Amey Varhade

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Education

Indian Institute of Technology Guwahati **2018 - 2022**
B.Tech in Computer Science and Engineering (Major), Product Design (Minor) *Guwahati, India*

Maharashtra State Board of Education **2018**
Higher Secondary Examination *Mumbai, India*

Maharashtra State Board of Education **2016**
Secondary School Examination *Mumbai, India*

Publications

RI-MAC: Optimising MAC Operation using Custom RISC-V Instruction Set for Neural Network Inference
Imljungla Longchar, Kaustubh Khutal, Aswath Reddy, **Amey Varhade**, Hemangee K Kapoor
International Conference on AI-ML Systems ***(AIMLSys 2025)***

Can Physics informed Neural Operators self improve?
Ritam Majumdar, **Amey Varhade**, Shirish Karande, Lovekesh Vig
DLDE-III Workshop ***(Spotlight Talk)****, Neural Information Processing Systems* ***(NeurIPS-W 2023)***

CluSpa: Computation Reduction in CNN Inference by exploiting Clustering and Sparsity
Chetan Ingle, Imljungla Longchar, **Amey A Varhade**, Saurabh Baranwal, Hemangee K Kapoor
International Conference on AI-ML Systems ***(AIMLSys 2022)***

Experience

Microsoft Research **Sep 2024 - Present**
Research Fellow, Advisors: Dr. Ravishankar Krishnaswamy, Dr. Navin Goyal, Dr. Kirankumar Shiragur

- Researching algorithmic improvements to Approximate Nearest Neighbour (ANN) based index and search methods, including enhancements to Microsoft's DiskANN algorithm. Developing a ANN based joint clustering and indexing algorithm.
- Leading the design and development of a large-scale synthetic workplace email and document dataset to evaluate and benchmark, the M365 Copilot (Agentic RAG and DeepResearch) systems and to finetune the models therein.

IBM (India Systems Development Labs) **Sep 2022 - Sep 2024**
Software Engineer, IBM Cloud, Manager: Prasad Krishnegowda

- Worked on the Control Plane of the Overlay Network (SDN) for IBM Virtual Private Cloud (VPC) Offering.
- Collaborated with IBM Research on Retrieval Augmented Generation (RAG) for code generative models for Ansible.

Google Summer of Code (GSoC) **Jun 2021 - Aug 2021**
Student Developer, ML4SCI Organization, Advisor: Prof. Brad Marston, Brown University *git.io/JuXQr*

- Generated large-scale fluid motion data from solving **Navier Stokes equation** with spectral methods.
- Applied **dimensionality reduction** techniques such as Proper Orthogonal Decomposition **(POD)** to analyse the data.

Citrix **Apr 2021 - Jun 2021**
Software Developer Intern, Cloud and Networking Team, Manager: Muthukumar Shunmugiah

- Designed a solution for the **Canary Deployment** and **Blue-Green Deployment** of Kubernetes based applications.
- Employed Citrix ADC VPX as the Load Balancer for the application deployment on Azure Kubernetes Services **(AKS)**.

Columbia University **Jul 2020 - Aug 2020**
Research Intern, Programming Systems Lab, Department of Computer Science, Mentor: Shirish Singh

- Investigated privacy threats by **side channel attacks** on smartphone device sensors, particularly the **magnetometer**.
- Analyzed the **user locations** and performed fingerprinting of the **user activity** using KNN, SVM and Random Forest.

Professional Services

Reviewer: NeurIPS'25 D&B Track, ICML'25, ICLR'25, AISTATS'25, NeurIPS'24, DLDE-III (NeurIPS'23)

Technical Skills

- **Programming Languages**: Python, C, C++, Go, Bash
- **Technologies/Tools:** Docker, Kubernetes, MATLAB, Git, MySQL, IBM Cloud, Azure
- **Frameworks/Libraries:** PyTorch, Huggingface/Transformers, Scikit-learn, OpenCV, Plotly

Selected Projects

Neural Solvers for Partial Differential Equations **Jun 2023 - Dec 2023**

Research Collaboration, Advisor: Dr. Shirish Karande, Principal Scientist, TCS Research

- Worked on a self-supervised training technique for Physics-Informed Neural Operators for learning PDE Solutions.
- Researched on using Hypernetworks to LoRA finetune PINNs and thus eliminating their pretraining from scratch.

Incremental Co-clustering of Documents and Words **Jan 2021 - Apr 2021**

Data Mining Course Project, Instructor: Prof. Amit Awekar, Department of CSE, IIT Guwahati *git.io/JqGnS*

- Implemented the ***Spectral Graph Bipartitioning*** algorithm in **C++** for reproducibility and achieved at par results.
- Devised an incremental version of the algorithm reducing computation time by **60%** and improving the purity metric.

Accelerators for Convolutional Neural Networks **Jul 2021 - May 2022**

Bachelor's Thesis Project, Advisor: Prof. Hemangee Kapoor, Department of CSE, IIT Guwahati

- Explored the algorithmic and architecture-based optimization techniques for efficient inference of Neural Networks.
- Devised an algorithm for quicker inference of **CNNs** by exploiting the model structure in **PyTorch**.

CDR/IPDR Data Visualizer **Mar 2020 - Aug 2020**

Smart India Hackathon, Software Edition (Bureau of Police R&D) *git.io/JJil4*

- Developed a **Dash** web application for call and internet data with predictive filtering options through a callback model.
- Displayed interactive visualizations and corresponding real time user statistics through **Plotly** and **NetworkX**.

Scholastic Achievements

Microsoft Research: Among the 30 selected as **Research Fellow** out of 15000+ candidates **2024**
ACM ICPC: Achieved National Rank of **657** in the Amritapuri Region Preliminary Round **2021**
Facebook Hacker Cup: Qualified for the Round 2 of the competition **2021**
Smart India Hackathon: Shortlisted among top **5** teams nationally for Grand Final Round **2020**
JEE Mains: Achieved a 99.5 percentile score among 1 million candidates **2018**
JEE Advanced: Achieved a 97.3 percentile score among 200k candidates **2018**
INSPIRE: Offered the INSPIRE Scholarhsip by Government of India **2018**
KVPY: Offered the KVPY fellowship twice for streams SA and SX by Government of India **2016, 2017**
RMO: Qualified the Pre-RMO examination and selected to appear for RMO twice **2014, 2015**

Relevant Coursework

Mathematics: Real Analysis, Linear Algebra, Multivariate Calculus, Probability and Statistics, Discrete Mathematics, Number Theory and Abstract Algebra, Differential Equations, Game Theory

Computer Science: Design and Analysis of Algorithms, Formal Languages and Automata Theory, Compilers, Software Engineering, Database Systems, Operating Systems, Computer Networks, Parallel Algorithms

Machine Learning: Machine Learning, Deep Learning, Data Mining, Deep Learning Specialization (MOOC)

Leadership/Extracurricular

Institute Secretary, Arts Club, Conducted first ever annual art exhibition at IITGuwahati 2019 - 2020
Inter-IIT Cultural Meet, Secured 3^{rd} and 5^{th} position in live-sketching art events 2018 - 2019
TEDxIITGuwahati, Responsible for branding and content curation deliverables 2019 - 2021
SAIL IITGuwahati, Organized various initiatives and events to connect the students with alumni 2019 - 2022