Niraj Gupta

Starkville, MS | ng739@msstate.edu | github.com/NirajVerse | linkedin.com/in/ng9812

EDUCATION

Mississippi State University - Bachelors in Computer Science (Minor in Data Science) (GPA: 4.0/4.0) Aug 2024 – May 2028

- Coursework: Data Structures & Algorithms, Methods & Tools in Software Development, Database Management Systems, Computer Networks, Linear Algebra, ML, AI, Data Wrangling, Probability, Systems Programming.

EXPERIENCE

Researcher Intern - AI2F: AI-enabled Industrial Solutions for Forest Products, Mississippi State University - Department of Industrial & Systems Engineering June 2025 – Aug 2025

- Designed and deployed deep learning classification models using transfer learning (ResNet50, Xception) to classify Southern Yellow Pine and Red Oak wood chips - achieved over accuracy of 99%.
- Developed a semantic segmentation pipeline using PyTorch and U-Net (ResNet34 backbone) to automate tree ring detection, implementing custom Elastic Transformations and Dice Loss optimization to handle complex organic variances.
- Engineered a robust prediction system utilizing Test-Time Augmentation (TTA) and weighted sliding-window processing to eliminate grid artifacts, applying Zhang-Suen morphological thinning to refine output masks into precise measurements.

Undergraduate Research Assistant - MSU Wireless communication Research, Mississippi State University Oct 2025 – Dec 2025

- Adapted existing Deep Reinforcement Learning (DRL) algorithms to optimize network parameters, modifying the code logic and hyperparameters to ensure stable convergence in a stochastic environment.
- Fine-tuned a DistilBERT Large Language Model (LLM) within a hybrid Actor-Critic neural network, leveraging semantic embeddings to significantly outperform standard MLP baselines.
- Developed a scalable PyTorch training pipeline optimized for GPU (CUDA) execution, implementing custom experience replay buffers to efficiently handle large-scale matrix operations.

PROJECTS

CubeSat Forest Fire Detection System Jan 2026 - Present

- Engineered and trained a lightweight YOLO Nano model (2.3M parameters) for resource-constrained CubeSat fire monitoring using PyTorch and AMD ROCm.
- Engineering a thermal-reduction mechanism using "early-exit" AI logic to minimize onboard compute heat and implementing CCSDS compression algorithms to optimize data downlink for satellite bandwidth.

Neural Network From Scratch Dec 2025 – Present

- Developing a custom deep learning library in Python using NumPy to simulate the core mechanics of frameworks like PyTorch, starting with a comprehensive Tensor computation engine.
- Implemented essential linear algebra operations, including matrix multiplication, broadcasting, and dynamic reshaping, to serve as the mathematical foundation for upcoming neural network layers and activation functions.

TECHNICAL SKILLS

Skills: Python (TensorFlow, PyTorch, Keras, TensorRT, Matplotlib, Numpy, Scikit-Learn, Pandas, Selenium, BeautifulSoup), C/C++, SQL, MPI, MLOps

Software: Git and GitHub, Linux, Firebase DB