VAN PHAN

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Education

Georgia State University, Atlanta, GA — Expected Graduation: *May. 2027*

B.S. Mathematics, GPA: 4.18/4.30

Relevant Coursework: Optimization, Numerical Analysis, Probability and Statistics, Linear Algebra, Calculus, Differential Equations, Biostatistics and Mathematical Biology, Computer Science

Technical Skills

- **Programming & Tools:** Python, Git/GitHub, Linux/macOS (Command Line), SQL, LaTeX, CompuCell3D, Microsoft Office Suite
- **AI, Deep Learning & GenAI**: PyTorch, TensorFlow, Hugging Face (Transformers, TRL, BitsAndBytes), LLMs, Multimodal ML (VLMs), Seq2Seq Models, Fine-Tuning (LoRA), Quantization (4-bit)
- **Machine Learning & Data Science**: Scikit-learn, Ensemble Methods, OpenCV, Pandas, NumPy, SciPy, Scikit-image, Pillow, Mahotas, Matplotlib, Seaborn
- **Scientific ML & Math Modeling**: Physics-Informed Neural Networks (PINNs), Tensorized Fourier Neural Operators (TFNO), PDE Modeling, Uncertainty Quantification (UQ), Polynomial Chaos Expansion (PCE), Augmented Lagrangian Method (ALM), Chaospy, Uncertainpy, Brian2, Manim

Research Experience and Projects

Density and BI- RADS - Aware Triage and Report Generation System (DB-ATRG) — *Jan. 2026 – Present*

- Engineered the Density and BI-RADS-Aware Triage and Report Generation (DB-ATRG) system to automatically classify and prioritize high-risk mammography cases, optimizing clinical workflows and reducing time-to-diagnosis for vulnerable patients by directing attention to high-risk density/severity categories.
- Fine-tuned the Google MedGemma-1.5-4B Vision-Language Model using **Low-Rank Adaptation (LoRA)** and **4-bit quantization (BitsAndBytes),** establishing an efficient multimodal pipeline capable of generating clinical reports from 510 mammography images and clinical reports.
- Achieved high-fidelity automated report generation as evidenced by key performance metrics including **a ROUGE-L score of 0.6693, a METEOR score of 0.7187, and a Word-Level F1 score of 0.6789**, validating the system's ability to accurately capture clinical semantics and serve as a reliable supplementary screening tool.

Morphological Feature Analysis of Retinal Pigment Epithelial Cell from Mice during Aging — *Jun. 2024 – Aug. 2025*

- Developed an automated, config-driven **7-step end-to-end machine learning pipeline** for classifying Retinal Pigment Epithelial (RPE) cell during aging, generating insights for potential therapeutic strategies in Age-related Macular Degeneration.
- Achieved highly accurate classification as measured by **90%+ cross-validation F1-score**, by extracting **133 morphological and texture-based features** (LBP, GLCM, Gabor) from 326 RPE cell images and implementing a **stacking ensemble of XGBoost, LightGBM, and CatBoost with a Logistic Regression meta-learner**.
- Successfully **replicated both fusion and purse-string closure mechanisms** of RPE wound healing dynamics *in silico* by designed computational models in **CompuCell3D**, analyzing model outputs to assess the impact of parameter perturbations on healing rates and tissue stability,.

Enhanced Physics-Informed Neural Networks for Collective Cancer Invasion — *Jun. 2025 – Aug. 2025*

- Engineered a **Physics-Informed Neural Networks (PINNs)** model to simulate collective cancer invasion, resulting in a data-efficient, mesh-free solution for complex Partial Differential Equations (PDEs).
- Developed a framework utilizing **Tensorized Fourier Neural Operators (TFNO)** and PyTorch's autograd engine to encode physical laws (PDEs, boundary, and initial conditions) directly into the model's loss function, reducing reliance on labeled data.
- Explored advanced techniques, including a sequence-to-sequence **(Seq2seq) PINO** approach and **Augmented Lagrangian methods (ALM)**, to overcome model failure modes like vanishing gradients and improve solution accuracy and stability.

Work Experience

Undergraduate Researcher and **Near-peer Mentor** — *Jun. 2024 – Present*

Center for the Advancement of Students and Alumni — *Atlanta, GA*

- **Spearheaded a 3-member student team** in two concurrent computational biology projects, developing wound healing simulations and morphological analysis of Retinal Pigment Epithelial (RPE) cells, resulting in successful research presentations at the Summer Undergraduate Research Symposium 2024 and the Georgia State Undergraduate Research Conference 2025.
- Provided near-peer mentorship and research support to students in the Math Path program, guiding research technique implementation and project development for the Enhanced Physics-Informed Neural Networks for Collective Cancer Invasion project, resulting in **winning the best project** in the Summer Undergraduate Research Symposium 2025.