Zhenjia Xu

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Research Interests

Computer Vision, Representation Learning, Deep Learning

Education

Shanghai Jiao Tong University — **Shanghai, China**
Bachelor of Engineering, Computer Science, ACM class — *September 2015 - June 2019 (expected)*
Advisor: **Yong Yu**

- ACM Class is a highly selective class (**top 5%**) in the Department of Computer Science and Engineering.
- GPA: **overall: 91.11/100 (3.94/4.3)** | **major: 93.75/100 (4.10/4.3)** | **ranking: 3rd/24**.
- TOEFL: **108** (R30, L28, S22, W28).

Massachusetts Institute of Technology — **Cambridge, MA, USA**
Visiting Student, Electrical Engineering and Computer Science Department — *July 2018 - January 2019*
Advisors: **Joshua B.Tenenbaum**

Publications

Unsupervised Discovery of Parts, Structure, and Dynamics
Zhenjia Xu*, *Zhijian Liu**, *Chen Sun, Kevin P. Murphy, William T. Freeman, Joshua B.Tenenbaum, and Jiajun Wu*
International Conference on Learning Representations (**ICLR**) 2019. **[PDF]**

DensePhysNet: Learning Dense Physical Object Representations via Multi-step Dynamic Interactions
Zhenjia Xu, *Jiajun Wu, Andy Zeng, Joshua B.Tenenbaum, and Shuran Song*
Submitted to *Robotics: Science and Systems* (**RSS**) 2019. **[PDF]**

Research Experiences

Massachusetts Institute of Technology — **Cambridge, MA, USA**
Research Intern, Computer Science & Artificial Intelligence Lab — *July 2018 - January 2019*
Advisors: **Joshua B.Tenenbaum** and **Shuran Song** (incoming Professor at Columbia University).

- **Modeling Parts, Structure, and System Dynamics via Predictive Learning**
  Objective: Parts recognition, hierarchical structure decomposition, and future prediction.
  - Proposed a novel formulation that learns to recognize and segment each object and its parts, build their hierarchical structure, and capture their motion distribution with a generative model, which can be further utilized for future prediction and video synthesis.
  - Evaluated our PSD model on both real and synthetic datasets, and our model works well on all three tasks: segmentation, building the hierarchical structure, and future prediction.
  - In Proceedings of *International Conference on Learning Representations* (**ICLR**) 2019.

- **Robot Learning of Physical Object Properties**
  Objective: Self-supervised learning of physical property representation via interaction.
  - Built a simulator for testing models and implemented two primitive actions: push and collide.
  - Proposed a novel recurrent model to encourage the learning of physical properties. The representation can be used for further application.
  - Achieved good performance on both on both simulator and real robot, especially the great generalization ability when encountering new objects.
  - Submitted to *Robotics: Science and Systems* (**RSS**) 2019.

Cornell University **Ithaca, NY, USA**
Remote Collaboration, Systems and Networking Group *June 2018 - July 2018*
Advisor: **Robbert van Renesse**.

- **Consensus Protocol Design and Implementation**
  Objective: A system for maintaining decentralized, authenticated data structures.
  - *Charlotte* addresses the fundamental shortcoming of traditional blockchains: scalability and efficiency.
  - Proposed and implemented a novel permissionless consensus protocol with *Charlotte*. The experiment result proves that *Charlotte* can reduce overhead effectively when the network scale becomes large.
  - In progress. Prepare to submit to *IEEE Symposium on Security and Privacy* (**Oakland**) 2020.

Shanghai Jiao Tong University **Shanghai, China**
Research Intern, Apex lab *July 2017 - June 2018*
Advisors: **Yong Yu** and **Weinan Zhang**.

- **IJCAI-18 Alimama Sponsored Search Conversion Rate (CVR) Prediction Contest**
  Objective: Predict the conversion rate (CVR) in sponsored search.
  - Proposed a flexible framework including feature extraction, CVR prediction, and model ensemble.
  - Designed the whole pipeline, implemented the majority of feature extraction modules and tried several state-of-the-art recommendation models.

Course Projects

- **Audio Event Recognition**, using deep learning to recognize audio. **97/100** **[PDF]**
- **Text Classification & Item Recommendation**, using machine learning. **99/100** **[PDF][PDF]**
- **Mx Compiler**, translating a C-like language into x86-64, over **12,000** lines. **99/100** **[GitHub]**
- **Advanced Data Structures** {Strict Fibonacci Heap, AAA Tree, PQ Tree}. **98/100** **[GitHub]**

Honors and Awards

Scholarships

- **National Scholarship** (highest honor for undergraduates, **top 0.2%** in China). 2016, 2017
- **Rongchang Scholarship** (**top 1%** over 17,000 students in SJTU). 2016
- **Zhiyuan Honorary Scholarship** (**top 5%** over 17,000 students in SJTU). 2016, 2017

Programming Contests

- **Second Runner-up** (**3rd over 150** teams) in ACM-ICPC Regional Contest, Beijing Site. 2016
- **Second Runner-up** (**3rd over 120** teams) in Chinese Collegiate Programming Contest. 2016
- **Gold Medal** (**top 5% over 200** teams) in ACM-ICPC China Final. 2016
- **Gold Medal** (**top 7% over 150** teams) in ACM-ICPC Regional Contest, Beijing Site. 2015
- **Silver Medal** (**top 0.1% over 70,000** participants) in National Olympiad in Informatics. 2014

Mathematical Contest in Modeling

- **Meritorious Winner** (**top 10%**) in Mathematical Contest in Modeling. 2017

Teaching Experiences

- **Teaching Assistant** of Data Structure (*MS105*). 2017
- **Assistant Coach** of SJTU ACM-ICPC Team. 2017 - 2018

Technical Strengths

Programming Languages: C/C++, Python, Java, Pascal, JavaScript, MATLAB.

Toolkits / Software: Torch, Pytorch, Tensorflow, MXNet, Pybullet.