ARJUN ASHOK RAO

ARJUNASHOKRAO.ME ARJUNRAO@LINK.CUHK.EDU.HK

RESEARCH INTERESTS

Robust Machine Learning, Decentralized Optimization, Generalization

EDUCATION

The Chinese University of Hong Kong (CUHK) Expected Graduation: 07/2022
Bachelor of Engineering in Financial Technology
CGPA: 3.534 — Latest Term: 3.85
Selected Coursework: Machine Learning, Stochastic Models, Optimization Methods, Discrete Mathematics, Data Structures, Human-Computer Interaction, Linear Algebra and Vector Calculus

RESEARCH EXPERIENCE

The Chinese University of Hong Kong Hong Kong SAR
Undergraduate Research Intern: Professor Hoi-To Wai's Group *September 2020 – Present*

- Convergence rates of gossip algorithms for non-convex, Lipschitz-smooth problems are normally bounded by number of workers, graph topology (spectral gap of mixing matrix), and number of iterations.
- We study the convergence and generalization properties of decentralized gossip algorithms used to train **large-width** networks on decentralized systems. We develop convergence bounds on decentralized optimization algorithms using over-parameterized networks and analyze the change in convergence rates on distributed systems with varying conditions – including gradient quantization, regularization, and infinite width settings.

The Chinese University of Hong Kong Hong Kong SAR
Summer Research Intern: Professor Bei Yu's Group *May 2020 – September 2020*

- 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

PUBLICATIONS

Conference Papers

- 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)

WORK EXPERIENCE

LSCM R&D Centre Cyberport, Hong Kong
Summer Intern, Financial Technology R&D Dept *June 2019 – August 2019*

- 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.

Asiabots Limited Hong Kong Science and Technology Park, Hong Kong
Summer Intern, Asiabots Voice AI *April 2020 – June 2020*

- 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.

ACADEMIC AWARDS & ACHIEVEMENTS

- CUHK Admission Scholarship (2018 – Present) Awarded for Outstanding Academic Performance
- Faculty of Engineering Admission Scholarship, CUHK (2018 – Present)
- CUHK Outstanding Student Award for community service at the International Student Association ISA-CUHK
- Dean's List (2019-20): Awarded for year GPA = 3.8, top 10% of cohort
- Microsoft Learn Student Ambassador: Selected to the Microsoft Developer network for excellent research and project experience

EXTRACURRICULARS, 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.