KATHERINE BROWN

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EDUCATION AND TRAINING

Tennessee Technological University *August 2018 - July 2023*
PhD in Engineering (Computer Science)
Dissertation Title: *Evaluating, Explaining, and Utilizing Model Uncertainty in High-Performing, Opaque Machine Learning Models*
Advisor: Dr. Doug Talbert

Tennessee Technological University *August 2018 - May 2021*
Master's of Computer Science
Area of Emphasis: Artificial Intelligence
Cumulative GPA: 4.0/4.0
Advisor: Dr. Doug Talbert

Tennessee Technological University *August 2014 - May 2018*
Bachelor's of Computer Science
Concentration: Data Science
Cumulative GPA: 3.96/4.0
Member of Kappa Mu Epsilon
Summa Cum Laude

SKILLS

Programming: Python, R, Java, C++, NoSQL, MySQL, PostgreSQL
Software & Tools: Scikit-Learn, Keras, PyTorch, Pandas, SciPy, Numpy, Git, Weka, Splunk, Splunk ITSI

PROFESSIONAL EXPERIENCE

Postdoctoral Research Fellow Trainee (T15 Grant) *August 2023 - Present*
Vanderbilt University Medical Center, Nashville, TN
- Funded through National Library of Medicine.
- Perform research in biomedical and clinical informatics.
- Develop computational solutions to research tasks.
- Write and present scholarly works.

Graduate Research Assistant (Machine Learning Research Consulting) *August 2022 - May 2023*
Tennessee Technological University, Cookeville, TN
- Developed and piloted a research consulting service for Tennessee Technological University.
- Includes one-on-one consultation appointments with researchers from multiple engineering and science disciplines, development of machine learning resources, and delivery of informative seminars.

PhD Student Research Mentor *August 2022 - July 2023*
Tennessee Technological University, Cookeville, TN
- Mentor to an undergraduate research team performing research on computerized trauma triage.
- Cleaned and processed the National Trauma Data Bank for machine learning use.
- Helped supervise development of machine learning tools.

Graduate Teaching Assistant *August 2021 - May 2022*
Tennessee Technological University, Cookeville, TN
- Instructor of record for a sophomore undergraduate course on algorithm analysis and algorithm design techniques.
- Delivered lectures, prepared and graded written and programming assignments and exams.

Graduate Research Assistant *August 2018 - May 2021*
Tennessee Technological University, Cookeville, TN
- Design experiments in the areas of Artificial Intelligence, Machine Learning, and Healthcare Informatics.
- Develop computational solutions to research tasks.
- Write and present scholarly works.

Adjunct Instructor *Summer 2019 & 2020*

Tennessee Technological University, Cookeville, TN

– Taught sophomore-level introduction to theoretical computer science course during a full-term summer semester.
– Developed and administered an online, undergraduate algorithms course
– Course introduces sophomore undergraduates to algorithm analysis and algorithm design techniques.
– Recorded lectures, prepared and graded written and programming assignments and exams.

Undergraduate Research Assistant *March 2016 - May 2018*

Tennessee Technological University, Cookeville, TN

– Conducted research in machine learning and healthcare informatics.
– Co-authored scholarly works.
– Programmed solutions to various research problems.

Research Intern *June 2017 - August 2017*

Oak Ridge National Laboratory, Oak Ridge, TN

– Participant in the Higher Education Research Experience (HERE) Program within the Biomedical Computing Division.
– Developed a bioinformatics machine learning application with Python and Sci-Kit Learn

Undergraduate Teaching Assistant *August 2015 - December 2016*

Tennessee Technological University, Cookeville, TN

– Evaluated quizzes, exams, and assignments in various Computer Science courses.
– Tutored students.
– Assisted in designing and administering laboratories.

PUBLICATIONS AND PRESENTATIONS

Conference Publications

1. **Brown KE**, Talbert S, Talbert DA. "A QUEST for Model Assessment: Identifying Difficult Subgroups via Epistemic Uncertainty Quantification." To appear in *Proceedings of the American Medical Informatics Association Annual Symposium*, 2023.

2. Phillips KL, **Brown KE**, Talbert S, Talbert DA. "Group Bias and the Complexity/Accuracy Tradeoff in Machine Learning-Based Trauma Triage Models." *Proceedings of the Florida Artificial Intelligence Research Society (FLAIRS-36)*, 2023.

3. Gannod M, Masto N, Owusu C, Highway C, **Brown KE**, Blake-Bradshaw A, Feddersen JC, Hagy HM, Talbert DA, Cohen B. "Semantic Segmentation with Multispectral Satellite Images of Waterfowl Habitat." To appear in *Proceedings of the Florida Artificial Intelligence Research Society (FLAIRS-36)*, 2023.

4. **Brown KE**, Talbert DA. "A Simple, Direct Uncertainty Quantification Technique Based on Machine Learning Regression". *Proceedings of the Florida Artificial Intelligence Research Society (FLAIRS-35)*, 2022.

5. **Brown KE**, Talbert DA. "Using Explainable AI to Measure Feature Contribution to Uncertainty". *Proceedings of the Florida Artificial Intelligence Research Society (FLAIRS-35)*, 2022.

6. **Brown KE**, Talbert DA, Talbert, S. "The Uncertainty of Counterfactuals". *Proceedings of the Florida Artificial Intelligence Research Society (FLAIRS-34)*, 2021.

7. **Brown KE**, Bhuiyan F, Talbert DA. "Uncertainty Quantification in Multimodal Ensembles of Deep Learners". *Proceedings of the Florida Artificial Intelligence Research Society (FLAIRS-33)*, 2020. **(Winner: Best Student Paper Award)**

8. Bhuiyan F, **Brown KE**, Sharif B, Johnson Q, Talbert DA. "Assessing Modality Selection Heuristics to Improve Multimodal Machine Learning for Malware Detection". *Proceedings of the Florida Artificial Intelligence Research Society (FLAIRS-33)*, 2020.

9. **Brown KE**, Talbert DA."Heuristically Reducing the Cost of Correlation-Based Feature Selection". *Proceedings of the Association of Computing Machinery Southeast Conference*, 2019. **(Runner-Up: Best Paper Award)**

Invited Talks

1. Talbert DA, **Brown KE**. "Explainability and Medical AI." Vanderbilt University Department of Biomedical Informatics. January 13, 2022.

Abstracts and Poster Demonstrations

1. **Brown KE**, Talbert S, Talbert DA. "Assessing the Quality of Uncertainty Calibration." To appear in *Proceedings of the American Medical Informatics Association Annual Symposium*, 2023.
2. **Brown KE**, Talbert DA. "Estimating Uncertainty in Deep Image Classification." *Proceedings of the American Medical Informatics Association Annual Symposium*, 2019.
3. **Brown KE**, Talbert DA. "Multi-Task Correlation-Based Feature Selection for Gene Expression Data." *Proceedings of the American Medical Informatics Association Annual Symposium*, 2018.

AWARDS

- **Best Student Paper Award**: Florida Artificial Intelligence Research Symposium, May 2020.
- **Runner-up Best Paper Award**: Association of Computing Machinery 2019 Southeast Conference, April 2019
- **Research and Creative Inquiry Award Winner (TIE)**: Tennessee Technological University, April 2019
- **Research and Creative Inquiry Award Winner**: Tennessee Technological University, April 2018
- **Engineering, Computing, and Technology Spectrum Award**: Tennessee Technological University College of Engineering, February 2018

LEADERSHIP & SERVICE

Track Co-Chair (Artificial Intelligence in Health Informatics Special Track) *September 2023 - Present*
Florida Artificial Intelligence Research Society

- Organize and perform peer review of papers submitted to the Artificial Intelligence in Health Informatics Special Track of the FLAIRS annual conference.

College of Engineering Graduate Studies Executive Committee – Graduate Student Representative *August 2022 - May 2023*
Tennessee Technological University, Cookeville, TN

- Represented engineering graduate students college-level policy and catalog revisions and updates.

***JAMIA* Student Editorial Board – Member** *January 2022 - December 2023*
Journal of the American Medical Informatics Association

- Reviewed submitted articles for the *Journal of the American Medical Informatics Associates* under the mentorship of the associate editors of the journal.
- Will moderate two *JAMIA* Journal Club Seminars for calendary year 2023.

Data Science League — Co-founder and Student Officer *September 2018 - May 2022*
Tennessee Technological University, Cookeville, TN

- President (January 2018 - August 2018; August 2020 - May 2022)
- Vice President (August 2018 - August 2020)
- Co-Founder and Charter Member

Computer Science Graduate Student Club — Officer *September 2019 - September 2021*
Tennessee Technological University, Cookeville, TN

- Vice President (August 2020 - September 2021) Managed meeting logistics and served as acting president and moderator when necessary
- Treasurer (September 2019 - May 2020) Managed funds and procured university funding for the Computer Science Graduate Student Club

Department of Computer Science Student Advisory Council — Member *September 2018 - September 2021*
Tennessee Technological University, Cookeville, TN

- Represented graduate and data science students in department-wide administrative meetings.

Tennessee Tech ACM-W Chapter — Student Officer *August 2015 - May 2019*
Tennessee Technological University, Cookeville, TN

- Student Mentor (August 2018 - May 2019): Served as mentor to newly-elected officers.
- President (August 2016 - May 2018): Administered local chapter including organizing and conducting meetings
- Vice President (August 2015 - May 2016): Managed meeting logistics and served as acting president when necessary