FANGCHEN (CATHERINE) LIU

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EDUCATION

University of California San Diego   Sep. 2018 − Jun. 2020 (expected)
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   *view link*
Overall GPA: 3.67/4.0 (top 10%)   Major GPA: 3.72/4.0 (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, and combing actuation and perception to build intelligent agents. My past research experience mainly lies on the algorithms of reinforcement learning and imitation learning. I also worked on 3D vision, robot manipulation (a CVPR submission), 2D image adversarial defense (a CVPR paper) and autonomous driving dataset construction (an arXiv report with 202 Google Scholar citations as of Dec. 14, 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, Hanxiao Jiang, Yifu Yuan, 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 (Currently with positive review scores: 3, 6, 8)

- 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

- Revisiting the Master-Slave Architecture in Multi-Agent Deep Reinforcement Learning. Xiangyu Kong, **Fangchen Liu***, Bo Xin*, Yizhou Wang. *arXiv:1712.07305*

- 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

Learning-based Robot Manipulation in 3D Simulated Environments　　Oct. 2019 − Present
Research Assistant at University of California San Diego, advised by Prof. Hao Su

- Build robot manipulation environments in a PhysX-based simulator developed in SU Lab

- Use PointNet++ to encode object mobility and generate state representations

- Use reinforcement learning algorithms to solve robot manipulation tasks (e.g., door opening, drawer pulling), and test its generalizability for unseen objects

- 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 and morphologies

- Use state-based Variational Auto-Encoder to robustify behavior cloning and Wasserstein distance to measure global imitation progress

- Combine local and global constraints by reformulating the optimization objective of Proximal Policy Optimization (PPO) algorithm

- Submitted to ICLR 2020 with positive review scores (average 5.67)

Task-Oriented Reinforcement Learning and Planning　　Dec. 2018 − May. 2019
Research Assistant at University of California San Diego, advised by Prof. Hao Su

- Propose to 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, and build a graph-based environment abstraction in an end-to-end framework

- Achieve SOTA on goal-oriented robot control, manipulation, and navigation tasks and outperform hierarchical reinforcement learning algorithms

- 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
Intern at Microsoft Research Asia, advised by Prof. Yizhou Wang & Dr. Bo Xin

- Propose a hierarchical multi-agent framework for video game playing, outperformed Deep-Mind's baseline on StarCraft II at the time

- The global agent uses an SSD-like detection algorithm to get object proposals and generates a schedule plan for local agents

- Propose to use LSTM for multi-agent communication by aggregating every low-level agent's observation, and train a shared local policy using A3C

- Part of the results can be founded in the arXiv report: arXiv:1712.07305

Face Set Recognition   Sep. 2016 − Mar. 2017
Intern at SenseTime AI, advised by Dr. Yi Sun

- Work on face set recognition using memory networks

- Implement a memory module acting like Neural Turing Machine to aggregate a set of features belonging to the same ID

- Some works on face recognition and detection were integrated into the company's products and internal deep learning frameworks

TEACHING EXPERIENCE

TA for Introduction to Convex Optimization, UCSD	Dec. 2019 − Feb. 2019
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, EECS Department	Jul. 2018 (30 in 350)
Excellent Graduate Award	Jul. 2018
Member of the Elite 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	Dec. 2013

SERVICE

Reviewer for CVPR 2020