SAI ANUROOP KESANAPALLI

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Education

Master of Science, Computer Science May 2024
University of Southern California CGPA: 3.85/4.00

Bachelor of Technology, Computer Science and Engineering June 2021
Indian Institute of Technology Dharwad CPI: 8.86/10.00

Skills

Python, PyTorch, NumPy, pandas, scikit-learn, NLTK, HuggingFace, Matplotlib,
C++, C, GDB, Bash, Linux, Linux4Tegra, macOS, Weenix OS, HTML, CSS, Git, LaTeX, MATLAB, SQL,
Machine Learning, Deep Learning, LLM, Natural Language Processing, Computer Vision

Work Experience

Project Associate - I, DREAM:Lab, Department of Computational & Data Sciences August 2021 - July 2022
Indian Institute of Science, Bangalore, KA, India

- Co-authored a research project on optimizing performance of deep learning workloads on edge-GPUs [1,3,4], and a review of systems research into training deep learning models on edge hardware [2].
- Developed a comprehensive instrumentation harness that profiled various system and workload parameters such as CPU, GPU and RAM utilization, average and instantaneous power.
- Implemented and automated large-scale training runs of several deep learning models such as ResNet-18, MobileNetV3, and LeNet-5, across 3 classes of Nvidia Jetson devices - AGX, NX, and Nano. The project made significant progress and led to several publications at top venues in less than a year. Received NSF Travel Grant to present [1] at SIGMETRICS @ ACM FCRC 2023 (core A*) at Orlando, FL.

Internship Experience

Machine Learning Software Intern May 2023 - August 2023
DeGirum Corp., Santa Clara, CA, USA

- Designed an ONNX OCR pipeline with pre/post-processor modules compatible with edge-hardware.
- Created a NumPy-only implementation of forward pass of some vision-based PyTorch operators such as Conv2D, MaxPool, among others, and published as a PyPI package (beaverpy).

Other Experience

Course Producer, Thomas Lord Department of Computer Science August 2023 - May 2024
University of Southern California, Los Angeles, CA, USA

- Graded assignments, held discussion sessions, and scribed lectures, for CSCI 699 Theory of Machine Learning and CSCI 567 Machine Learning courses.

Research Assistant, Thomas Lord Department of Computer Science April 2023 - August 2023
University of Southern California, Los Angeles, CA, USA

- Added a new functionality for Orthogonalized ALS (Orth-ALS) to Tensor Toolbox, an open source project on tensor decomposition methods for MATLAB, and worked on a faster C++ implementation of a random forest based anomaly-detection algorithm (PIDForest).

Undergraduate Researcher, Department of Computer Science August 2020 - June 2021
Indian Institute of Technology Dharwad, KA, India

- Performed research on Federated Algorithms with Bayesian [5] and Exponential Weighted Average approaches.

Academic Projects

A comparison of shared encoders for multimodal emotion recognition

- Developed unimodal audio and vision, and multimodal emotion recognition pipelines by employing various classes of shared encoders - 2D CNNs (ResNet18, GoogLeNet, VGG16), 3D CNNs (Simple3D CNN, I3D), Transformers (ViT, VideoMAE). Tested pipelines on a full-scale version of CREMA-D dataset. Presented a principled comparison of performance of different pipelines and encoders, identified achievements and shortcomings of these architectures, and discussed implications.

Leveraging static analysis for evaluating code-generation models

- Developed a pipeline that integrates static errors generated by linters (cppcheck, flake8) as feedback to improve baseline code generation model (CodeLlama), and fine-tuned model using DPO to enhance its ability to directly generate code with fewer errors. Demonstrated effectiveness of both strategies in reducing frequency of static errors in generated code.

Forward-Forward: Is it time to bid adieu to BackProp?

- Compared FF with traditional BackProp framework. Studied architectural differences of FF and BackProp and explored new architectures. Analyzed system performance of FF and BackProp.

Classical ML

- Performed dataset exploration to identify potential trends, seasonal patterns, and features for Store Sales - Time Series Forecasting competition on Kaggle. Trained various models from linear regression to decision-tree regressors on enriched feature set.
- Identified bias towards non-fraud transactions in a Kaggle dataset on credit card fraud detection. Addressed bias by employing bagging of feature vectors and assigning weights to classifiers associated with every bag. Trained SVM with Gaussian and Polynomial kernels using two strategies.

Operating Systems

- Implemented Procs, VFS, and VM kernel modules of Weenix OS.
- Added functionality for Immediate Files in Minix OS.

Distributed Systems

- Proposed hashing techniques that address heterogeneity of node capacities in light of consistent hashing.

Databases

- Provided page buffering for the PF layer of ToyDB using LRU and MRU page replacement strategies.

Computer Architecture

- Implemented parts of processor simulator for ToyRISC ISA.

Networks

- Emulated congestion control algorithm of TCP over a UDP socket.

Publications

1. Prashanthi S.K, Sai Anuroop Kesanapalli, and Yogesh Simmhan. "Characterizing the Performance of Accelerated Jetson Edge Devices for Training Deep Learning Models". In: SIGMETRICS '23. Orlando, Florida, United States: Association for Computing Machinery, 2023, pp. 37–38. doi: 10.1145/3578338.3593530
2. Prashanthi S. K, Aakash Khochare, Sai Anuroop Kesanapalli, Rahul Bhope, and Yogesh Simmhan. "Don't Miss the Train: A Case for Systems Research into Training on the Edge". In: 2022 IEEE International Parallel and Distributed Processing Symposium Workshops (IPDPSW). 2022, pp. 985–986. doi: 10.1109/IPDPSW55747.2022.00157.
3. Prashanthi S.K, Sai Anuroop Kesanapalli, and Yogesh Simmhan. "Characterizing the Performance of Accelerated Jetson Edge Devices for Training Deep Learning Models". In: Proc. ACM Meas. Anal. Comput. Syst. 6.3 (2022). doi: 10.1145/3570604.
4. Prashanthi S. K, Sai Anuroop Kesanapalli, Aakash Khochare, and Yogesh Simmhan. "Characterizing the Performance of Deep Learning Workloads on Accelerated Edge Computing Devices". In: 28th IEEE International Conference on High Performance Computing, Data & Analytics Student Research Symposium (HiPC SRS). 2021, [Poster].
5. Sai Anuroop Kesanapalli and B. N. Bharath. "Federated Algorithm with Bayesian Approach: Omni-Fedge". In: ICASSP 2021 - 2021 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP). 2021, pp. 3075–3079. doi: 10.1109/ICASSP39728.2021.9413571.

Honors & Awards

- (2024) **Gift Award** and **Travel Grant** worth INR 600,000 and INR 50,000 respectively, by **Tata Education and Development Trust** for studies abroad.
- (2023) **J N Tata Endowment Scholarship** worth INR 900,000 for master's.
- (2023) **NSF Travel Grant** worth USD 1200 for attending SIGMETRICS co-located with ACM FCRC 2023.
- (2020) **AP grade** twice for exceptional performance during B. Tech. at IIT Dharwad.
- (2017) IIT JEE (Advanced) **All India Rank 8682** among ~171,000 candidates.
- (2015) **State Rank 1** among ~700,000 candidates in first year TSBIE Intermediate Public Examination.
- (2014) **Certificate of Merit** from CBSE Delhi for outstanding performance and for obtaining Grade **A1** in all five subjects in Secondary School Examination.