Jiayi Weng

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Education

August 2016
– July 2020

Tsinghua University, Beijing, China

B.Eng. (Expected) in Computer Science and Technology

GPA: 3.8/4.0 (Major: 3.82, Overall: 3.75), **Rank:** 17/158 ($\sim$10%)

Course Highlights: Fundamentals of Computer Graphics (A^+), Database Special Topic Training (A^+), Data Structures (A), Artificial Neural Networks (A), Foundation of Object-Oriented Programming (A)

Publications and/or Submitted Manuscripts

August 2019
Playing FPS Game with Environment-aware Hierarchical Reinforcement Learning

Shihong Song*, **Jiayi Weng***, Hang Su, Dong Yan, Haosheng Zou, and Jun Zhu
The 28th International Joint Conferences on Artificial Intelligence (IJCAI 2019). Oral Presentation. Acceptance rate: 17.9% (850/4752). *co-first author

November 2018
URBER: Ultrafast Rule-Based Escape Routing Method for Large-Scale Sample Delivery Biochips

Jiayi Weng, Tsung-Yi Ho, Weiqing Ji, Peng Liu, Mengdi Bao, and Hailong Yao
IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD)

March 2019
Model-based Credit Assignment for Model-free Deep Reinforcement Learning

Dong Yan, **Jiayi Weng**, Shiyu Huang, Chongxuan Li, Yichi Zhou, Hang Su, and Jun Zhu
IEEE Transactions on Neural Networks and Learning Systems (TNNLS), submitted

Professional Experiences

July 2019
– Present

Montreal Institute for Learning Algorithms (MILA)   Université de Montréal (UdeM)

Advisor: Professor Yoshua Bengio

Working on Rule-Transformer based on the Consciousness Prior
- Proposed the Rule-Transformer model by integrating the Consciousness Prior and programming language into Transformer architecture for better disentanglement
- Implemented the Rule-Transformer by incorporating a novel self-attention mechanism *Rule-Attention* into both the encoder and decoder of Transformer model
- Validated the proposed model in various scenarios, including language modeling, machine translation, natural language inference, multi-task imitation learning, and some other algorithmic problems

March 2018
– present

Statistical AI & Learning (TSAIL) Group   Tsinghua University

Advisor: Professor Jun Zhu

Working on reinforcement learning algorithm
- Proposed an environment-aware hierarchical reinforcement learning algorithm. **We achieved the first place in VizDoom AI Competition 2018**, and **our work is accepted by IJCAI 2019**
- Proposed an efficient model-based deep reinforcement learning algorithm which incorporates first-order logic and reward shaping leveraging on Relational Markov Decision Process. **Our work is under review by TNNLS**
- Improved the performance of reinforcement learning platform Tianshou by changing the structure of frame buffer and adding parallel training, which was 10x faster than previous version within DQN, A2C, DDPG, and PPO algorithms

March 2018 – June 2018	**Front-end Interactive Computing Group**	Sensetime Inc.

Mentor: Hongwei Qin

Worked on fast multi-frame noise reduction and AI-based ISP pipeline
- Designed a temporal and spatial domain-based noise reduction network, which could output high-quality results in about 70ms given eight 12M pixel full-resolution images on a GTX1060

May 2017 – October 2017	**BioCAD Group**	Tsinghua University

Advisor: Professor Hailong Yao

Worked on large-scale microfluidic biochip automation design method
- Proposed an ultrafast rule-based escape routing method, which was 600 to 340k times faster than previous proposals. **Our work is published in IEEE Trans. on CAD**

Selected Awards and Honors

November 2018	**Comprehensive Excellence Award**	Tsinghua University

Top 5% of 171 students

August 2018	**Rank 1st,** VizDoom AI Competition 2018 Single Player Track(1)

IEEE Computational Intelligence and Games (CIG) 2018

VizDoom AI Competition is famous in the reinforcement learning community, and our team achieved the best score among 51 teams

September 2017	**Highest Score,** 11th CCF Certified Software Professional (CSP)

China Computer Federation (CCF)

Top 0.02% of 6414 participants

Selected Course Projects

For more infomation, please refer to this GitHub link (★437 by 01/29/2020)

June 2018	**Realistic Image Rendering**	Fundamentals of Computer Graphics

Implemented Path Tracing (PT), Progressive Photon Mapping (PPM), and Stochastic Progressive Photon Mapping (SPPM) algorithms. Rendered 3D models with Bezier surface. Proposed a novel algorithm for solving the intersection of line and rotating Bezier curve. ★62 on GitHub by 01/29/2020

January 2018	**Login Security**	Network Security Engineering and Practice

Measured the login security of all campus websites and found a serious security vulnerability for all sites. The campus network was therefore fully upgraded

June 2017	**Escape Routing**	Foundation of Object-Oriented Programming

Designed and implemented a heuristic escape routing method which was fundamentally faster than previous network-flow-based proposals. Follow-up work has been published in IEEE Trans. on CAD

Extracurricular Activities

November 2016 – June 2018	**Volunteer Tutor**	Student Learning and Development Center, Tsinghua University

One night on duty per week to answer questions for students, including Calculus, Linear Algebra, Programming, etc. Accumulated volunteer time 131 hours, and rated as an excellent volunteer

December 2016 – May 2018	**Propositional Person**	

Student Algorithm and Competition Association, Tsinghua University

Do problem-setting in several competitions of informatics (7 problems in total), including Chinese National Team Training (CNTT), Tsinghua University Informatics Summer Camp for Excellent High School Student(THUSC), Tsinghua University Programming Competition and College Invitational Tournament (THUPC), etc.

Skills

Programming Languages: Python, C/C++, Java, JavaScript, Bash, HTML/CSS, MATLAB

Tools and Frameworks: Git, LaTeX, PyTorch, TensorFlow, Keras, OpenCV, django, Bootstrap