

# Tianyang ZHAO (Steven)

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<https://programminglearner.github.io/>

## EDUCATION

### Department of Statistics, UCLA

Los Angeles, CA

- Ph.D. Candidate Student, advised by **Prof. Ying Nian Wu**, collaborate with *Prof. Song-Chun Zhu* Sept 2019 -
- VCLA research group, <https://vcla.stat.ucla.edu/people.html>

### Yuanpei College, Peking University

Beijing, China

- Bachelor of Science in Data Science and Big Data Technology, Aug 2015 - Jul 2019
- GPA (Junior Year): **3.70/4.0**; TOEFL: **111/120**;
- Core Courses: Statistical Learning / Reinforcement Learning / Computer Vision & Deep Learning / Mathematical Statistics / Probability Theory / Algebraic Structure & Combinatorial Mathematics / Numerical Methods / Mathematical Analysis / Intro to Data Science / Intro to Computation / C&C++ / Data Structure & Algorithm / Algorithm Design & Analysis / Intro to Computer Systems / Compiler Design / Computer Networks / Database Systems (Honor Track)

### The High School Affiliated to Renmin University of China (RDFZ)

Beijing, China

## PUBLICATIONS

- **Tianyang Zhao**, Yifei Xu, Mathew Monfort, Wongun Choi, Chris Baker, Yibiao Zhao, Yizhou Wang, Ying Nian Wu. Multi-Agent Tensor Fusion for Contextual Trajectory Prediction. **IEEE Conference on CVPR 2019**;
- Yifei Xu, Jianwen Xie, **Tianyang Zhao**, Chris Baker, Yibiao Zhao, Ying Nian Wu. Energy-Based Continuous Inverse Optimal Control. *ArXiv:1904.05453*.

## RESEARCH EXPERIENCE

### Multi-Agent Trajectory Prediction for Autonomous Driving with Deep Learning and Inverse Optimal Control

UCLA, Los Angeles, CA; ISEE Inc, Cambridge, MA

Research Assistant, Advisor: **Ying Nian Wu**, Professor at Department of Statistics, UCLA Jun 2018 – Mar 2019

Co-advisors: **Wongun Choi**, **Chris Baker**, **Yibiao Zhao**, research scientists at ISEE, an MIT autonomous driving start-up

- Proposed, implemented, and trained a novel Multi-Agent Convolutional Tensor Fusion model to reason about social interactions among varying numbers of agents & between agents and scene contexts, which retains the spatial structure of agents and the scene;
- Implemented a CGAN to learn a joint distribution of multi-agent trajectories based on the proposed Fusion model;
- Conducted ablative studies on Stanford Drone and NGSIM datasets, outperformed *Social GAN*;
- Paralleled the Multi-Agent code on GPU; presented the paper at *CVPR 2019*; published the source code on Github;
- Participated in proposing another Inverse Optimal Control (IOC) based prediction approach, which learns non-Markovian cost functions defined over entire trajectories; participated in extending weighted feature-based cost functions to neural network augmented ones; completed a manuscript submitted to *ArXiv*.

### Music Generation with Hierarchical Deep Reinforcement Learning, EECS, Peking University

Beijing, China

### Computer Vision and Digital Art (CVDA) research group

Jun 2017 - Jun 2018

Research Assistant, Advisor: **Yizhou Wang**, Professor at School of Electronics Engineering and Computer Science, PKU

- Proposed novel hierarchical LSTM architectures and corresponding RL algorithms to learn long-range consistency for sequence modeling, and to generate music by combining learned patterns from dataset with structured domain knowledge;
- Designed the architecture as follows: a higher level learns correlations across measures and patterns for chord progressions, and a lower level learns a distribution over the notes to generate within a measure; the two operate at different clock rates while communicating with each other;
- Generated samples via supervised learning: <https://github.com/HAPPIER-Music/> ; completed a manuscript.

## OPEN SOURCE PROJECTS

- Proficient in C++, C, python, TensorFlow, PyTorch.
- **Chinese Chess Program Developing and AI Designing with Novel Heuristic  $\alpha$ - $\beta$  Tree Search**: Developed a Chinese Chess game program from scratch; Proposed and implemented a novel approach of  $\alpha$ - $\beta$  tree search based on heuristic methods; Proved its superiority over conventional  $\alpha$ - $\beta$  tree search w.r.t. time complexity and winning rate; 3k+ lines in C++.
- **Automatic Back-Propagation**: Implemented automatic BP algorithm for any given DAG and Neural Nets from scratch, which calculated the backward path automatically, given any forward path.

## AWARDS AND HONORS

- Merit Student (top 10%), Peking University, Nov 2017;
- 5 of 318, Botzone AI contest (Reversi), Peking University;
- Meritorious Winner (top 15%), Mathematical Contest in Modeling (MCM), Feb 2018;
- 3rd Prize, ACM Programming Contest in Peking University, May 2017