# Zhenghao PENG

Homepage: https://www.pengzhenghao.com/

Github: pengzhenghao
Email: pengzh@sjtu.edu.cn
Phone: +(86)132-4689-9730

## RESEARCH INTERESTS

Machine Learning System, Computer Vision, Machine Learning Theory, Reinforcement Learning.

## EDUCATION

**Shenzhen Institutes of Advanced Technology (SIAT), Chinese Academy of Sciences** *June 2018 - Sept. 2018*

- Research intern at Multimedia Research Center, under the supervision of Prof. Yu Qiao.

**University of California, Berkeley** *July 2017 - Aug. 2017*

- Summer session.

**Shanghai Jiao Tong University** *Sept. 2015 - June 2019 (Expected)*

- B.E. in Naval Architecture and Ocean Engineering. GPA: 85.95/100, 3.63/4.3.
- Member of Zhiyuan Honors Program (Top 10% students at whole university).
- Won Zhiyuan Honors Scholarship for 2 consecutive years.

## PUBLICATIONS

[1] **Peng, Zhenghao**, Xuyang Chen, Chengwen Xu, Naifeng Jing, Xiaoyao Liang, Cewu Lu, and Li Jiang. Axnet: Approximate computing using an end-to-end trainable neural network. In *Proceedings of the 2018 International Conference on Computer-Aided Design. ICCAD'18*. IEEE/ACM, 2018 [arXiv, pdf]

[2] Zhuoran Song, Dongyu Ru, Ru Wang, Hongru Huang, **Peng, Zhenghao**, Jing Ke, Xiaoyao Liang, and Li Jiang. Approximate random dropout. In *Design, Automation & Test in Europe Conference & Exhibition, 2019. DATE'19*. IEEE, 2019 (Camera-ready version is not not available currently at arXiv.) [arXiv, pdf]

## RESEARCH EXPERIENCES

**Weakly-supervised Video Action Detection via Convex Clustering** *June 2018 - Sept. 2018*
*Supervised by Prof. Yu Qiao* *Research Intern at SIAT*

- Leveraged an external representativeness database to strengthen UntrimmedNet, the weakly supervised video action recognition framework.
- Applied reinforcement learning as action instances detector in untrimmed videos based on the reward signals from the snippet-level action classifier.

**Approximate Random Dropout** *Apr. 2018 - Sept. 2018*
*Supervised by Prof. Li Jiang*

- Replaced the random dropout in neural network training with predefined dropout patterns, thus enabled the prediction of dropped neurons and the skip of the redundant zero-multiplication. The work collaborates the randomness in software with the efficiency in hardware.
- Reduced the training time by 20%-77% (19%-60%) when dropout rate is 0.3-0.7 on MLP (LSTM) with marginal accuracy drop.
- Provided mathematical proof for the equivalence of this approach and the random dropout, reorganized [2] and proofread the original paper.

**Wire Routing on IC by Multi-agent Reinforcement Learning** *Feb. 2018 - June 2018*
*Supervised by Prof. Li Jiang*

- Formulated wire routing problem to a competitive-cooperative multi-agent reinforcement learning problem, the possible solution for NP-hard problems.
- Applied PPO, TRPO, DDPG, ACKTR and A2C algorithms to train the agents.
- Implemented 3D wire routing reinforcement learning environment allowing multi-agent cooperation, competition, and communication, based on Gym library and open-source.

**Neural Network Based Approximate Computing Framework** *Sept. 2017 - May 2018*
*Supervised by Prof. Li Jiang*

- Fused the conventional approximate computing architecture as an end-to-end structure. Applied the Hadamard product at the output of predictor and the activation of approximator to learn jointly.
- Reduced 74% training time; Improved the invocation by 50.6%, averagely. In JPEG benchmark, 60% parameters reduced and achieved 32× speedup.
- Formulated the question, proposed idea, wrote codes, conducted experiments, and finished the paper [1].

**Handwritten Arithmetic Expression Recognition** *May 2017 - June 2017*

*Side Project*

- Built an End-to-End system providing recognition and calculation service of handwritten arithmetic expression via WeChat (an IM application).
- Utilized conventional CV techniques like Sobel filter, gaussian blur, erosion and dilation to segment digits and operators. Used convolutional neural network to recognize.
- Expanded MNIST dataset with 10000+ operators images for neural network training.

## PROFESSIONAL ACTIVITIES

· Participated in a project with Huawei: Research on key techniques of the mobile training framework, Sept. 2018.

· Delivered a 15 minutes speech on approximate computing in China Testing Conference, Aug. 2018, Harbin.

· Reviewed conference papers for Asian Test Symposium, June 2018.

· Provided mathematical proof for journal paper: On quality trade-off control for approximate computing using iterative training, Apr. 2018.

## SKILLS

| | |
|---|---|
| **Programming** | Python (Numpy, Jupyter Notebook, Pandas), C/C++, Matlab, HTML, CSS, etc. |
| **ML Frameworks** | TensorFlow, PyTorch, Keras, etc. |
| **Expression** | OpenGL, LaTeX, Keynote, Markdown, Matplotlib, Photoshop, Final Cut, etc. |
| **Miscellaneous** | Linux, Git, OpenCV, OmniFocus, Mind Map, Zotero, etc. |
| **Languages** | Mandarin Chinese (Native), Cantonese (Native), English (Proficient). |
| **Hobbies** | Film Criticism, Skateboard, Ukulele, Billiards, Painting, etc. |