Arnav Menon

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EDUCATION

CARNEGIE MELLON UNIVERSITY, PITTSBURGH, PA Spring 2025
Master of Science in Electrical and Computer Engineering with a Concentration in AI/ML Systems 3.83/4.0
Coursework: Deep Learning Systems, Computer Networks, Machine Learning, Artificial Intelligence, Machine Learning in Production, Data Analytics for Semiconductors, Deep Generative Modeling, Sports Technology

UNIVERSITY OF CALIFORNIA, RIVERSIDE, RIVERSIDE, CA Spring 2023
Bachelor of Science in Computer Engineering 3.72/4.0
Coursework: Machine Learning, Artificial Intelligence, Edge Computing, Embedded Systems, Computer Networks, Database Management, Operating Systems, Computer Architecture, VLSI Design, Data Structures & Algorithms, Linear Algebra

EXPERIENCE

PLUS - PERSONALIZED LEARNING SQUARED – SOFTWARE DEVELOPER Spring 2024
- Built an internal communication tool using **FastAPI**, **Java**, and **Python**, reducing spam email rates from **20%** to **13%** by automating user-specific messaging workflows.
- Streamlined data management and improved code maintainability by designing and implementing **DAO** and **DTO** patterns, enhancing system reliability.
- Architected and deployed containerized microservices using **Docker** with end-to-end **SSL/TLS encryption**, reducing deployment time by **90%** while ensuring secure internal communication across 8 distributed teams with **99%** uptime.

ZWIFT – BACKEND ENGINEER Summer 2022
- Enhanced database efficiency and reduced error rates by **30%** through modifications to the **Spring Boot** service layer, automating data population in **PostgreSQL**.
- Delivered new data retrieval endpoints in **JSON** and **Protobuf** formats, utilizing **SQL** queries to optimize data transfer processes.
- Verified endpoint integration with **C++** networking libraries via testing using **Google Test**, ensuring availability and robustness.

PROJECTS

MOVIE RECOMMENDATION SERVICE Fall 2024
- Designed a CI/CD pipeline with **Jenkins** and **Docker**, improving deployment efficiency for a movie recommendation engine.
- Implemented scalable data ingestion and model training pipelines using **Kafka**, **Docker**, and **FastAPI**, processing over 10 million data points to optimize real-time predictions.
- Achieved **85% test coverage** and improved system reliability by integrating **PyTest** for unit testing across key modules**.**

HTTP VIDEO SERVER Fall 2024
- Developed a scalable HTTP video server in **Python**, supporting 1,000 concurrent connections using non-blocking I/O techniques.
- Reduced latency by **20%** through optimized file streaming with **5MB** chunks, ensuring seamless playback for large files.
- Enhanced user experience by implementing **HTTP 206** (byte-range requests) for efficient streaming of files exceeding **10GB**.

END-TO-END SPEECH RECOGNITION Fall 2024
- Developed transformer-based model (60M params, 5 enc, 7 dec layers, 10 attn heads) using **CTC loss**, achieving **10.6% CER.**
- Developed encoder-decoder model, integrating **ResNet**-based embedding layer with pyramidal bidirectional **LSTMs** in encoder and 5-layer MLP in decoder with CTC decoding, achieving Levenshtein distance of 4.18.

FACE CLASSIFICATION AND VERIFICATION Fall 2024
- Developed and trained **ResNet-50** model with image augmentations from research papers, achieving **95%** training accuracy, **96.5%** validation accuracy, **90%** validation verification accuracy, & Equal Error Rate (EER) of **0.09.**
- Optimized training with **SGD** and fine-tuned with custom **ArcFace** loss. Implemented real-time tracking with **Weights & Biases.**

MODELING TRAFFIC BEHAVIOR WITH TIME SERIES Spring 2024
- Achieved a model loss of 0.023 by developing and tuning **LSTM** models for vehicle velocity profile predictions, outperforming baseline **Transformer** models.
- Leveraged **YOLO** to extract vehicle trajectories from video data, significantly improving model input accuracy.
- Utilized **NGSIM** dataset to analyze anomalous driving behaviors, enhancing predictive safety for autonomous vehicle systems.

SKILLS

- **Programming Languages**: Python, C/C++, Java, JavaScript
- **Frameworks and Libraries**: Spring Boot, Django, Flask, FastAPI, PyTorch, Sklearn
- **Development Tools**: DynamoDB, Jupyter Notebooks, Postman, Google Test, Docker, Jenkins, Weights & Biases