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Md Abul Kalam Azad

PhD Candidate

Google Scholar
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Summary

- Leveraging program analysis and AI/Machine Learning in developing methods for automated detection of software performance bugs and repair to ensure optimal efficiency.
- Developed a deeper understanding of the intricacies behind building and deploying cutting-edge AI technologies such as LLM's.
- Hands-on experience in Generative AI, prompt engineering, fine-tuning LLMs, data augmentation, RAG, large-scale data manipulation, model evaluation, and deployment.

Education

Ph.D. in Computer and Information Science — **Fall 2021 — Present**
Rackham Graduate School, University of Michigan – Dearborn — Dearborn, MI, USA

- Research area: Computing systems and software engineering, with a focus on software performance bugs
- Relevant courses: Data Analytics in Software Engineering, Natural Language Processing, Applied Regression Analysis

M.Sc. in Computer and Information Science — **Winter 2024**
University of Michigan – Dearborn — Dearborn, MI, USA

- Cumulative GPA of 4.0 on a 4.0 Scale. Graduated with *High Distinction*

B.Sc. in Computer Science and Engineering — **Fall 2011**
University of Rajshahi — Rajshahi, Bangladesh

- Cumulative GPA of 3.80 on a 4.0 Scale. Ranked *Top 3 of Class*

Publications

- **Azad, M. A. K.**, Alexender, M., Hasan, F., and Roy, P, "PcMINER: Mining Performance Bug Related Commits at Scale", *Empirical Software Engineering (EMSE) Journal "* [**Journal Rank:** $Q1$**, (Submitted)**]
- **Azad, M. A. K.**, Alexender, M., Hasan, F., and Roy, P, "PcMINER: Mining Performance Related Commits at Scale", *Super-computing Conference (SC) 2024, Atlanta, GA, USA, 2024* (Poster) [**CoreRank:** A^***, Acceptance Rate:** 20%]
- **Azad, M. A. K.**, Iqbal, N., Hasan, F., and Roy, P., "An Empirical Study of HPC Performance Bugs ," *The IEEE/ACM International Conference on Mining Software Repositories, Melbourne, Australia, 2023* [**CoreRank:** A**, Acceptance Rate:** 27%]
- Pramanik, M. I., Lau, R. Y., Demirkan, H., **Azad, M. A. K.**, Hossain, M. S., Chowdhury M.K.H.,Karmaker, B.K, "Healthcare informatics and analytics in big data," *Expert Systems with Applications* Volume 152, (2020): 113388, ISSN 0957-4174, [**Journal Rank:** $Q1$]
- Pramanik, M. I., Lau, R. Y., Demirkan, H., and **Azad, M. A. K.**, "Smart health: Big data enabled health paradigm within smart cities," *Expert Systems with Applications* 87 (2017): 370-383 (Elsevier/ESWA) [**Journal Rank:** $Q1$]
- Alam, M. H. , Rahoman, M. M. and **Azad, M. A. K.**, "Sentiment Analysis for Bengali Sentences using Convolutional Neural Network", *20th International Conference on Computer and Information Technology (ICCIT 2017))* [**Acceptance Rate:** 30%]
- **Azad, M. A. K.**, Xie, N. and Ahmad, S., and and Nakajima, M., "Bangladeshi Facial Artistic Stylization", *13th Annual International Conference "NICOGRAPH International 2014" (poster)* **Acceptance Rate:** 27%]
- **Azad, M. A. K.**, Xie, N. and Ahmad, S. , "Bangladeshi style: A way of facial artistic stylization in visual effects", *16th International Conference on Computer and Information Technology (ICCIT 2013)* [**Acceptance rate:** 30%]

Awards & Honors

- NSF Travel Award for attending MAPS-2023, co-located at ESEC/FSE 2023, San Francisco, California — **December 2023**
- NSF Travel Award ($\$3367$) for attending and presenting a paper at ICSE 2023, Melbourne, Australia — **May 2023**
- ACM SIGSOFT and U of Michigan Exp+ Conference Award ($\$2500$) for MSR 2023, Melbourne, Australia — **May 2023**
- Received recognition for outstanding contribution to teaching, research, service to the Univerity of Michigan-Dearborn — **2021 — 2022**
- **Divisional Champion** at the ACM International Collegiate Programming Contest, Asia Regional, Dhaka site (team contest) — **May 2010**
- **9th rank** at the National Collegiate Programming Contest, BUET, Bangladesh (team contest) — **May 2008**
- Undergrad Merit Scholarship for excellent academic records and media coverage for a project — **2007 — 2010**

Conference & Workshop attended

- The 7th Annual Symposium on Machine Programming-2023, co-located at ESEC/FSE 2023, San Francisco — **December 2023**
- Attended & Presented paper at ICSE2023 and IEEE/ACM International Conference on Mining Software Repositories (MSR), Australia
- The 37th IEEE/ACM International Conference on Automated Software Engineering, *Rochester, Michigan* — **Oct 2022**
- The 28th IEEE International Symposium on High-Performance Computer Architecture (PPoPP/CGO/HPCA/CC), *Virtual* — **Apr 2022**

Technical Skills

Programming Languages	C/C++, Python, Java, C#, Git, SQL, NoSQL
Software Tools & Library	VSCode, PyTorch/Tensorflow, vLLM, Huggingface, LangChain, HPCToolkit, Kubernetes, Docker, Hadoop
Problem Solving	Deep Learning/Machine Learning (LLM, Generative AI), Algo. and Data Structure, ACM programming*
Exposure	BigQuery, AWS, Google/Oracle Cloud
Communication	English Oral and Written (Full professional proficiency), Bengali (Native proficiency)

Research Experience

Graduate Research Assistant **Fall 2021 — Present**

SRLab, University of Michigan - Dearborn

- Conducting research and assisting PI in NSF Funded projects.
- Developing and implementing tools and techniques (i.e., NLP) for exposing software performance bottlenecks and optimization opportunities in software systems such as HPC applications, cloud applications, and IoT applications, and more.
- Investigating and evaluating LLM for detecting software performance bugs and providing efficient code recommendations.
- Developed PcMINER, a mining tool that employs a lightweight transformer model trained through knowledge distillation from a teacher LLM for classification of performance-related commits at Scale.
- Developed working prototypes to test and refine the bug detection tool and deployed cost-effectively on a 45-node CPU cluster to curate a large-scale dataset of performance bugs, improving detection accuracy by 28%
- Published research papers and reusable artifacts in top-tier conferences.

Big data health informatics **Apr 2017 — Mar 2020**

The City University of Hong Kong

- Collaborated with a researcher at The City University of Hong Kong in the project titled "Smart health: Big data enabled health paradigm within smart cities." and "Healthcare informatics and analytics in big data"
- Published two referred journals.

Guiding-line Extraction from Real Photo for Painterly Rendering **Apr 2012 — May 2013**

Image Processing Lab, Dept. of Computer Sci. & Engg., University of Rajshahi

- Conducted an independent MS thesis focused on developing clustering techniques to extract guiding lines from real-world photos, leveraging pattern recognition/computer vision/OpenCV, and image processing libraries."
- Published one conference paper and one conference poster.

Teaching and Mentoring

Graduate Teaching Assistant **Sep 2022 — Present**

Department of Computer and Information Science, University of Michigan - Dearborn

- Courses: CIS 150L, CIS 250L, CIS 310, CIS 450
- Teaching programming lab on Object-oriented Programming (OOP) for undergraduate students.
- Grade homework, lab reports, and maintain office hours.

Lecturer **Mar 2014 — May 2021**

Department of Computer Science and Engineering, Begum Rokeya University

- Teaching undergraduate major courses on Programming Language in C/C++, Data Structure, Algorithm Design and Analysis, Parallel Programming, and Intro to Artificial Intelligence (AI)
- Coaching students for ACM ICPC programming contests.

Professional Membership

- Association for Computing Machinery (ACM) Member, *ID:5581827*