PENG Zhenghao

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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 - July 2019*

- B.E. in Naval Architecture and Ocean Engineering.
- Member of Zhiyuan Honors Program.
- Research assistant at Advanced Computer Architecture Laboratory with Prof. Li Jiang.

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.