HARSH TRIPATHI

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EDUCATION

Master of Science in Computer Science, University at Buffalo, Buffalo, NY (CGPA - 3.96/4) Aug 2024 - Dec 2025
Master of Science in Mathematics, Birla Institute of Technology and Science Pilani, India Aug 2018 - July 2022
Bachelor of Engineering in Electrical Engineering, Birla Institute of Technology and Science Pilani, India Aug 2018 – July 2022

SKILLS

- **Programming & Scientific Computing :** Python, C++, SQL, Java, Numerical Computing, Algorithmic Modeling
- **AI/ML:** Deep Learning (CNNs, Transformers, Protein Language Models), Multi-Label Classification, Representation Learning, Statistical Modeling, Quantitative ML, Machine Learning Research
- **Computational Biology & Data Modeling :** Sequence-Based Modeling, Hierarchical Ontologies (DAGs), Sparse & Noisy Label Learning, Information-Theoretic Metrics, Generalization-Focused Evaluation
- **Frameworks & Libraries:** PyTorch, TensorFlow, HuggingFace, Scikit-Learn, NumPy, Pandas, SciPy
- **High-Performance/ Research Computing:** High-Performance Computing, SLURM, MPI, Parallel/Batch Training, Low-Latency Inference
- **Data & Systems:** MLOps (CI/CD, Model Deployment), Docker, Kubernetes, Distributed Computing (Spark, PySpark)
- **Databases & Data Management:** PostgreSQL, MongoDB · Large-Scale Dataset Handling

PROFESSIONAL EXPERIENCE

ML Research Engineer, *The Research Foundation For SUNY, USA* Sep 2024 – Dec 2025

- Engineered an analytical model for ray-tracing using a custom **Projection Probability Density Function (PPDF)**, forming the system response matrix for tomographic reconstruction.
- Devised a **convex-hull based geometric filter** to prune redundant ray computations, reducing workload by ~70% w/o accuracy loss.
- Re-implemented attenuation integrals using **PyTorch vectorization and multi-CPU threading**, achieving **60× speedup** over baseline.
- Scaled computation across the **UB CCR HPC cluster** with **MPI + SLURM**, enabling distributed processing of billion-ray simulations.
- Optimized numerical kernels to approach hardware limits of CPU parallelism and memory bandwidth.
- **Co-authored 2 research publications** at **SNMMI 2025** and **IEEE MIC 2025**, contributing to advancements in applied math for imaging.

AI Engineer, *Center Of Intelligent Imaging, USA* June 2025 – Aug 2025

- **Developed LLM-based NLP pipelines** for unstructured medical and financial-style reports, building robust structuring workflows.
- Implemented **feedback loops and monitoring systems** for model refinement across **100+ input formats**,
- Designed **real-time inference services** with FastAPI + Docker, ensuring reproducibility and deployment at enterprise scale.
- Collaborated across research and product teams to align ML solutions with domain-specific requirements.

Machine Learning Engineer, *Piramal Capital, India* Jul 2022 – Aug 2024

- **Built ML pipelines for financial risk modeling, and fraud detection**, applying ranking algorithms to millions of daily transactions.
- Developed **targeting and recommendation models** for financial campaigns, boosting ROI by **18%**, improving customer acquisition.
- Deployed cloud-native ML services on AWS with **Docker + Kubernetes**, scaling to real-time, production-grade systems.
- Collaborated with quantitative and business teams to **translate financial requirements into ML solutions** with measurable impact.

CERTIFICATIONS

- AWS Machine Learning Engineer - Associate

PROJECTS

Protein Function Prediction with Biological Constraints

- **Built hierarchy-aware protein function predictors** mapping sequences to GO (MF/BP/CC) using protein LM & motif-based networks.
- **Designed homology-aware validation pipelines** to prevent sequence leakage & optimize generalization in protein annotation tasks.
- **Optimized extreme multi-label biological prediction**, ontology-consistent inference, and IA-weighted F-max calibration.

User Modeling with Soft Biometrics | Python, NLP, Data Mining

- Created a **framework for retrieval and ranking** of individuals based on multimodal biometrics (structured + unstructured data).
- Applied **NLP and data mining** techniques for scalable user modeling.
- Published findings in **IEEE IoT/CPS-Security 2023**, demonstrating robustness of ML for real-world applications.

Lung Cancer Image Segmentation Analysis Pipeline | PyTorch, TensorFlow, OpenCV

- Designed a **deep learning pipeline** for lung image classification and segmentation using CNNs and Transformers.
- Implemented preprocessing techniques (color normalization, stain augmentation) for histopathology images.
- Evaluated models with metrics such as AUC, F1, and IOU, and deployed models on cloud infra for scalable use.