Iou-Jen (Adam) Liu

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Education

University of Illinois at Urbana-Champaign, IL, U.S.A.
PhD, Electrical and Computer Engineering

2022 (Expected)
Advisor: Prof. Alexander Schwing

National Taiwan University, Taipei, Taiwan
Master of Science, Electrical Engineering

2014

Bachelor of Science, Electrical Engineering

2012
Advisor: Prof. Yao-Wen Chang

Publications

11. **Iou-Jen Liu***, Zhongzheng Ren*, Raymond A. Yeh*, Alexander G. Schwing, "Semantic Tracklets: An Object-Centric Representation for Efficient Visual Multi-Agent Reinforcement Learning", IEEE/RSJ International Conference on Intelligent Robots and Systems **(IROS)**, 2021

10. **Iou-Jen Liu**, Unnat Jain, Raymond A. Yeh, Alexander G. Schwing, "Coordinated Exploration for Multi-Agent Deep Reinforcement Learning", in International Conference on Machine Learning **(ICML)**, 2021**(Long Talk)**

9. Unnat Jain, **Iou-Jen Liu**, Svetlana Lazebnik, Aniruddha Kembhavi, Luca Weihs, Alexander Schwing, "GridToPix: Training Embodied Agents with Minimal Supervision", arXiv. 2021

8. **Iou-Jen Liu**, Raymond A. Yeh, Alexander G. Schwing, "High-Throughput Synchronous Deep Reinforcement Learning", in Neural Information Processing Systems **(NeurIPS)**, 2020

7. **Iou-Jen Liu***, Raymond A. Yeh*, Alexander G. Schwing, "PIC: Permutation Invariant Critic for Multi-Agent Deep Reinforcement Learning", in Conference on Robot Learning **(CoRL)**, 2019

6. Youjie Li, **Iou-Jen Liu**, Deming Chen, Alexander G. Schwing, Jian Huang, "Accelerating Distributed Reinforcement Learning with In-Switch Computing", in ACM/IEEE International Symposium on Computer Architecture **(ISCA)**, 2019

5. **Iou-Jen Liu**, Jian Peng, Alexander G. Schwing, "Knowledge Flow: Improve upon Your Teachers", in International Conference on Learning Representations **(ICLR)**, 2019

4. **Iou-Jen Liu**, Shao-Yun Fang, Yao-Wen Chang, "Overlay-Aware Detailed Routing for Self-Aligned Double Patterning Lithography Using the Cut Process", in IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems **(TCAD)**, Vol. 35, 2016

3. **Iou-Jen Liu**, Shao-Yun Fang, Yao-Wen Chang, "Stitch-Aware Routing for Multiple E-Beam Lithography", in IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems **(TCAD)**, Vol. 34, 2015

2. **Iou-Jen Liu**, Shao-Yun Fang, Yao-Wen Chang, "Overlay-Aware Detailed Routing for Self-Aligned Double Patterning Lithography Using the Cut Process", in ACM/IEEE Design Automation Conference **(DAC)**, 2014

1. Shao-Yun Fang, **Iou-Jen Liu**, Yao-Wen Chang, "Stitch-Aware Routing for Multiple E-Beam Lithography", in ACM/IEEE Design Automation Conference **(DAC)**, 2013

Selected Awards

- **Third Place**, ACM/IEEE ICCAD CAD Programming Contest, 2012
  3rd place out of 60 teams around the world
- **Best Master Thesis Award**, Taiwan IC Design Society, 2014
- **Graduate Scholarship**, National Taiwan University, 2014
  Top 10% student in one academic year
- **Travel Grant**, ICLR'19, NeurIPS'20
- **Graduate Student Fellowship**, University of Illinois, Summer'20
- **Teachers Ranked as Excellent**, University of Illinois, Spring'17, Spring'18, Fall'18, Spring'19, Fall'19
  Average student rating higher than 4.3 (out of 5.0)

Machine Learning Research

Microsoft Research, Montreal (Summer 2021)
Research Intern
University of Illinois at Urbana-Champaign (2018 - present)
Research Assistant
Advisor: Professor Alexander Schwing

- **High-Throughput Synchronous RL (HTS-RL)** maintains the advantages of synchronous RL, i.e., data efficiency, training stability, full determinism, and reproducibility, while achieving speedups, especially in environments where the step time varies. (NeurIPS'20)
- **Permutation Invariant Critic (PIC) for MARL** studies the ordering issue in centralized MARL. PIC significantly improves the sample efficiency over baseline MARL method, and scales to 200 agents. (CORL'19)
- **Accelerating Distributed Reinforcement Learning with In-Switch Computing (iSwitch)** is an in-switch acceleration solution that moves the gradient aggregation from server nodes into the network switches. iSwitch not only reduces the end-to-end network latency for synchronous training, but also improves the convergence with faster weight updates for asynchronous training. (ISCA'19)
- **Knowledge Flow** transfers knowledge from multiple (pre-trained) teacher models to a student model. Student trained with knowledge flow achieves top results in both supervised learning and RL tasks. (ICLR'19)

D-wave Systems (Summer 2017)
<u>Research Intern</u>
- Combine DCGAN with restricted Boltzmann machine, where sampling steps could be performed on D-wave quantum computers.

EDA RESEARCH

TSMC-NTU Research Center (2012 - 2015)
<u>Research Assistant</u>
Advisor: Professor Yao-Wen Chang
- **Overlay-Aware Routing for Self-Aligned Double Patterning Lithography** proposed a dynamic-programming-based detailed router that significantly reduces overlay errors. (DAC'14, TCAD'16)
- **Stitch-Aware Routing for Multiple E-beam Lithography (MEBL)** is the first work of stitch-aware routing framework for MEBL. We developed stitch-aware routing algorithms for each VLSI routing stage, i.e. global routing, layer / track assignment, and detailed routing. (DAC'13, TCAD'15)

TEACHING

University of Illinois at Urbana-Champaign (2017 - present)
<u>Teaching Assistant (Head TA)</u>
ECE220 - Computer System and Programming
- Teach weekly C/C++ programming studios.
- Maintain online grading system (PrairieLearn) for machine-based tests.

National Taiwan University (Spring 2014)
<u>Teaching Assistant</u>
EE5026 - Physical Design for VLSI

SKILLS

- Programming Languages: Python, C, C++, CUDA, Matlab
- Deep Learning Platform: Pytorch, Tensorflow

SERVICES

- Reviewer for ICML, NeurIPS, ICLR, IEEE Transactions on CAD

COURSE WORKS

- Statistical Reinforcement Learning, Computer Vision, Pattern Recognition
- Random Processes, Abstract Linear Algebra, Nonlinear Programming
- VLSI CAD Flow, Physical Design for Nanometer ICs