Arjun Ashok Rao

CONTACT INFORMATION

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EDUCATION

The Chinese University of Hong Kong (CUHK)
Bachelor of Engineering in Financial Technology (Systems Engineering)
GPA: 3.534 — Latest Term: 3.85 — Dean's List 2018-2021
Selected Coursework: Machine Learning, Stochastic Models, Optimization Methods, Numerical Analysis, Discrete Mathematics, Data Structures, Human-Computer Interaction

EXPERIENCE

NASA Jet Propulsion Laboratory, Caltech, Pasadena, CA **06/2021—Present**
Machine Learning and Instrument Autonomy Group

Working in collaboration with the Imaging Spectroscopy group on improving **robustness** of machine learning models on-board large-scale imaging spectrometers for methane emission detection. My research centers around utilizing synthetic methane data generated through Large Eddy Simulations (LES) to improve robustness for **OoD detection** problems. We proposed novel optimization techniques that is built to withstand distribution shift, domain-seperated datasets, and noisy labels. Conference submission under review.

Advisors: **Dr. Andrew Thorpe**, **Dr. Steffen Mauceri**, **Dr. Brian Bue**.

Fellowship: Caltech SURF Award.

The Chinese University of Hong Kong, Hong Kong **05/2020—09/2020**
Research Intern, Department of Computer Science and Engineering

Studied the effect of adversarial perturbations (PGD, FGSM) on stereo-based object detection in autonomous systems. Discovered that adversarial examples compromise stereo disparity perception and cause large and inaccurate region proposals on background elements. Developed a novel adversarial training algorithm *SmoothStereo* which uses left-right feature map regularization and enforces local linearity of the loss surface to deliver robustness to common stereo-based computer vision models within a moderate perturbation set. *SmoothStereo* demonstrated superior robustness with a more convex loss-landscape, lesser gradient obfuscation.

Advisor: **Professor Bei Yu**

The Chinese University of Hong Kong, Hong Kong **09/2020—06/2021**
Research Intern, Network Science and Optimization Laboratory

Decentralized training of deep neural networks over a sparse graph topology normally requires a consensus among workers on the underlying parameter distribution. We study the convergence and generalization properties of decentralized gossip algorithms used to train **large-width** networks. Our worked empirically showed the invariance of convergence and consensus between workers to neural network width/ problem dimensionality.

Advisor: **Professor Hoi-To Wai**

PUBLICATIONS

Qi Sun, **Arjun Ashok Rao**, Xufeng Yao, Bei Yu, Shiyan Hu.
"Counteracting Adversarial Attacks in Autonomous Driving"
IEEE/ACM International Conference on Computer-Aided Design (**ICCAD**), Westminster, CO, Nov. 2-5, 2020. (Invited Paper)

Arjun Ashok Rao, Hoi-To Wai.
"An Empirical Analysis on Compressed Decentralized Stochastic Gradient Algorithms with Over-parameterized Models"
Asia-Pacific Signal and Information Processing Association Annual Summit and Conference (**APSIPA**), 2021

Work Experience

Asiabots, Hong Kong **04/2020—06/2020**
Machine Learning Intern, Asiabots Voice AI

Developed a semi-supervised Ladder-VAE based TTS Model For emotion and speech generation. Improved model understanding by developing algorithms to sample latent space of VAEs and generate speech prosody changes with alteration in high-dimensional latent variables.

LSCM R&D Centre, Hong Kong **06/2019—08/2019**
Summer Intern, Financial Technology R&D Department

Built an attention-transformer model for Chinese to English legal document translation. Our machine translation model demonstrated significant BLEU score improvements and captured essential context in legal documents.

Honors and Awards

Caltech SURF@JPL 2021

Dean's List (2018-20): Awarded for year GPA = 3.8, top 10% of cohort

CUHK Admission Scholarship (2018 – Present)

Faculty of Engineering Admission Scholarship, CUHK (2018 – Present)

CUHK Outstanding Student Award for community service at the International Student Association ISA-CUHK

Microsoft Learn Student Ambassador

Outreach

Winner: Cyberport University Partnership Program (CUPP): 100K Hong Kong Dollar seed funding to develop Flux — a Reinforcement Learning powered financial planner.

International Student Association at CUHK - Information Technology Officer (Feb 2019 - Feb 2020)

Volunteer Educator, Sri Ramana Maharishi School for the Blind - Spent two years as a volunteer part-time computer science instructor for visually disabled students in Bangalore, India. Helped teach concepts in data structures, algorithms, and basic computing.