. Sadowski and J. A. Shepherd. Annotation Parsing in Clinical, Real-World Breast Ultrasound Imaging Data [poster presentation]. *Summer Undergraduate Research Experience Symposium*. Aug 2023.

A. Bunnell , D. Valdez, T. Wolfgruber, B. Quon, L. Leong, J. Fukui, B. Hernandez, Y. Shvetsov, P.

Washington, P. Sadowski and J. A. Shepherd. Artificial Intelligence Predicts Mammographic Breast Density from Clinical Breast Ultrasound Images [oral presentation]. *10th International Breast Density & Cancer Risk Assessment Workshop*. Jun 2023.

L. Leong, T. Wolfgruber, B. Quon, **A. Bunnell**, J. Fukui, B. Hernandez, Y. Shvetsov, K. Kerlikowske and J. A. Shepherd. Image-Based Models for Predicting Advanced Breast Cancer Risk [oral presentation]. *10th International Breast Density & Cancer Risk Assessment Workshop*. Jun 2023.

A. Bunnell, D. Valdez, T. Wolfgruber, J. Fukui, P. Sadowski and J. A. Shepherd. Data Standardization of Clinical, Real-World Breast Ultrasound Imaging Data [poster presentation]. *Biomedical Sciences & Health Disparities Symposium*. Apr 2023.

A. Bunnell and S. Rowe. The Effect of AI-Enhanced Breast Imaging on the Caring Radiologist-Patient Relationship [oral presentation]. *Pacific Symposium on Biocomputing*. Jan 2023.

A. Bunnell, D. Valdez, T. Wolfgruber, B. Hernandez, P. Sadowski and J. A. Shepherd. Artificial Intelligence Detects, Classifies, and Describes Lesions in Clinical Breast Ultrasound Images [poster presentation]. *San Antonio Breast Cancer Symposium*. Dec 7, 2022.

J. Stevens and **A. Bunnell**. Extending the Stuart-Maxwell Test to Account for Ordinal Category Levels [oral presentation]. *NCCC-170 Research Advances in Agricultural Statistics Annual Meeting*. June 25, 2021.

Work Experience

Data Science Intern, Milliman May 2022 - August 2022
Designed and coded a multi-output regression deep neural network for predicting patient cost-based insurance risk scores from their diagnosis and treatment history.

Analytics Engineer Intern, Health Catalyst April 2021- July 2021
Worked on a project developing a new measure for health inequity for continuous-valued health outcomes in an inpatient facility based on the Gini coefficient. Also coded query auditing software for automated query performance and design analysis.

Mathematics & Statistics Teaching Fellow, Utah State University Jan 2019- May 2021
Supported instructor with grading, lesson planning, assessment design, and one-on-one student instruction at Utah State University. Experience in the following courses: Business Statistics, Biostatistics, Design of Experiments, Linear Regression & Time Series, and Introduction to Statistics.

Research and Operations Intern, Principal Financial Group May 2020- December 2020
Designed an internal tool for the research and deployment of investment products for the Data Science and Research Team at Principal Global Investors.

Data Science Intern, UnitedHealth Group Research & Development Jun 2019- Aug 2019
Led a team of three other interns to design and implement an algorithm in Python to predict hyperglycemic events in Type II diabetics in the Medicare population with over 89% accuracy. Presented findings at a company-wide conference.

Leadership & Service Activities

GWISH President May 2024 - *Present*
Design and host professional development events for the Graduate Women in Science Hawaii (GWISH)

organization as well as manage all official communications and activities of the organization. Professional development coordinator was absorbed into this position in Spring 2024.

Undergraduate Mentorship May 2023 - *Present*
I have had the opportunity to mentor several undergraduate students in computer science in the completion of independent research projects, typically over the summer semester. Past mentees: Kailee Hung (May 2023 - May 2024) BS in CS in May 2024; Cade Kane (May 2024 - August 2024) BS in CS in May 2025.

Graduate Student Community Engagement Co-Chair August 2023 - *Present*
My co-chair Linnea Wolniewicz and I regularly apply for university grants (more than $3,000 awarded to date) to organize weekly Coffee Hours for graduate students and faculty to foster community within the Information and Computer Science department at UH Manoa. We also organize and maintain a communal space for graduate students to engage with each other.

Sci-MI Computer Science Program Director April 2023 - November 2023
Manage a team of ≈25 undergraduate and graduate instructors in creating content for a summer program mentoring underrepresented high school students. Mentor high school students one-on-one in computational neuroscience- and computer science-focused research projects with the goal of getting them prepared for careers in science and college applications. Also composed and presented lecture content relating to deep learning and data visualisation in the sciences.

GWISH Professional Development Coordinator May 2023 - May 2024
Design and host professional development events for the Graduate Women in Science Hawaii (GWISH) organization. Activities are designed to support graduate women in STEM as they progress through their graduate career. Development themes include: Conference Conqueror (Fall 2023 focused on networking and presentation skills; Spring 2024 focused on mentorship).

Volunteer Data Analytics Consultant Sept 2019-July 2021
Performed data analytics on behalf of the Student Nutrition Access Center (SNAC) pantry (a free on-campus food pantry for students and dependents) to prove their contribution to the Utah State University community. This report resulted in the creation of a university-funded full-time position to staff the SNAC pantry.

Data Science Club President Jun 2020- May 2021
President of the Utah State University Data Science Club. Responsible for organizing biweekly meetings, providing members with professional speakers, and assisting members with personal data science projects.

Food Recovery Network Volunteer Jan 2019- May 2020
Sorted, logged and collected food from dining locations around campus for students to obtain in the Student Nutrition Access Center on-campus food pantry for students and dependents.