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
Overall GPA: 3.67/4.0 (top 10%), Advanced GPA: 3.82/4.0 (top 2%)

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 want to further explore the combination of actuation and perception. My past research experience focuses on the core 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 181 Google Scholar citations as of Nov 26, 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 (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

- Help build 3D environments for robot manipulation 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)
- 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 with positive review scores (3, 6, 8)

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
Intern at Microsoft Research Asia, 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

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, which was integrated in their internal deep learning framework

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, 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