Sean Wu

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Education

Pepperdine University
B.S in Computer Science/Mathematics GPA:4.0/4.0 2021–2025
Minor in Data Science GPA: 4.0/4.0

Research Interests

Generative Deep Learning, 2D to 3D Reconstruction, Medical Image Analysis, One-Shot Learning

Honors and Awards

- CRA Outstanding Undergraduate Researcher Award Honorable Mention 2024
- Barry Goldwater Scholarship Winner 2023
- Northrop Grumman Endowed Computer Science Scholarship 2023
- Amazon SURE Research Fellow 2023
- Blanche E. Seaver Faculty-Staff Scholarship 2023
- Alteryx Datathon Finalist 2023
- Pepperdine Natural Science Scholarship 2022–2023
- Pepperdine Keck Scholars Data Science Research Fellowship 2022–2023
- Pepperdine Academic Grant 2021–2023
- Pepperdine Deans List (Top 10% of Class) 2021–2023

Research Experience

W.M Keck Undergraduate Researcher
Research Advisor: Professor Fabien Scalzo April 2022-Present

- Developed a novel technique for accurate 3D brain blood vessel reconstruction from 2D angiographic images, reducing X-ray radiation exposure.
- Deployed conditional generative adversarial network (C-GAN) to synthesize novel angiogram views for 3D reconstruction.

UCLA Glaucoma Artificial Intelligence Researcher
Research Advisor: Professor Kouros Nouri-Mahdavi April 2022-Present

- Utilized 3D convolutional neural networks to predict threshold sensitivity values from OCT data.
- Deployed a deep survival analysis algorithm to accurately predict the time to progression of patients with glaucoma.
- Created deep learning models for semantic segmentation of the iris and contour of the eye using U-Net with a ResNet backbone.

UCLA Natural Language Processing Researcher
Research Advisor: Professor Ira B. Kurtz April 2023-

– Trained large language models from the Facebook LLama foundation on the dataset I synthesized consisting of over 75k training examples.
– Created algorithms to benchmark open-sourced large language models and proprietary models in their ability to answer clinically relevant questions in nephrology.

Columbia University Research Fellow in Applied Mathematics and Physics
Research Advisor: Professor Simon Billinge Summer 2023

– Developed a Python-based solution with a pre-computed distance list database to streamline crystallography's inverse problem, enhancing efficiency for computational material scientists and machine learning applications.
– Apart of NSF funded research titled Complex Nanofeatures in Crystals: Theory and Experiment Meet in the Cloud

Undergraduate Researcher in Data Structures
Research Advisor: Professor Stanley J. Warford January 2022-May 2022

– Theoretical research for manipulating general n-way trees, leveraging the Composite State Design Pattern to define child relationships.

Publications

[1] V. Mohammadzadeh, **S. Wu**, T. Davis, K. Vepa Arvind Edalati, J. Martinyan, A. Martinyan, M. Rafiee, J. Scalzo Fabien Caprioli, and Nouri-Mahdavi, "Prediction of visual field progression based on baseline and longitudinal structural measurements with a deep learning model", *American Journal of Ophthalmology*, (Revisions) 2024.

[2] V. Mohammadzadeh, A. Vepa, C. Li, **S. Wu**, L. Chew, G. Mahmoudinezhad, E. Maltz, S. Sahin, A. Mylavarapu, K. Edalati, *et al.*, "Prediction of central visual field measures from macular oct volume scans with deep learning", *Translational Vision Science & Technology*, vol. 12, no. 11, pp. 5–5, 2023.

[3] V. Mohammadzadeh, **S. Wu**, T. Davis, A. Vepa, E. Morales, S. Besharati, K. Edalati, J. Martinyan, M. Rafiee, A. Martynian, *et al.*, "Prediction of visual field progression with serial optic disc photographs using deep learning", *British Journal of Ophthalmology*, 2023.

[4] Z. Mossing, **S. Wu**, K. Hong, F. Scalzo, and E. S. Cha, "Foil-net: Deep wave classification for hydrofoil surfing", in *International Symposium on Visual Computing*, Springer, 2023, pp. 109–120.

[5] **S. Wu**, N. Kaneko, S. Mendoza, D. S. Liebeskind, and F. Scalzo, "3d reconstruction from 2d cerebral angiograms as a volumetric denoising problem", in *International Symposium on Visual Computing*, Springer, 2023, pp. 382–393.

[6] **S. Wu**, M. Koo, L. Blum, A. Black, Z. Fei, F. Scalzo, and I. Kurtz, "A comparative study of open-source large language models, gpt-4 and claude 2: Multiple-choice test taking in nephrology", *New England Journal of Medicine Artificial Intelligence*, vol. 1, 2023.

[7] **S. Wu**, V. Mohammadzadeh, J. Y. Chen, Z. Fei, T. Davis, K. Nouri-Mahdavi, J. Caprioli, and F. Scalzo, "Denoising visual field data via self-supervised masked autoencoders for enhanced glaucoma progression detection", *Pending Submission to Nature Scientific Reports*, 2023.

[8] **S. Wu**, V. Mohammadzadeh, K. Edalati, J. Martinyan, A. Martinyan, J. Caprioli, K. Nouri-Mahdavi, and F. Scalzo, "Auxiliary-domain learning for a functional prediction of glaucoma progression", in *International Workshop on Ophthalmic Medical Image Analysis*, Springer, 2023, pp. 21–31.

[9] **S. Wu**, R. A. Dabagh, A. L. Jacobsen, H. I. Holmlund, and F. Scalzo, "Deep learning-based classification of plant xylem tissue from light micrographs", in *International Symposium on Visual Computing*, Springer, 2022, pp. 237–248.

*See a full list of publications on **Google Scholar**

Selected Conference Presentations

- **Prediction of Functional Glaucoma Progression Combining Baseline Clinical and Structural Data with a Deep Learning Model** 2024
  Oral presentation at the American Glaucoma Society Annual Meeting
- **Prediction of the Final Visual Fields from Earlier Visual Field Data with Artificial Intelligence** 2023
  Poster presentation at American Academy of Ophthalmology Annual Meeting
- **Prediction of Glaucoma Progression from Initial Visual Field Data with Deep Learning Survival Analysis** 2023
  Poster presentation at the American Academy of Ophthalmology Annual Meeting
- **A Multimodal Approach for Predicting Glaucoma Progression with Artificial Intelligence** 2023
  Poster presentation at the American Academy of Ophthalmology Annual Meeting
- **Using Artificial Intelligence for Evaluating Structural Eyelid Change Following Muller's Muscle Conjunctival Resection** 2023
  Poster presentation American Society of Ophthalmic Plastic and Reconstructive Surgery Annual Meeting
- **Interatomic Distance List Database and Deep Learning for Ab Initio Structure Solution From PDF Data** 2023
  Poster presentation Amazon-Columbia Summer Research Symposium
- **Deep Learning Classification, Segmentation, and Diameter Measurements of Cell Types in Xylem Tissue** 2023
  Poster presentation Ecological Society of America Annual Meeting
- **Constructing an N-Way Tree** 2023
  Poster presentation at Southern California Conference for Undergraduate Research (SCCUR)

Teaching and Service

- **Teaching Assistant and Grader** Fall 2023-
  Applied Machine Learning/Data Science (COSC 220)
  Introduction to Machine Learning (COSC 210)
  Data Structures (COSC 320)
  Programming Paradigms (COSC 450)
- **University Tutor** Fall 2022-
  Artificial Intelligence (COSC 200, 210, 220)
  Computer Networks (COSC 475)
  Data Structures (COSC 320)
  Automota Theory (Math 365)
  Discrete Math (Math 221)

Skills

Packages: Python, C++, Java, Racket, Prolog
Computational Software: PyTorch, TensorFlow, Keras, Scikit-learn, Pandas, OpenCV, Numpy