Md Muzakker Hossain

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Research Focus: ML Compiler Optimization, MLIR Infrastructure, High-Performance Computing

Education

Ph.D. in Computer Science *Expected: Dec 2027*
Iowa State University | Advisor: Dr. Ali Jannesari

B.Sc. in Computer Science, Summa Cum Laude *Dec 2021*
American International University-Bangladesh | CGPA: 3.97/4.0

Experience

Graduate Research Assistant – ML Compiler Optimization Aug 2024 – Present
SwAPP Lab, Iowa State University, Ames, IA

- GEMM Autotuner Development with Pacific Northwest National Lab: Building ML-guided compiler optimization framework for GEMM kernels using MLIR/IREE/Triton. Extracted and profiled 250+ kernels from KernelBench, developing automated pass selection strategies that identify performance bottlenecks across lowering pipeline stages.
- Compiler Optimization Research: Designed and evaluated intelligent pass ordering strategies for domain-specific compiler optimization, using graph-based program analysis to optimize performance on domain-specific hardware.

Graduate Teaching Assistant Aug 2023 – Present
Iowa State University, Ames, IA

- Mentored 29+ student teams through full SDLC in production-style software engineering course (COM S 309) coordinated 10-person TA team as Head TA for 250+ student class.

AI/ML Engineer Consultant (Remote) Dec 2022 – Jun 2023
Synergic Improvement Solutions Ltd., Perth, Australia

- Engineered CNN-based audio classification system for mining anomaly detection (92% accuracy); deployed conversational AI bot using Python/Twilio, reducing manual work-order processing by 40%.

ML Research Assistant Jun 2022 – Dec 2022
Elite Research Lab, Dhaka, Bangladesh

- Developed ensemble ANN models for COVID-19 lockdown forecasting (96% accuracy, published NCIM 2023); implemented CNN pipeline for HER2 cancer detection (88% accuracy).

Technical Projects

Distributed Matrix Multiplication with MPI | *C++, MPI, OpenMP* | GitHub Fall 2024

- Implemented Cannon's algorithm achieving 50+ GFLOPS on 4000×4000 matrices with 32-process scaling; reduced communication overhead 35% through optimized 2D grid data distribution.

CNN vs. ViT Comparison on CIFAR-10 | *PyTorch, LoRA, DINOv2* | GitHub Spring 2025

- Fine-tuned DINOv2-Small ViT using parameter-efficient LoRA (8.06% trainable params), achieving 95.95% test accuracy; compared against custom CNN (83.46%) and DenseNet (91.22%) architectures.

RAG-Based Document Query System | *Python, Pinecone, OpenAI, Gradio* | GitHub Spring 2024

- Built retrieval-augmented generation system with PDF processing pipeline; deployed interactive web interface for context-aware document question-answering.

Technical Skills

Languages: Python, C++, C, Java, CUDA (learning)
ML Compilers & IR: MLIR (Torch, Linalg, Affine, SCF, Vector, Memref, LLVM dialects), IREE (Turbine, Compiler), Triton
ML/AI Frameworks: PyTorch, TensorFlow, JAX, Hugging Face Transformers, RAG
HPC & Tools: OpenMP, MPI, Git, CMake, Bazel, LLVM
Systems & Optimization: Progressive lowering, Kernel fusion, Performance profiling (nsys, nvprof), IR optimization patterns

Publications & Awards

Publications:

- **M. M. Hossain**, Z. Awosaf, M.S.H. Prottoy, A.S.M. Alvy, M.K. Morol. "Approaches for Improving the Performance of Fake News Detection in Bangla: Imbalance Handling and Model Stacking." *IC4IR'21, Springer*, 2022.
- S. S. Das, A. S. Anik, **M. M. Hossain**, M. K. Morol, F. Jahan, M. A. Al-Jubair. "A Study on Future Lockdown Predictions using ANN." *NCIM'23, IEEE*, 2023.

Honors: SC'25 Student Volunteer, Summa Cum Laude, Vice Chancellor's Award (Best Thesis), Dean's List (5x), Academic Scholarship.