TALHA MAHMOOD

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EDUCATION

Bachelor of Computer Science, University of Delaware — Expected Spring 2025
GPA **3.99**
Concentration **AI & Robotics**
Minor **Mathematics**

PhD in Computer Science, University of Delaware — Starting Fall 2025
Research Focus: Deep Learning Applications in Sciences

RESEARCH INTEREST

I am interested in Machine Learning, Computer Vision, Multi-Modal AI, and NLP with applications across sciences, and other real-world challenges.

PUBLICATIONS

1st Author, *Unveiling Hidden Meadows: Seagrass Classification Using Multispectral Imaging*, Manuscript in preparation; available upon request.

EXPERIENCE

Research Assistant at Cybersecurity and AI for Sciences Lab — May 2024 - Present
University of Delaware — *Newark, DE*

- Developed a multi-class image segmentation model for coastal marine ecosystems using multi-spectral data, fine-tuning Vision Transformers (ViTs) and U-Net architectures to improve prediction accuracy from 30% to 93
- Designed preprocessing pipelines to address labeling inconsistencies and class imbalance in a limited dataset, enabling robust model training and generalization for critical marine classes (e.g., seagrass, coral).
- Delivered state-of-the-art results in environmental AI by resolving challenges unique to small datasets, directly contributing to scalable solutions for marine ecosystem monitoring and conservation.

Summer Scholar — June 2024 - August 2024
University of Delaware — *Newark, DE*

- Developed and evaluated the MMST-ViT model for county-level soybean yield prediction using multi-modal data (Sentinel-2 imagery, WRF-HRRR weather parameters, and USDA crop data), achieving state-of-the-art performance (RMSE: 5.72, R^2: 0.99, correlation: 1.0).
- Optimized model hyperparameters through systematic testing of activation functions and optimizers, identifying AdamW as the top-performing optimizer, which reduced prediction error by 27% compared to baseline methods.
- Enhanced agricultural decision-making by integrating spatial-temporal dependencies and climate-aware features, enabling precise yield forecasts under seasonal weather variability and long-term climate impacts, with plans to scale the framework to diverse crops via the CropNet dataset.

Undergraduate Teaching Assistant — Fall 2022 – Present
University of Delaware — *Newark, DE*

- Assisted in courses including **Automata Theory, Data Structures, General Computer Science for Engineers, Intro to Computer Science I**, and **Mobile Robot Programming** by holding office hours, grading assignments, and helping students understand challenging topics.
- Provided one-on-one mentorship in algorithms and software design, tailoring explanations to individual needs and fostering an inclusive learning environment for both standard and honors sections.

PRESENTATIONS

Presented my work on multi-class image segmentation for coral reef ecosystems using Vision Transformers and U-Net in the Intro to Machine Learning course. (December 2024)

Presented research poster Multi-Modal Spatial-Temporal Vision Transformer for Crop Yield Prediction at *Symposium For Undergraduate Research And Creative Activity*, showcasing optimization techniques and model performance analysis (August 2024)

Presented research on Towards Interpretable Machine Learning for U.S. Hospitals' CMS Rankings at the *Data Science Institute's (DSI) Symposium* (September 2023)

HONORS & AWARDS

Received *Most Impactful Project Award* at Data Science Institute Symposium for innovative application of machine learning to healthcare quality assessment

SKILLS

Languages	Python, C++, C, Java
Frameworks	PyTorch, OpenCV, TensorFlow, NumPY, Pandas

RELATED COURSES

Intro to Machine Learning, Intro to AI, Intro to Computer Vision, Machine Learning for Time Series Analysis