Arun George Zachariah

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EDUCATION

University of Missouri-Columbia
Ph.D., Computer Science — Spring 2020 – Summer 2022
Dissertation Title: *A System for Large-Scale Image and Video Retrieval on Everyday Scenes*
Advisor: *Dr. Praveen Rao*

University of Missouri-Kansas City
Interdisciplinary Ph.D., Computer Science (Transferred) — Fall 2018 – Fall 2019
Advisor: *Dr. Praveen Rao*

Cochin University of Science and Technology
Bachelor of Technology, Electrical and Electronics Engineering — 2008 – 2012

PROFESSIONAL EXPERIENCE

Software Engineering Manager
NVIDIA Corporation — 06/2022 – Present

Responsibilities

- Lead a cross-functional team of engineers to design and deliver scalable AI model production pipelines, ensuring efficient workflows and meeting project milestones.
- Mentor team members in advanced data engineering principles and best practices, fostering a culture of innovation and continuous improvement.
- Collaborate with stakeholders to align project goals with organizational objectives, ensuring adherence to Trustworthy AI principles throughout development and deployment.
- Architect and implement a robust data engineering pipeline for the Metropolis AI Model production system, automating data and asset handling processes to improve efficiency.
- Design an AI-assisted data labeling framework leveraging modern data-centric AI principles, enabling significant reductions in manual labeling efforts.
- Develop automated workflows to generate diverse, high-quality datasets, accelerating AI model training and deployment cycles.
- Spearhead the end-to-end planning and execution of TAO releases, optimizing release management processes and ensuring timely delivery of high-quality software.
- Engineer a user-friendly framework that abstracts away TAO model complexities, empowering users to explore and adopt AI solutions effortlessly.

Graduate Research Assistant
University of Missouri-Columbia — 02/2020 – 05/2022
University of Missouri-Kansas City — 09/2018 – 01/2020

Responsibilities

- Built a comprehensive evaluation framework for benchmarking Blind Learning against state-of-the-art privacy-preserving deep learning techniques as part of an industry-sponsored research project with TripleBlind.
- Developed a system to democratize genome sequence analysis on CloudLab as part of NSF-RAPID (CNS-2034247) and the MU Center for Biomedical Informatics.

- Developed a deep learning model to predict energy usage metrics of buildings, considering a large number of building parameters, as part of the NSF Center for Big Learning (CNS-1747751).
- Designed and tested a large-scale image retrieval system as part of the NSF Center for Big Learning (CNS-1747751).
- Built a scalable system for storage and fast retrieval of Whole Slide Images to enable next-generation image analytics, as part of the NSF I-Corps program.
- Utilized high-performance networking with RDMA and DPDK to enable lightning-fast storage and retrieval.
- Collected, processed, and analyzed data from various sources using advanced techniques and procedures to support the preparation of grant proposals or funding applications.
- Conducted customer discovery interviews as part of the NSF I-Corps program to understand industry requirements and challenges.
- Supervised students working on research projects.
- Performed additional duties as assigned by the supervisor.

Intern, Engineering

Arm Ltd. 06/2021 – 08/2021

Responsibilities

- Analyzed code to identify bottlenecks across software, micro-architecture, and architecture.
- Performed extensive experiments on real and simulated platforms to assess performance and identify optimization opportunities.
- Developed innovative tools for architectural exploration and performance analysis.
- Autonomously queued and executed benchmarks on a pool of machines using MAAS and AWS, orchestrated with Ansible and Juju.

Technology Analyst

Infosys (Consultant at Apple Inc.) 05/2013 – 08/2018

Responsibilities

- Implemented innovative systems for data collection, storage, and management of customer data, improving overall efficiency and accessibility.
- Built a custom product for customer persona data standardization, matching, de-duplication, linking, and integration into enterprise data warehouse systems.
- Successfully set up Hadoop across multiple nodes and migrated data from Oracle 10g to HBase using Sqoop for enhanced scalability and performance.
- Designed and implemented a locking and buffering mechanism using an in-memory database, resulting in a tenfold increase in processing bandwidth with the same hardware configuration.
- Transformed normalized RDBMS applications into de-normalized structures, improving response times from 200–300ms to 20–30ms.
- Developed multiple MapReduce jobs for data cleaning and pre-processing, enhancing the quality and usability of large datasets.
- Wrote optimized Hive queries to read from HBase, ensuring efficient data retrieval and processing.
- Conducted application tuning, including JVM performance tuning, database optimization, profiling, capacity planning, and health check monitoring during peak business days.
- Identified and integrated new technologies and tools to enhance product value and increase team productivity.
- Translated business goals and customer needs into prioritized product requirements and actionable use cases, ensuring alignment with organizational objectives.

- Trained, mentored, and managed a team of software engineers, fostering professional growth and ensuring successful project execution.

PUBLICATIONS

Arun Zachariah, Varun Praveen, Samuel Ochoa and Parthasarathy Sriram – "Multi-Model Workflows for Advanced Visual Understanding", In the *2025 ACM Web Conference,* Sydney, Australia, 2025 (To Appear).

Rajat Keshri, **Arun George Zachariah**, Michael Boone – "Enhancing Code Consistency in AI Research with Large Language Models and Retrieval-Augmented Generation," *arXiv preprint arXiv:2502.00611*, 2025

Nikhil Mehta, Jonathan Lorraine, Steve Masson, Ramanathan Arunachalam, Zaid Pervaiz Bhat, James Lucas, **Arun George Zachariah** – "Improving Hyperparameter Optimization with Checkpointed Model Weights". In 1*8th European Conference on Computer Vision* (ECCV) *Efficient Foundation Models* (EFM) *Workshop*, Italy, 2024.

Shijia Liao, Shiyi Lan, **Arun George Zachariah** – "EVA-GAN: Enhanced Various Audio Generation via Scalable Generative Adversarial Networks". *arXiv preprint arXiv:2402.00892*, 2024.

Arun Zachariah, Praveen Rao – "Video Retrieval for Everyday Scenes with Common Objects". In the *Annual ACM International Conference on Multimedia Retrieval* (ICMR 2023), Greece, 2023.

Praveen Rao, **Arun Zachariah** – "Enabling Large-Scale Human Genome Sequence Analysis on CloudLab". In *IEEE INFOCOM 2022 - IEEE Conference on Computer Communications Workshops* (INFOCOM WKSHPS), 2022.

Arun Zachariah, Praveen Rao, Brian Corn, and Dominique Davison – "Zero Shot Learning for Predicting Energy Usage of Buildings in Sustainable Design". In *AAAI Workshop on AI to Accelerate Science and Engineering* (AI2ASE), Canada, 2022.

Arun Zachariah, Maha Alrasheed – "Private-Share: A Secure and Privacy-Preserving De-Centralized Framework for Large Scale Data Sharing". In Proc. of the *3rd ACM International Conference on Multimedia in Asia* (ACM MM Asia 2021), Australia, 2021.

Praveen Rao, **Arun Zachariah**, Deepthi Rao, Peter Tonellato, Wesley Warren and Eduardo Simoes – "Accelerating Variant Calling on Human Genomes Using a Commodity Cluster". In the *30th ACM International Conference on Information and Knowledge Management* (CIKM), Australia, 2021 (Nominated for Best Short Paper Award).

Suveen Angraal, **Arun Zachariah**, Raaisa Raaisa, Rohan Khera, Praveen Rao, Harlan M Krumholz, and John A Spertus – "Evaluation of Internet-based Crowdsourced Fundraising to Cover Healthcare Costs in the United States". In *JAMA Network Open*, 4(1), 2021.

Arun Zachariah, Mohamed Gharibi, Praveen Rao – "A Large-Scale Image Retrieval System for Everyday Scenes". In Proc. of the *2nd ACM International Conference on Multimedia in Asia* (ACM MM Asia 2020), Singapore, 2021.

Nouf Alrasheed, **Arun Zachariah**, Shivika Prasanna, Deepthi Rao, and Praveen Rao – "Deepfakes for Histopathology Images: A Myth or Reality?". In *49th Annual IEEE Applied Imagery Pattern Recognition (AIPR) Workshop 2020: Trusted Computing, Privacy, and Securing Multimedia*, Washington, D.C., 2020.

Arun Zachariah, Mohamed Gharibi, Praveen Rao – "QIK: A System for Large-Scale Image Retrieval on Everyday Scenes with Common Objects". In the *10th International Conference on Multimedia Retrieval* (ICMR 2020), Dublin, Ireland, 2020.

Mohamed Gharibi, **Arun Zachariah** and Praveen Rao – "FoodKG: A Tool to Enrich Knowledge Using Machine Learning Techniques". In *Frontiers in Big Data*, Volume 3, 2020.

Daniel E. Lopez Barron, Praveen Rao, Deepthi Rao, Ossama Tawfik, **Arun Zachariah** – "Large-Scale Storage of Whole Slide Images and Fast Retrieval of Tiles Using DRAM". In *2020 SPIE Defense + Commercial Sensing: Big Data II: Learning, Analytics, and Applications Conference* (11395), Anaheim, CA, 2020.

Arun Zachariah, Praveen Rao, Anas Katib, Monica Senapati, Kobus Barnard – "A Gossip-Based System for Fast Approximate Score Computation in Multinomial Bayesian Networks". In the *35th IEEE International Conference on Data Engineering* (ICDE), Macau, China, 2019.

PATENTS

Shijia Liao, Shiyi Lan, **Arun George Zachariah**, Subhashree Radhakrishnan – "Audio Generation and Augmentation using Generative Neural Networks", *19/025,317* (Jan 2025) (Under Review)

Rajat Keshri, **Arun George Zachariah**, Michael Boone, Kimberly Truong – "Neural Network Retraining According to Data Set Differences", *19/005,897* (Dec 2024) (Under Review)

Kimberly Truong, **Arun George Zachariah**, Rajat Keshri, Michael Boone – "Automatical Generation and Maintenance of Data Cards for Datasets", *18/825,954* (Sept 2024) (Under Review)

Rajat Keshri, **Arun George Zachariah**, Michael Boone, Kimberly Truong – "Automatic Model Card Generation for Machine Learning Models", *18/811,020* (July 2024) (Under Review)

Steve Masson, Ramanathan Arunachalam, **Arun George Zachariah**, Varun Praveen – "Scalable Cloud Execution of Machine Learning Tasks", *18/774,660* (June 2024) (Under Review)

Kimberly Truong, **Arun George Zachariah**, Michael Boone, Nikki Pope – "Bias Detection and Mitigation for Machine Learning Models", *18/813,740* (June 2024) (Under Review)

Parthasarathy Sriram, Farzin Aghdasi, **Arun George Zachariah**, Varun Praveen – "Automated Media Content Recognition for Understanding Multimedia", *18/673,972* (May 2024) (Under Review)

Steve Masson, Ramanathan Arunachalam, Nikhil Mehta, Farzin Aghdasi, Jonathan Lorraine, Zaid Pervaiz Bhat, **Arun Geroge Zachariah** – "Neural Network Performance Based Search", *18/660,182* (May 2024) (Under Review)

TECHNICAL SKILLS

- **Programming Languages:** C, C++, Java, Python, R, Scala
- **Machine Learning & Deep Learning:** TensorFlow, PyTorch, Keras, scikit-learn, Caffe, Hugging Face, OpenCV, SpaCy, NLTK
- **Data Engineering & Big Data:** Hadoop, Spark, Kafka, Hive, HBase, Greenplum, MongoDB, PostgreSQL, MySQL, Amazon S3, Apache Airflow, Dataflow, Luigi, Pandas, NumPy, SciPy, Dask

- **Cloud Platforms & Infrastructure:** AWS (EC2, Lambda, S3, SageMaker), Google Cloud (BigQuery, Dataflow), Azure, Docker, Kubernetes, Jenkins, Terraform, Ansible, CI/CD pipelines
- **DevOps & Version Control:** Git, GitHub, GitLab, SVN, Maven, Gradle, sbt, Ant
- **Web Technologies & Visualization:** HTML5, JavaScript, jQuery, AngularJS, Matplotlib, Seaborn, Plotly, TensorBoard, Neo4j, TinkerPop, Elasticsearch, Solr
- **J2EE Technologies:** Servlets, JSP, Web Services

ACADEMIC SERVICES

Program Committee Member

- 14th International Conference on Multimedia Retrieval 2024
- 5th International Workshop on Health Data Management in the Era of AI. 2022
  (held in conjunction with EDBT/ICDT 2023)

External Reviewer

- The 4th International Conference on Electrical, Computer, Communications and Mechatronics Engineering 2024
- 40th International Conference on Data Engineering 2024
- Journal of Engineering Research and Sciences 2024
- 4th IEEE International Conference on Electrical, Computer, and Energy Technologies 2024
- IEEE International Conference on Artificial Intelligence, Computer, Data Sciences and Applications 2024
- 3rd IEEE International Conference on Electrical, Computer, and Energy Technologies 2023
- 23rd IEEE International Conference on Mobile Data Management 2022
- NeurIPS Workshop on Human and Machine Decisions 2021
- 23rd International Conference on Big Data Analytics and Knowledge Discovery 2021
- 30th International Conference on Computer Communications and Networks 2021
- 4th International Conference on Connected and Autonomous Driving (MetroCAD) 2021
- Cluster Computing Journal – Springer 2020
- 8th International Conference on Big data and Cloud Computing 2020
- 8th IEEE International Conference on Healthcare Informatics 2020
- 25th International Conference on Pattern Recognition 2020
- 22nd International Conference on Big Data Analytics and Knowledge Discovery 2020
- 21st IEEE International Conference on Mobile Data Management 2020
- 8th International Conference on Big Data Analytics 2020
- 32nd Conference on Graphics, Patterns and Images SIBGRAPI 2019
- 7th International Conference on Big data and Cloud Computing 2019
- 7th International Conference on Big Data Analytics 2019
- 21st International Conference on Big Data Analytics and Knowledge Discovery 2019

Mentorship

- Global Mentorship Initiative 2022, 2023, 2024
- KaggleX BIPOC Mentorship Program 2023

Conference Workshops Conducted/Volunteered

- Upsilon Pi Epsilon - After School Program 2021
- ACM/Code.org Hour of Code at Centro Latino 2021
- 35th Conference on Neural Information Processing Systems (NeurIPS) 2021
- 34th Conference on Neural Information Processing Systems (NeurIPS) 2020
- ICBCC - Fundamentals of Deep Learning for Computer Vision 2019

- 7th International Conference on Big data and Cloud Computing 2019
- Deep Learning Fundamentals for Computer Vision. 2019

AWARDS AND GRANTS

- 3rd place at the 38th Annual Research & Creative Activities Forum 2022
- 35th NeurIPS Student Volunteer Registration 2021
- Upsilon Pi Epsilon Scholarship Award 2021
- ACM SIGMM Travel Grant 2021
- VLDB SPEND grant 2021
- MU Graduate Professional Council Research Development Award 2021
- 34th NeurIPS Student Volunteer Registration 2020
- UMKC School of Graduate Studies Travel Grant 2019
- Student Activity Fee Committee Travel Grant 2019
- CSEE Balaji Krithikaivasan Memorial Travel Grant 2019