Darryl Cherian Jacob

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Research Interests: Computer Science and Software Engineering, Deep Learning, Reinforcement Learning for Explainable Systems, Computer Vision.

Education

Ph.D. Computer Science and Software Engineering - Auburn University
Auburn, AL — Aug 2024 – Present

M.S. Computer Science - Georgia Institute of Technology
Atlanta, GA — Aug 2022 – May 2024
Specialization: Machine Learning.

B.S. Computer Science - Texas A&M University
College Station, TX — Aug 2016 – May 2020
Minor: Mathematics.

Work Experience

Technical Program Manager, Microsoft Corporation
Redmond, WA — Oct 2020 – Aug 2022

- Created KPIs on Azure DevOps to improve Privacy and Transparency across Browsers, Settings, and Windows Security APIs.
- Reported progress to Senior Leadership Team during Monthly Business Reviews.
- Designed feature to inform applications when used by minors.
- Enabled compliance with the UK Age-Appropriate Design Code
- Avoided $22 million in fines.
- Delivered Camera, Microphone, and Location Usage History.
- Increased Monthly Active Usage (MAU) for Privacy Settings pages by 1 million users.

KBR Intern, NASA Ames Research Center
Mountain View, CA — May 2019 – July 2019

- Deployed physics-based optimization solvers to Linux HPC resources.
- Published statistics and plots by writing Python scripts to process experiment data.
- Developed nodejs interface for quantum optimization algorithms through a RESTful API.
- NoSQL MongoDB to store job, user, and group information.
- Dockerized application for quick deployment to production cloud infrastructure.

Research Experience

Graduate R&D Intern, Southwest Research Institute
San Antonio, TX — May 2023 – Aug 2023

- Created traffic simulator for the U.S. EPA's Energy Efficient Mobility Systems program.
- Trained Reinforcement Learning agent to control all traffic lights in an urban corridor.
- Reduced average trip time per vehicle by >15%.
- Modeled degradation of LG M50T and E78X batteries with Kernel Lasso Regression.
- Increased accuracy by 10% compared to leading physics-based models.

- Presented results to Senior Leadership Teams at leading automotive and battery manufacturers.

AI and Research Intern, Microsoft
Redmond, WA May 2018 – July 2018

- Developed simulator for particles in time-varying magnetic field like an MRI machine.
- Reduced time to simulate tissue by 20x on a 32-core machine by implementing 4th order Runge-Kutta ODE simulator in C++ and multithreading solution using OpenMP.
- Improved accuracy for automatic tissue classifier and robustness to patient noise by speeding up search for best parameters using Continuous Simulated Annealing.
- Presented with Case Western Reserve University at the Microsoft Build 2018.

Research Assistant, Computational and Data Intensive Physics Group
College Station, TX Feb 2017 – May 2020

- Deployed physics-based Markov Chain Monte-Carlo optimization algorithms (e.g. Simulated Annealing, Parallel Tempering) to High Performance Computing resources.
- Produced statistics and plots for publications by writing Python scripts to process data from HPC runs.
- Developed "Feeding the Multitude", a polynomial time algorithm that generates new solutions to optimization problems from existing pool of solutions.

Publications

1. "OracleTSC: Oracle-Informed Reward Hurdle and Uncertainty Regularization for Traffic Signal Control" - Accepted by Transactions in Machine Learning Research.
2. "Automated design of pulse sequences for magnetic resonance fingerprinting using physics-inspired optimization" - Proceedings of the National Academy of Sciences.
3. "Quantum-Inspired RF Pulse Optimization" - International Society for Magnetic Resonance in Medicine.
4. "From Near to Eternity: Spin-glass planting, tiling puzzles, and constraint satisfaction problems" - Physical Review E.
5. "Feeding the multitude: A polynomial-time algorithm to improve sampling" - Physical Review E.

Selected Teaching Experience

CSE 6740 - Data Analysis, Georgia Institute of Technology
Atlanta, GA Aug 2023 – Dec 2023

- Taught 200 students about the Game Theoretic basis for Online Learning, link between regret and generalization risk, and exponential weights algorithm.

MATH 442 - Mathematical Modeling, Texas A&M University
College Station, TX Jan 2020 – May 2020

- Taught 30 students how to model natural phenomena using Ordinary Differential Equations and basic CS tools like the UNIX shell and GIT.
- Introduced curriculum where students model a stock's price by estimating hyper-parameters parameters for a Stochastic Differential Equation that best explains the current trajectory.