Mohit Marvania

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EDUCATION

George Mason University **Fairfax, Virginia**

M.S. in Computer Science – Machine Learning *Expected Graduation, May 2026*

- Related Coursework: Computer System and System Programming, Mathematical Foundations of CS, Introduction to Artificial Intelligence, Data Mining, Machine Learning, Component-based Software Development.

Charusat University **Changa, India**

B. Tech in Computer Science *Graduated, April 2024*

- GPA: 3.78/4.00
- Related Coursework: Data Structures & Algorithms, Data Science & Analytics, Image Processing & Computer Vision, Software Engineering, Data Communication & Networking, Database management, Mobile Application Development, Machine Learning, Artificial Intelligence.

EXPERIENCE

LLM Watermarking Detection **Virginia, USA**

Supervisor: Dr. Abolfazi Safikhani, George Mason University *Spring 2025 - Present*

- Engineering quantitative and probabilistic methods for detecting watermarks within AI text.
- Design high-performance hashing algorithms for rapid recognition of watermarked text segments. Testing on paraphrasing sentences.
- Assess detection precision and robustness across various language models and text styles.
- Establish standardized benchmarks to measure watermark detection effectiveness systematically.

Path Planning with LLM / LRM **Virginia, USA**

Supervisor: Dr. Ziyu Yao, George Mason University *Spring 2025 - Present*

- Developed comprehensive benchmark datasets to evaluate language models performance in Path Planning tasks, incorporating diverse environments, varying obstacle densities, and both single and multi-goal scenarios.
- Optimized reasoning models to achieve near-optimal solutions for complex path planning problems, ensuring complete coverage of all objectives in multi-goal environments.
- Employed prompt optimization and fine-tuning techniques to adapt large reasoning models (LRMs) for enhanced performance and suitability in path planning applications.
- Analyzed and differentiated the reasoning processes of Large Reasoning Models (LRMs) compared to traditional LLMs in context of decision-making.

Machine Learning Research Intern **Changa, India**

Supervisor: Dr. Amit Thakkar, Charusat University. *Dec 2023 – Apr 2024*

- Developed a student e-learning engagement analysis system utilizing Python as the core language and advanced deep learning algorithms, including ResNet50v2, VGG16, and Yolov8 models on large dataset – DAiSEE and YawDD. Expected to improve student engagement in online learning and increase student satisfaction by 15%.
- Published a conference paper detailing the creation and implementation of the student e-learning engagement analysis system, showcasing innovative use of deep learning technology in educational settings and data mining and visualizing to improve efficiency of model. Received positive feedback from industry experts and peers.
- Used automation for preparing dataset from the two different formats of data – images and videos. DAiSEE contains large image dataset and YawDD is a large-scale video dataset, leveraging Python and OpenCV for perform accurate task.
- Worked closely with multidisciplinary team to access the performance of the system, conducting testing, debugging, and iterative enhancements based on feedback to optimize accuracy.

Android Developer Intern **Rajkot, India**

Raven Technolabs *May 2023 – June 2023*

- Engineered a high-performance receipt generator application using Java, Kotlin, and XML. Integrated Firebase for real-time data management, achieving a 30% reduction in processing time.
- Collaborated with cross-functional team to implement iterative improvements, resulting in 20% increase in client retention.

PUBLICATIONS

Marvania M., Kansagara R., Thakkar A., Rathod D. (2024). YOLOv8-based emotion recognition for effective student engagement assessment in online learning environments. In ICRAIC-2k24: Second International Conference on Robotics, Automation and Intelligent Computing. AIP Publishing. [Google Scholar]

PROJECTS (github)

Live Camera Feedback System

- Identified a need to enhance teaching effectiveness and feedback accuracy by analyzing student engagement in real-time during lectures. Worked on a system to intuitively analyze student emotions from a video feed with the intent to develop better understanding of students' engagement to faculty members.
- Designed and implemented a deep learning model using TensorFlow and Keras with a video data emotion detection pipeline and applied matplotlib and scikit-learn to do visual analytics for the data. Proposed an easy-to-use GUI based on OpenCV and Tkinter which showed emotion insights in real time. Collaborated with faculty members to fine-tune the emotion-based feedback system, resulting in a 30% increase in overall satisfaction with teaching.

Document Shadow Removal

- Designed and implemented a deep learning based lightweight model to remove shadows from document, combining frequency decomposition with low-frequency illumination correction and high-frequency details restoration.
- Built hybrid model integrating FSENet, LSRNet, and DRNet, maintaining high-resolution (1024x1024), shadow-free document images withing few epochs, while maintaining computational efficiency.
- Applied distributed processing techniques and optimized ML pipelines.

Movie Review Sentiment Analysis

- Developed a Flask Web App that lets users search Hollywood movies (1995-2015) and receive genre-based similar movie recommendation.
- Integrated the IMDb API to retrieve user reviews and implemented a fine-tuned T5 transformer to classify each review as Positive or Negative.
- Displayed aggregated sentiment breakdown alongside IMDb ratings for the queries movies and its recommended peers in real time.
- Optimized the end-to-end pipeline for low-latency review processing and dynamic recommendation rendering.

HAFNet: Medical Image Segmentation

- Engineered HAFNet with parallel CNN and Swin-Transformer branches fused via ASPP, adaptive cross-attention, and SE-attention modules to capture both local and global context in 3D cardiac MRIs.
- Introduced class token cross attention, strategically placed SE-attention blocks, and optimized skip connections reducing parameter count and computational overhead.
- Trained on the ACDC dataset with a combined Cross-Entropy + Dice Loss using SGD, batch size 16 over 100 epochs on dual T4 GPUs.
- Delivered segmentation accuracy on par with state-of-the-art hybrids while using just ~5-10M parameters, enabling real-time clinical deployment.

SKILLS

Programming: Python, C++, C, Java, Kotlin, JavaScript, React.js, Next.js, Typescript, Object-Oriented Programming.
AI & Models: Advanced Machine Learning, Deep Learning, predictive Modeling, Natural Language Processing, Text Classification, Knowledge Extraction, Reinforcement Learning, Distributed Processing, Scalable ML Pipelines, BART, Deepseek, T5, GPT.
Tools & Libraries: TensorFlow, Keras, PyTorch, Unsloth, Scikit-Learn, OpenCV, NumPy, Pandas, Matplotlib, Jupyter Notebooks, Hugging Face, Transformers, spaCy, Weights & Biases, Analytics.
Development: Kubernetes, GitHub, Scripting, AWS (EC2, S3, Lamda), Firebase, Git, Jira, Linux, Docker, Clustering.
Certifications: AWS Certified Cloud Practitioner, Microsoft Azure Fundamentals, Deep learning – Nvidia.