Akash Dutta

adutta@iastate.edu | 515-735-0473 | https://www.linkedin.com/in/akash-dutta-66a7807b/ | https://github.com/akash-isu

Graduate Student

PhD candidate in the Department of Computer Science, Iowa State University working on deep learning-based optimizations for state-of-the-art compilers aiming to apply research advancements to solve problems on a real-world scale.

Expertise

- High-Performance Computing
- Machine Learning
- Web-Application Development

Education

- **Doctor of Philosophy in Computer Science**   **GPA: 3.76/4**   **2018 - Present**
  Iowa State University
- **Master of Science in Computer Science**   **GPA: 3.76/4**   **2018 - 2023**
  Iowa State University
- **Bachelor of Technology in Computer Science**   **GPA: 8.07/10**   **2010 – 2014**
  West Bengal University of Technology

Ongoing Research

- Pre-training a large GNN-based model for code feature extraction based on IR-based code flow graphs
- Generating/Synthesizing a dataset tailored to GPGPU executions for HIP and OpenMP GPU
- Building techniques for the optimization of tensors primitives and irregular access patterns in tensors Deep Learning setups.

Technical Skills

Programming Languages and Models: Python, C, C++, OpenMP, JavaScript, JAVA, HTML5, CSS3, Shell Script, FORTRAN
Tools: PAPI, perf, nvprof, RAPL, rocprofiler, Pytorch, Pytorch Geometric

Work Experience

Co-Op/Intern   **May 2022 – Dec 2022, Jun 2023 – Aug 2023**
AMD, Austin, Texas
- Performance analysis of OpenMP GPU kernels by profiling through rocprofiler based tools
- Analyzing kernel performance on GPUs, performance bottlenecks in host-device architectures
- Developing components/adding functionality to AMD's clang-based OpenMP compiler
- Verifying OpenMP 4.5, 5.1, 5.2, 5.3 spec compliance of the AOMP compiler through the SOLLVE test suite

Software Development Intern   **May 2019 – August 2019**
IdRamp, Indianola, Iowa
- Developed the user-facing layer of an application for blockchain-based identification services

Teaching Assistant   **August 2018 - Present**
Department of Computer Science, Iowa State University, Ames, Iowa
- Head TA for Introduction to Computer Programming (COMS 127) (Fall 2021 – Spring 22)
- TA for the courses Introduction to Spreadsheets and Databases (COMS 113), Object-Oriented Analysis and Design (COMS 362), Software System Safety (COMS 415/515)

Team Lead and Senior Developer   **January 2017 - August 2018**
Learningmate Solutions Pvt. Ltd., Kolkata, India
- Led a team to design, develop, and deliver accessible K-12 e-learning applications for Pearson PLC

Systems Engineer   **September 2014 - January 2017**
Infosys Ltd., Pune, India
- Contributed to UI/UX re-designing of a term deposit application to increase usability and ease-of-use
- Led re-development of the front- and back-end of a legacy Forex trading application to make the platform more intuitive, usable, and secure.
- Developed multiple modules of a marketing strategy improvement web application to improve marketability and reach of products based on customer demographics and feedback for American Express.
- Helped develop a cross-platform mobile application for the management of payroll and human resource information for employees of the Government of the State of Gujarat, India

Academic Projects

- **Predicting Wine Ratings using Sentiment Analysis: A comparative study**: Analyzed wine reviews taken from www.winemag.com and used NLP based techniques to predict wine ratings from user reviews. Compared the performance of 3 classifiers, namely, Naïve Bayes, SVM, and Logistic Regression and 2 different word embeddings, namely Bag-of-Words, and TF-IDF.
- **A Review of Theorem Provers for DNN Verification**: Reviewed the verification of neural network modules used in safety critical systems. Techniques based on Safisfiability Modulo Theory (SMT) and Bounded Model Checking (BMC) were analyzed.
- **HyperTesting**: Devised an approach to automatically come up with a way to generate test cases from a model for system verification, where the specifications are in HyperLTL format.
- **Co-operation between Software Defined Networks in IoT security: A review**: Reviewed and discussed how using co-operative software defined networks (SDN) can improve security of IoT devices in de-centralized network systems.

Publications

- Jordi Alcaraz, Ali TehraniJamsaz, Akash Dutta, Anna Sikora, Ali Jannesari, Joan Sorribes, Eduardo Cesar: Predicting Number of Threads using Balanced Datasets for OpenMP Regions. *Journal of Computing*, May 2021 [published]
- Ali TehraniJamsaz, Mihail Popov, Akash Dutta, Emmanuelle Saillard, Ali Jannesari: Learning Intermediate Representations using Graph Neural Networks for NUMA and Prefetchers Optimization. *IPDPS '22: 36th IEEE International Parallel and Distributed Processing Symposium,* May 2022 [published]
- Akash Dutta, Jordi Alcaraz, Ali TehraniJamsaz, Anna Sikora, Eduardo Cesar, Ali Jannesari: Pattern based Autotuning of OpenMP Loops using Graph Neural Networks. *AI4S '22: The 3rd Workshop on Artificial Intelligence and Machine Learning for Scientific Applications (co-located with SC '22),* Nov 2022 [Published]
- Akash Dutta, Jee Choi, Ali Jannesari: Power Constrained Autotuning using Graph Neural Networks. *IPDPS '23: 37th IEEE International Parallel & Distributed Processing Symposium,* May 2023 [Published]
- Akash Dutta, Ali TehraniJamsaz, Jordi Alcaraz, Anna Sikora, Eduardo Cesar, Ali Jannesari: Autotuning OpenMP Runtime Parameters using Heterogeneous Graph based Multimodal Learning. *HPDC '23: Principles and Practice of Parallel Programming 2023* [Accepted]

Co-Curricular Activities

- Ambassador for the Ames, Iowa chapter of the Women in Data Science (WiDS) conference, 2022
- Member of the Photo Club at Iowa State University