VATSAL MALKARI

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SUMMARY

Incoming master's student at Rutgers University with a B.S. in Computer Science and Data Science from Rutgers University. Experienced in building secure full-stack applications, production-ready machine learning pipelines, and low-level system tools. Skilled at translating complex technical problems into clean, scalable solutions. Strong foundation in algorithms, systems, and AI, with a passion for impactful engineering.

EXPERIENCE

Extern — NJCCIC via Rutgers MBS Externship Exchange

Jan 2025 – May 2025

- Built anomaly detection models using autoencoders in BigQuery ML to identify suspicious login behavior.
- Engineered features from authentication logs, incorporating MFA usage, login timing deviations, and browser anomalies.
- Analyzed geolocation and user-agent data for risk patterns; optimized performance using vectorized code and efficient feature selection.

PROJECTS

NBA Player Management System

June 2024- July 2024

- Engineered a secure, full-stack Spring Boot application with robust RESTful APIs, integrating PostgreSQL for data persistence and Thymeleaf for dynamic web UI.
- Implemented comprehensive security using Spring Security, including custom form-based authentication, granular authorization rules, and strategic CORS configuration for cross-origin data access.

Lightweight C Task Scheduler

November 2024 - February 2025

- Developed a thread-safe, event-driven task scheduler in C for precise, time-based execution of functions (one-shot and periodic).
- Implemented efficient core logic using a min-heap for O(logN) task scheduling and retrieval, paired with a hash table for O(1) average-case task cancellation.
- Ensured concurrency safety with pthread_mutex_t for data protection and pthread_cond_t for efficient thread synchronization (avoiding busy-waiting).
- Demonstrated robust systems programming skills, manual memory management (malloc/free) and utilization of CLOCK_MONOTONIC for high-resolution timing.

AOT and FMAB QA system

May 2025 - July 2025

- Built an end-to-end QA system using Retrieval-Augmented Generation (RAG), combining semantic search (ChromaDB + Sentence Transformers) with generative AI.
- Designed scalable vector search pipelines and integrated fuzzy string matching (fuzzywuzzy) for robust and tolerant querying.
- Deployed an interactive Gradio interface with multiple answer modes (trivia, summary, fanfiction), enabling real-time natural language interaction.

Wine Quality Classification System

January 2024 - June 2024

- Engineered an ML pipeline using Scikit-learn for data preprocessing, PCA-based dimensionality reduction, andDecision Tree classification to predict wine quality.
- Optimized model performance through hyperparameter tuning, achieving [X]% accuracy/F1-score.
- Built and deployed a scalable RESTful API on Render for real-time inference, demonstrating expertise in MLOps and cloud deployment.

Emotion recognition model

September 2024 - December 2024

- Designed and trained a PyTorch Convolutional neural network for real-time facial emotion recognition, achieving a 66.34% accuracy.
- Integrated OpenCV for live face detection and Python for a complete, functional webcam application.
- Utilized advanced training techniques (like learning rate decay) and rigorous evaluation metrics to enhance model robustness and performance.

Pneumonia and brain cancer detection

July 2025 - August 2025

- Built and trained convolutional neural networks (CNNs) in TensorFlow/Keras to classify pneumonia from X-rays and brain tumors from MRI scans with 85% accuracy.
- Implemented Flask API to serve model predictions, including preprocessing pipelines for multiple imaging modalities.

EDUCATION

- **Rutgers University**, New Brunswick, NJ
  Master of Science in Data Science
  Expected Graduation: December 2026

- **Rutgers University**, New Brunswick, NJ
  Bachelor of Science in Computer Science & Data Science
  Graduated: May 2025
  Relevant Coursework: Algorithms, Systems Programming, Computer Architecture, Data Science, Deep Learning

SKILLS

- **Languages:** Python, Java, C, SQL, JavaScript
- **Frameworks:** Spring Boot, Flask, FastAPI, Scikit-learn, PyTorch, Keras, Gradio
- **Tools & Platforms:** Git, Docker, Render, BigQuery ML, Google Gemini API, Jupyter Notebook
- **Databases:** PostgreSQL, ChromaDB (Vector Database)
- **Libraries:** TensorFlow, Pandas, NumPy, OpenCV, Material Design, Express.js
- **Concepts:** RESTful APIs, Retrieval-Augmented Generation, MLOps, CI/CD, Authentication & Authorization, Multithreading, Manual Memory Management

Leadership

Alpha Phi Omega Co-Ed Service Fraternity
Webmaster, Brotherhood Engagement Committee, Alumni Chair

- Managed fraternity website and online platforms.
- Organized events to increase engagement and retention.
- Coordinated outreach and events to maintain relations with alumni.