ARJUN ASHOK RAO

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#330, CW Chu College, The Chinese University of Hong Kong, N.T, Hong Kong SAR

CURRENT RESEARCH INTERESTS

Computer Vision, Robust optimization for Deep Learning, Adversarial Examples, Stereo Vision and geometry.

EDUCATION

The Chinese University of Hong Kong   Expected Graduation: 07/2022
Bachelor of Engineering
Major in Financial Technology
Minor in Data Analytics and Informatics
GPA: 3.45 — Latest Term: 3.82
Courses Taken: Optimization Methods, Probability and Statistics for Engineers, Discrete Mathematics, Data Structures, Introduction to Data Science, Fundamentals of Financial Engineering.

RESEARCH EXPERIENCE

The Chinese University of Hong Kong   May 2020 - Present
Undergraduate Researcher – Professor Bei Yu's Research Group

Studied the effect of adversarial perturbations on stereo-regression models under the supervision of *Professor Bei Yu*. Adversarial examples generated via gradient-optimization techniques (PGD, FGSM) affect stereo-depth/disparity perception. Our stereo-adversarial training algorithm *SmoothStereo* improves model robustness by regularizing left-right stereo pair regression feature maps $f_l(x_l)$ and $f_r(x_r)$. We enforce local linearity of the loss surface by upper bounding the regularization term with the remainder of its first-order Taylor expansion. *SmoothStereo* exhibits greater adversarial robustness within a moderate perturbation set $\delta \in \Delta_\epsilon$ with comparatively lesser gradient obfuscation and beats standard adversarial training for stereo-image based 3D object detection in autonomous driving. Our work was accepted to ICCAD '20 as an invited paper.

PUBLICATIONS

Conference Papers

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

WORK EXPERIENCE

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

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

Datality Lab   April 2020 - June 2020
Software Engineering Intern   Kwun Tong, Hong Kong

Worked on *Moodie.ai* - a body movement detection and classification system for market research. Responsible for writing software to detect and classify over 50 body gestures coupled with emotion classification to analyze consumer behavior.

LSCM R&D Centre June 2019 - August 2019

Summer Intern, Financial Technology R&D Dept Cyberport, Hong Kong

Freshman year summer internship: Worked on a learning-based machine translation model for understanding document-level context in English and Chinese legal documents. My tasks included writing language-invariant pre- processing algorithms using text-mining and deep learning. Trained on a Transformer-attention model to significantly improve BLEU translation scores, and was able to capture essential legal context in text.

AWARDS, OUTREACH, LEADERSHIP

- Microsoft Learn Student Ambassador

- CUHK Admission Scholarship for Outstanding Academic Achievement

- Faculty of Engineering Admission Scholarship

- CUHK Outstanding Student Award for community service

- Finalist - Cyberport University Partnership Program (CUPP) For Flux - A Reinforcement Learning based Financial Planner

- Winner, Huawei AI Developer Competition (Hong Kong and China) for our image classifier. Presented findings to Huawei AI Cloud Team

- 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.