Matthew I. Swindall | AI/ML Researcher

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Professional Profile

Accomplished AI and Machine Learning researcher with a background in physics and astronomy. My research focuses on interdisciplinary applications of AI and Machine Learning that bridge the gap between state-of-the-art technology and ancient literary texts, specifically for the field of papyrology. A primary focus of my research is the development of image datasets for machine learning through crowdsourcing, and the application of deep learning models to such datasets. My work includes the creation of a dataset containing over 400,000 individual characters images from ancient Greek manuscripts utilizing crowdsourced annotations. I have been published and presented at international conferences and journals and am seeking to broaden my research experience in a research position.

Core Skills

- Deep Learning
- Tensorflow & Keras
- Computer Vision
- Parallel Processing
- Statistics
- Chemistry
- Angular
- Machine Learning
- Python, C++, Javascript, SQL
- Cloud Computing (GCP, AWS)
- Advanced Calculus
- Physics
- Micro-Controllers
- Robotics
- Neural Networks
- Unix/Linux, Bash
- Cluster Computing
- Linear Algebra
- Astronomy
- Micro-Computers
- STEM Education

Education

➢ PhD in Computational & Data Science	Middle Tennessee State University
➢ Master of Science in Computer Science	Middle Tennessee State University
➢ Bachelor of Science in Physics	Middle Tennessee State University
➢ Associate of Science in Physics	Columbia State Community College

Publications

- **Crowdsourcing Image Datasets: An Examination of Ground-Truth in Labeling, Text Segmentation, & Sampling Bias.** Matthew Swindall. In the Tenth AAAI Conference on Human Computation and Crowdsourcing Doctoral Consortium, 2022
- **Dataset Augmentation in Papyrology with Generative Models: A Study of Synthetic Ancient Greek Character Images**. Matthew Swindall, Timothy Player, Ben Keener, Alex C. Williams, James H. Brusuelas, Federica Nicolardi, Marzia D'Angelo, Claudio Vergara, Michael McOsker, John F. Wallin. In 2022 Proceedings of the Thirty-First International Joint Conference on Artificial Intelligence, pages 4948-4954. IJCAI, 2022.
- **Exploring learning approaches for ancient Greek character recognition with citizen science data.** Matthew I. Swindall, Gregory Croisdale, Chase C. Hunter, Ben Keener, Alex C. Williams, James H. Brusuelas, Nita Krevans, Melissa Sellew, Lucy Fortson, and John F. Wallin. In 2021 17th International Conference on eScience (eScience), pages 128– 137. IEEE, 2021.

Conferences & Talks

- AWS Human-in-the-Loop Science Summer Seminar Series – Virtual – "Understanding Ancient Manuscripts Using Crowd-sourcing and Data Science", August, 2023
- Alpha, Aleph, and AI: Languages of the Ancient Mediterranean and Near East – Bristol, Uk – "A.I.-Assisted Papyrology: Integrating Deep Learning into the Scholarly Workflow", June, 2023
- Tenth AAAI Conference on Human Computation and Crowdsourcing Doctoral Consortium – Virtual – "Crowdsourcing Image Datasets: An Examination of Ground-Truth in Labeling, Text Segmentation, & Sampling Bias", November, 2022
- American Mathematical Society, Special Session on Methods and Applications in Data Science – El Paso, Texas – "Crowd-sourced Datasets and Deep Learning", September, 2022.
- International Joint Conference on Artificial Intelligence (IJCAI) 2022 – Vienna, Austria – "Dataset Augmentation in Papyrology with Generative Models: A Study of Synthetic Ancient Greek Character Images", July, 2022.
- IEEE eScience 2021 – Innsbruck, Austria (virtual) – "Exploring Learning Approaches for Ancient Greek Character Recognition with Citizen Science Data", September, 2021.
- MSTU Scholars Day 2022 – Murfreesboro, TN – "Dataset Augmentation in Papyrology with Generative Models: A Study of Synthetic Ancient Greek Character Images"

Internships & Honors

- La Serena School for Data Science Class of 2021 - NFS and CMM/UChile funded Data Science for Astronomy Program in partnership with NOIRLab/AURA-O.
- MTeach Summer Internship 2016 – STEM teaching internship in partnership with the Discovery Center at Murfree Spring.

Career Summary

2019 – Present **Middle Tennessee State University** **Graduate Assistant**

Manage various computational projects. Components include microcontrollers (Arduino), microcomputers (Raspberry Pi, Jetson Nano), electrical circuits, robotics, coding, computer vision, object recognition, 3D printing, laser etching/cutting, and augmented/virtual reality.

Key Responsibilities

- Design & Prototype STEM demonstrations and institutional hardware/software tools
- Equipment, inventory, and network maintenance
- Equipment training and technology coaching
- Guide students in project-based learning
- Curation of exhibits

Key Achievements

- Designed & curated numerous STEM exhibits including a Lego block sorting robot, a Bluetooth enabled LED text sign with Android app, and a real-time object detection/segmentation exhibit.

2015 – 2016 **Middle Tennessee State University** **Physics & Astronomy Tutor**

Tutored students in departmental courses.

Key Responsibilities

- Tutored Physics Students
- Tutored Astronomy Students
- Assisted other departments when necessary

Key Achievements

- Tutored numerous students in my expertise areas, as well as advanced mathematics, chemistry, and engineering.

2006 – 2013 **First Tennessee Bank** **Teller III**

Award winning bank teller and trainer with extensive branch operations experience.

Key Responsibilities

- AML/BSA Compliance
- Staff training
- Foreign Exchange
- Vault & ATM control and maintenance
- Account Management
- Branch auditing

Key Achievements

- Numerous awards including the FTB Presidents Award
- Managed Operations of a single-person satellite branch in addition to main-branch duties.