Ashitabh Misra

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Urbana, IL 447-902-3149

EDUCATION

University of Illinois at Urbana-Champaign *Urbana, IL*
Candidate for PhD in Computer Science *August 2021 – May 2026 (Expected)*
Advisor: Prof. Tarek Abdelzaher

Indian Institute of Technology Bhilai *Chhattisgarh, India*
Bachelor of Technology in Computer Science and Engineering *August 2016 – May 2020*
GPA: 9.2/10

Publications

Latency-Constrained Input-Aware Quantization of Time Series Inference Workflows at the Edge *July 2024*
Under Review at IEEE International Conference on Computer Communications (INFOCOM)
Ashitabh Misra, Nurani Saoda, and Tarek Abdelzaher

ViX: Analysis-driven Compiler for Efficient Low-Precision Variational Inference *April 2023*
Design, Automation, and Test in Europe Conference (DATE)
Ashitabh Misra, Jacob Laurel, and Sasa Misailovic

BullsEye: Scalable and Accurate Approximation Framework for Cache Miss Calculation *August 2022*
ACM Transactions on Architecture and Code Optimization (TACO)
Nilesh Rajendra Shah, **Ashitabh Misra**, Antoine Miné, Rakesh Venkat, and Ramakrishna Upadrasta

Network Based Framework to Compare Vaccination Strategies *November 2021*
Computational Data and Social Networks
Rishi Ranjan Singh, Amit Kumar Dhar, Arzad Alam Kherani, Naveen Varghese Jacob, **Ashitabh Misra**, and Devansh Bajpai

Research Experience

Dept. of Computer Science, University of Illinois at Urbana-Champaign *Urbana, IL*
Research Assistant, Guide: Prof. Tarek Abdelzaher *January 2022 - Present*
Research focus: Design algorithms for adaptive compression of neural networks and probabilistic programs

Constrained Input-aware Compression of Neural Networks on the Edge

- Design novel quantization techniques for neural network inference that adapt based on input variations and changing operational environments
- Implement end-to-end compilation pipelines to easily deploy complex dynamically quantized NNs on microcontroller-grade devices like Raspberry Pi Pico
- Current experiments show up to $4\times$ speed-up and up to 30% additive increase in accuracy compared to existing state-of-the-art techniques on vehicular target detection benchmarks

Quantized Variational Inference for Probabilistic Programs on the Edge

- Designed novel static analysis techniques for probabilistic programs to perform Variational Inference (VI) using integer arithmetic with minimal overflows
- Implemented ViX, a probabilistic programming language that performs VI in integer arithmetic
- ViX achieves up to $15\times$ speed-up compared to its high precision counterpart on Arduino Due. ViX performs inference on $100\times$ more data than existing state-of-the-art accurately

Work Experience

Dept. of Computer Science, Indian Institute of Technology Hyderabad *Hyderabad, India*
Research Associate *August 2019 - August 2021*

- Developed cache-optimized neural network compression algorithms, achieving $40\times$ compression for VGG-16 and AlexNet with competitive accuracy against existing state-of-the-art
- Designed cardinality estimation approximate algorithms for octagon abstract domain, that achieved $50\times$ speedup with $< 5\%$ accuracy loss relative to conventional techniques

Egnyte *Poznan, Poland*
Machine Learning Intern *May 2018 - July 2018*

- Initiated and deployed a hybrid probabilistic-ML event detection pipeline for smart data caching in Egnyte's macOS app
- The solution surpassed and replaced established solutions by capturing $12\times$ more target events

Trading Projects

Backtesting HFT market-making strategies *Urbana, IL*
Guide: Prof. David Lariviere *Aug 2023 – Dec 2023*

- Lead a team of 4 to backtest high-frequency trading (HFT) market-making strategies, utilizing Level 2/Level 3 data for cash equities and cryptocurrencies
- Setup and managed linux servers to download and parse scripts from crypto-exchanges and Polygon API for backtesting on Strategy Studio.
- Backtested Ichimoku, Moving Average, and Volume-weighted moving average strategies over 1 month period producing net losses (Gitlab repo)

Skills

Languages: C, C++, Python, Shell Scripting **OS:** Linux

Frameworks: PyTorch, Numpy, Pandas, Flask, Selenium(Web Scraping), Integer Set Library, Barvinok Library, Clang, LLVM,

Miscellaneous: Public Speaking, Teaching

Relevant Courses

Compilers: Compilers(CS426), CS526: Advanced Compilers(CS526), Machine Learning for Compilers(CS598)

Robotics: Mobile Robotics for CS (GC 498)

Approximate Computing: Topics in Programming Languages: Approximate And Probabilistic Programming Systems(CS521)

Machine Learning: Data Mining Principles(CS512), Machine Learning, Reinforcement Learning, Math for Machine Learning

Cryptography: Introduction to Cryptography, Blockchain Technology, and Lightweight Cryptography

Trading: Algorithmic Market Microstructure (FIN 556)

Achievements

2020 **First Prize** in Health and Technology Category, Smart India Hackathon (SIH)

2020 **Exemplary Alumni Award** Mahatma Hansraj Modern School, India

2013 **Best Delegate** MUNOG (Model United Nations of Goldsberg, Germany) as Delegate of Afghanistan, UNESCO

2013 **Youngest Recipient of the Wazir Balichand Trophy** Mayo College Ajmer for excellence in Chess, India

Teaching Experience

Dept. of Computer Science, University of Illinois at Urbana-Champaign *Urbana, IL*
Teaching Assistant, CS427: Software Engineering *August 2021 - December 2021*

Dept. of Computer Science, Indian Institute of Technology Bhilai *Chhattisgarh, India*
Teaching Assistant, CS200: Software Tools and Technology *August 2019 - November 2019*