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EDUCATION	<ul style="list-style-type: none"> <li> <b>University of Tennessee</b>, Knoxville, TN 2022–2027 (expected)           <ul style="list-style-type: none"> <li>Ph.D in <a href="#">Data Science Engineering</a></li> <li>GPA: <b>4.0/4.0</b></li> </ul> </li> <li> <b>Juniata College</b>, Huntingdon, PA 2018–2022           <ul style="list-style-type: none"> <li>B.S. in <a href="#">Economics</a>, Minors in <a href="#">Mathematics</a>, <a href="#">Data Science</a>, and <a href="#">German Studies</a></li> <li>GPA: <b>3.92/4</b></li> </ul> </li> </ul>	
TECHNICAL SKILLS	<ul style="list-style-type: none"> <li><i>Programming Languages</i>: Python, Rstudio, SQL, Unix</li> <li><i>Languages</i>: German (<i>Full Professional Proficiency</i>)</li> <li><i>Data Analysis Skills</i>: Neural Networks, Large Language Models, Computer Vision, Random Forest, Support Vector Classifier, Linear Regression, Logistic Regression</li> </ul>	
RESEARCH EXPERIENCE	<ul style="list-style-type: none"> <li> <b>Graduate Research Assistant</b> August 2022 - present            Oak Ridge National Laboratory            Implementations for the projects below were done with Unix and Python, and R.           <ul style="list-style-type: none"> <li>Utilized deep learning and computer vision algorithms to develop and artificial intelligence model for <i>T. arvense</i> segmentation</li> <li>Developed frameworks for using LLMs in a biology-specific context by utilizing fine-tuning, RAG, and graph encoding methods.</li> <li>Implemented transformer-based architectures to predict binding site behavior from protein sequence and structure information</li> <li>Developed transformer-based architectures to predict plant phenotype outputs given a sequence of SNPs.</li> </ul> </li> <li> <b>Post-Undergraduate Research Assistant</b> June 2022 - August 2022            Wright Lab, Juniata College            Implementations for the project below were done with Python.           <ul style="list-style-type: none"> <li>Created multiple machine learning and deep learning models to classify samples and CDI positive or negative given microbiome inputs</li> <li>Created a support vector classifier that achieved up to 85% accuracy on CDI datasets</li> <li>Created a random forest that achieved up to 83% accuracy on CDI datasets</li> <li>created an artificial neural network that achieved up to 83% accuracy on CDI datasets</li> <li>Wrote modeling methods and results document for use in a National Health Institute grant application</li> <li>Presented findings at the Landmark Summer Research Conference</li> </ul> </li> <li> <b>Big Data REU Assistant</b> County            Implementations for the project below were done with Unix and Python.           <ul style="list-style-type: none"> <li>Worked with a team of five students, two mentors, and one external collaborator to develop five Neural Network AI models to forecast Arctic sea ice extent and sea ice concentration.</li> <li>Employed Convolutional Neural Network, Convolutional LSTM, and Multi-Task AI techniques.</li> <li>Developed weekly presentations detailing our progress and presented them to fellow researchers.</li> <li>Presented findings to members of UMBC's faculty and other students in a final presentation.</li> <li>Findings were published in the IEEE Big Data Conference.</li> </ul> </li> <li> <b>Undergraduate Research Assistant</b> December 2020 - June 2022            Wright Lab, Juniata College            Implementations for the project below were done with Rstudio and Python.           <ul style="list-style-type: none"> <li>Researched the mathematics behind neural networks and created a presentation for the Mathematical Association of America Allegheny Sectional detailing their process.</li> <li>Created a neural network that classified areas that had been sanitized using anti-pathogen technology with up to 90% accuracy.</li> </ul> </li> </ul>	

- Created a neural network classifying whether water samples were taken upstream or downstream from hydraulic fracturing sites with up to 94% accuracy.
- Worked with another student to create an AI classifying human dietary patterns with up to 87% accuracy.
- Created a seminar presentation in order to teach co-workers how to apply deep learning and AI technology to their own biological datasets.

• **Undergraduate Research Assistant** Summer 2020  
Juniata College

- Tested the genetic variation within Woodrat populations in Central Pennsylvania.
- Created mechanisms to collect Woodrat DNA and photograph Woodrats.
- Traveled to multiple locations in Central Pennsylvania to place and check DNA collection mechanisms.
- Gathered water samples to test for the presence of cyanobacteria in wetlands in Central Pennsylvania.
- Constructed educational videos detailing numerous Environmental Science subjects.

PRESENTATIONS

• **AI Methods for High-Throughput Pennycress Seedpod Phenotyping** August, 2024  
*International Pennycress Resilience Project Annual Meeting*

- Presented deep learning and computer vision methods to Pennycress seed pod phenotypes.

• **Systems Biology for Cover Crops: New Horizons for CBI** June, 2024  
*Center for Bioenergy Innovation Annual Science Meeting*

- Detailed the benefits of incorporating cover crops into the CBI feedstock portfolio.

• **Image Segmentation for Plant Phenotyping with Very Few Samples** September 6, 2023  
*ORNL Artificial Intelligence Expo*

- Presented methods for using transfer learning to extract phenotypes from multiple plant species using the same neural network architecture.

• **Modeling Methods for Microbiome Data** July 20, 2022  
*Landmark Conference Summer Research Symposium*

- Explained the theory and practice behind applying various machine learning models, such as support vector machines, random forests, and artificial neural networks, to microbiome data.

• **Liberal Arts Symposium** April 21, 2022  
*Juniata College*

- Explained the theory and practice behind applying generative deep learning models, specifically Variational Autoencoders and Generative Adversarial Networks, to microbiome data.

• **Generative Learning for Microbiome Data** April 1, 2022  
*MAA Allegheny Sectional*

- Explained the mathematical concepts behind how generative deep learning works.
- Examined specific generative deep learning architectures, including Variational Autoencoders and Generative Adversarial Networks.

• **Deep Learning for Biological Data** November 13, 2021  
*Allegheny Branch of the American Society of Microbiology*

- Detailed the applications and drawbacks of using deep learning techniques on microbiological data
- Won "best undergraduate presentation" at the conference.

• **Mathematics Colloquium** October 28, 2021  
*Juniata College*

- Presented the process and results of my REU experience.
- Used my experience to give younger students tips on finding research positions in the future.

• **Introduction to Deep Learning for Microbiological Data** August 15, 2021  
*Contamination Source Identification*

- Introduced the concepts behind deep learning to Microbiologists.

- Explained how and when to apply deep learning models to microbiome datasets using Python and R code examples.
- **Multi-Task Deep Learning Based Spatiotemporal Arctic Sea Ice Forecasting** July 31, 2021  
*University of Maryland, Baltimore County*
  - Worked with a group to present the findings from our REU experience, where we developed novel deep learning techniques to forecast Arctic sea ice extent and concentration.
- **Liberal Arts Symposium** May 13, 2021  
*Juniata College*
  - Presented the results of my neural network research, which involved creating a deep learning classifier to distinguish between sanitized and un-sanitized microbial samples from hospital surfaces.
- **Introduction to Neural Networks** April 9, 2021  
*MAA Allegheny Sectional*
  - Explained the mathematical concepts behind neural networks, including their architecture, training, evaluation, and predictive processes.
  - Discussed applications for neural networks, including image recognition and time series prediction.

#### SELECTED PUBLICATIONS

1. **Eliot Kim, Peter Kruse, Skylar Lama, Jamal Bourne Jr., Michael Hu, Sahara Ali, Yiyi Huang, and Jianwu Wang.** “Multi-Task Deep Learning Based Spatiotemporal Arctic Sea Ice Forecasting.” *IEEE Big Data Conference*, 2021.
2. **Andrew Yeich, Peter Kruse, Kristen Park, and Timothy J. Craig.** “Consistency of Hereditary Angiodema Care Across Demographic Subgroups.” *The Journal of Allergy and Clinical Immunology*, 2023.
3. **Regina Lamendella, Jeremy R. Chen See, Jillian Leister, Justin R. Wright, Peter I. Kruse, Mohini V. Khedekar, Catharine E. Besch, Carol A. Kumamoto, Gregory R. Madden, and David B. Stewart.** “Clostridioides difficile Infection is Associated with Differences in Transcriptionally Active Microbial Communities” *Frontiers in Microbiology*, 2024.
4. **Eric O Johnson, Heidi S Fisher, Kyle A Sullivan, Olivia Corradin, Sandra Sanchez-Roige, Nathan C Gaddis, Yasmine N Sami, Alice Townsend, Erica Teixeira Prates, Mirko Pavicic, Peter Kruse, Elissa J Chesler, Abraham A Palmer, Vanessa Troiani, Jason A Bubier, Daniel A Jacobson, and Brion S Maher.** “An Emerging Multi-Omic Understanding of the Genetics of Opioid Addiction.” *Journal of Clinical Investigation*, 2024.
5. **Kyle Sullivan, J Izaak Miller, David Kainer, Matthew Lane, Mikaela Cashman, Michael R Garvin, Alice Townsend, Peter Kruse, Bryan C Quach, Caryn Willis, Ke Xu, Bradley E Aouzierat, Eric O Johnson, Dana B Hancock, and Daniel Jacobson** “Network Biology Algorithms Identify Biological Pathways Underlying Cigarette Smoking Behaviors.” *European Neuropsychopharmacology*, 2023.

#### HONORS AND AWARDS

- ***Tickle College of Engineering Fellowship*** University of Tennessee Fall 2022 - present
- ***Leonard J. Fuoss Scholarship*** Juniata College 2020
- ***Tau Pi Phi Business Honors Society*** Juniata College 2020