FANGCHEN (CATHERINE) LIU

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EDUCATION

University of California San Diego Sep. 2018 – Present
M.S. in Computer Science – thesis track, GPA: 3.87/4.0
Peking University, Beijing, China, Sep. 2014 – Jul. 2018
B.S. in Computer Science with Honor – summa cum laude, GPA: 3.67/4.0 (top 10%)

CORE COURSES

UCSD: Convex Optimization (A+), Machine Learning on Geometric Data (A+), Stochastic Process (A+), Statistical Learning (A)
PKU: Advanced Mathematics I (98), Advanced Mathematics II (96), Advanced Algebra (90), Honored Operation System Programming (92), Honored Computer Networks Programming (96), Embedded System Programming (90)

RESEARCH INTEREST

I am interested in understanding the environments for interactions and through interactions. I have research experience in reinforcement learning (a NeurIPS paper), imitation learning (an ICLR submission), and 3D perception (a CVPR submission). I also worked on 2D image adversarial defense (a CVPR paper) and autonomous driving dataset construction (an arXiv with 169 Google Scholar citations as of Nov 3, 2019).

PUBLICATIONS

$*$ *indicates equal contribution*

- SAPIEN: a SimulAted Part-based Interactive ENvironment. Fanbo Xiang, Yuzhe Qin, Kaichun Mo, Yikuan Xia, Hao Zhu, **Fangchen Liu**, Minghua Liu, Li Yi, He Wang, Angel Chang, Leonidas Guibas, Hao Su. *In Submission to CVPR*, 2020
- State Alignment-based Imitation Learning. **Fangchen Liu**, Zhan Ling, Tongzhou Mu, Hao Su. *In Submission to ICLR*, 2020
- Mapping State Space using Landmarks for Universal Goal Reaching. **Fangchen Liu***, Zhiao Huang*, Hao Su. *NeurIPS*, 2019
- Adversarial Defense by Stratified Convolutional Sparse Coding. Bo Sun, Nian-hsuan Tsai, **Fangchen Liu**, Ronald Yu, Hao Su. *CVPR*, 2019
- Effective Master-Slave Communication On a Multi-Agent Deep Reinforcement Learning System. Xiangyu Kong, **Fangchen Liu***, Bo Xin*, Yizhou Wang. *NIPS Hierarchical Reinforcement Learning Workshop*, 2017
- BDD100K: A Diverse Driving Video Database with Scalable Annotation Tooling. Fisher Yu, Wenqi Xian, Yingying Chen, **Fangchen Liu**, Mike Liao, Vashisht Madhavan, Trevor Darrell. *arXiv:1805.04687*

RESEARCH EXPERIENCE

Reinforcement/Imitation Learning for Robot Manipulation in 3D Simulated Environments Oct. 2019 – Present

Research Assistant at University of California San Diego, advised by Prof. Hao Su

- Help build 3D environments for robot manipulation in a PhysX-based simulator developed in SU Lab
- Use goal-conditioned reinforcement learning and imitation learning methods to solve robot manipulation tasks (e.g., door opening)
- Use PointNet++ to generate grasping proposal and predict object mobility
- Submitted to CVPR 2020

Imitation Learning between Heterogeneous Actors Jul. 2018 – Oct. 2019

Research Assistant at University of California San Diego, advised by Prof. Hao Su

- Attack the imitation learning problem when experts and imitators have different dynamics
- Use state-based Variational Auto-Encoder to robustify behavior cloning and Wasserstein distance to measure imitation progress
- Combine local and global constraints by reformulating the objective of Proximal Policy Optimization (PPO) algorithm
- Submitted to ICLR 2020

Model-based Reinforcement Learning and Planning Dec. 2018 – May. 2019

Research Assistant at University of California San Diego, advised by Prof. Hao Su

- Combine reinforcement learning with search algorithms to solve long-horizon planning and exploration problems on a graph-based hierarchical environment model
- Use farthest point sampling to find landmarks in the replay buffer
- Achieve SOTA on learning-based goal-conditioned robot control, manipulation, and navigation benchmarks (AntMaze, PointMaze, FetchReach, FetchPush, etc)
- Accepted by NeurIPS 2019

Adversarial Defense by Convolutional Sparse Coding Oct. 2018 – Nov. 2018

Research Assistant at University of California San Diego, advised by Prof. Hao Su

- Implement a patch-based dictionary learning baseline for adversarial defense
- Accepted by CVPR 2019

Hierarchical Multi-Agent System in Video Game Playing Oct. 2017 – Mar. 2018

Research Assistant at Peking University, advised by Prof. Yizhou Wang & Dr. Bo Xin

- Propose a hierarchical multi-agent framework for video game playing, outperformed DeepMind's baseline on StarCraft II at the time
- The global agent uses an SSD-like detection algorithm to get object proposals and generate an schedule plan for local agents

- Use an LSTM to aggregate every low-level agent's observations, and use A3C to train the local policy
- Part of the results can be founded in the arXiv report: arXiv:1712.07305

WORKING EXPERIENCE

Intern at Microsoft Research Asia Sep. 2017 – Mar. 2018

- Work on multi-agent video game playing

Intern at SenseTime AI Sep. 2016 – Mar. 2017

- Work on face recognition and detection

TEACHING EXPERIENCE

TA for Introduction to Computer Vision, UCSD	Sep. 2019 – Dec. 2019
Seminar on Advanced Optimization, UCSD	Sep. 2019 – Dec. 2019
Seminar on Convex Optimization, UCSD	Feb. 2019 – May. 2019
Seminar on Spectral Graph Theory, UCSD	Sep. 2018 – Dec. 2018
TA for Algorithm Design and Analysis, Peking University	Feb. 2017 – Jun. 2017

HONORS AND AWARDS

Honored Bachelor of Science in Peking University	Jul. 2018 (30 in 350)
Member of Top-Notch Program in PKU (renamed as Turing Class now)	Jul. 2016 - Jul. 2018
Guanghua Scholarship	Mar. 2015 & Mar. 2017 (Twice)
Merit Student in Academic Study	Mar. 2016 & Mar. 2017 (Twice)
First-prize in Chinese Mathematical Olympiad in Senior, Shandong Province	Dec. 2013