Fan-Keng **Sun**

Machine Learning for Electronic Design Automation Researcher

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Education

National Taiwan University (NTU) *Taipei, Taiwan*

B.S. Major in Electrical Engineering, Minor in Computer Science and Information Engineering *Sept. 2014 - PRESENT*

- Average GPA: 4.17 / 4.3, top 5 %
- **Algorithm Courses**: Data Structures and Algorithms, Algorithm Design and Analysis, ACM-ICPC, Graph Theory
- **Machine Learning Courses**: Machine Learning, Machine Learning and Having It Deep and Structured, Advanced Deep Learning, Mathematical Principles of Machine Learning
- **Electronics Design Automation Courses**: Physical Design for Nanometer ICs, Switching Circuit and Logic Design

Experience

Speech Processing and Machine Learning Lab *Taipei, Taiwan*

Research Assistant, supervised by Prof. Hung-yi Lee *Sept. 2016 - PRESENT*

Multivariate Time Series Forecasting

- Proposed the temporal pattern attention for multivariate time series forecasting.
- Our model (LSTM + our attention) achieved state-of-the-art performance on various multivariate time series forecasting datasets and music notes prediction.

Natural Language Processing

- Trained a chat-bot with seq2seq model with deep reinforcement learning on the Cornell movie dialog corpus.
- Used the CycleGAN paradigm with LSTM to train unpaired machine translation.

Open-Set Multi-Speaker Speech Separation

- Ongoing.

Speech Processing Lab *Taipei, Taiwan*

Undergraduate Researcher, supervised by Prof. Lin-shan Lee *Sept. 2017 - Sept. 2018*

Reinforcement Learning on Real-Time Online Games

- Applied simple computer vision technique to guide a rule-based Slither.io agent.
- Trained another Slither.io agent by Asynchronous Advantage Actor Critic (A3C) which surpassed rule-based model.

Electronic Design Automation Lab *Taipei, Taiwan*

Undergraduate Researcher, supervised by Prof. Yao-Wen Chang *Feb. 2016 - PRESENT*

Gradient-based Wirelength Model

- Proposed a novel gradient-based wirelength model for global placement which combines the advantages of bivariate and multivariate wirelength models.
- Our wirelength model outperforms previous bivariate and multivariate wirelength models.

Bus Routing

- Implemented a topology-matching bus routing engine to compete in the 2018 ICCAD CAD contest, and won top 10.
- Our directed-acyclic-graph-based algorithm outperforms the winner of 2018 ICCAD CAD contest.

Initial Detailed Routing

- Implemented a detailed routing tools to compete in 2018 ISPD contest, and won 3rd place.
- Proposed a multithreaded detailed routing algorithm that considers global routing guides, which surpassed the winner of 2018 ISPD contest. [**ICCAD 18**]

Synopsys, Inc. *Hsinchu, Taiwan*

Summer Internship *Jul. 2016 - Aug. 2016*

Single Layer Global Routing

- Implemented a single layer global routing algorithm based on mixture of previous literature and own thoughts.
- The algorithm successfully routed many real industrial cases.

Publications

1. Shun-Yao Shih*, **Fan-Keng Sun***, Hung-yi Lee, "Anonymous Title", submitting to ECML/PKDD, 2019 (* indicates equal contribution)
2. **Fan-Keng Sun**, Yao-Wen Chang "Anonymous Title", submitting to DAC, 2019
3. Chen-Hao Hsu, Hao Chen, Shao-Chun Hung, **Fan-Keng Sun**, Yao-Wen Chang "Anonymous Title", submitting to DAC, 2019
4. **Fan-Keng Sun**, Hao Chen, Ching-Yu Chen, Chen-Hao Hsu, Yao-Wen Chang "A Multithreaded Initial Detailed Routing Algorithm Considering Global Routing Guides", ICCAD, 2018

Teaching

Algorithm Design and Analysis — *Taipei, Taiwan*
Teaching Assistant, supervised by Prof. Yun-Nung Chen and Prof. Hsu-Chun Hsiao — *Sept. 2018 - PRESENT*
- Assign homework about graph theory.

Machine Learning and Having It Deep and Structured — *Taipei, Taiwan*
Teaching Assistant, supervised by Prof. Hung-Yi Lee — *Feb. 2018 - Jul. 2018*
- Designed a new assignment about the mathematical complexity of deep learning models.
- Designed a new assignment to observe the optimization process and convergence of deep learning models.

Machine Learning — *Taipei, Taiwan*
Teaching Assistant, supervised by Prof. Hung-Yi Lee — *Sept. 2017 - Jan. 2018*
- Designed a new assignment about principal component analysis of colored images.

Honors & Awards

Semifinalist, Formosa Speech Grand Challenge - Talk to AI — *Ongoing*
Top 3, Problem A at ICCAD CAD contest — *2018*
Top 10, Problem B at ICCAD CAD contest — *2018*
3rd Place (first pure-undergraduate team in top 3 in 14 years), ISPD Contest — *2018*
Top 12, Formosa Speech Grand Challenge - Talk to AI (Warm-Up Match) — *2017*
National Technology and Science Scholarship, CTCI — *2017*
3rd Place (2 times), NTU ACM ICPC Ranking — *2016, 2017*
3rd Place, National Collegiate Programming Contest — *2017*
3rd Place, ACM ICPC Regional Contest — *2017*
2st Place, ACM ICPC Regional Contest — *2016*
Best Technique, Hackathon at NTU — *2016*
1st Place, Calculus World Cup — *2016*
6th Place, Data Structure and Programming Final Project Contest — *2016*
2nd Place, Newcomers for ACM-ICPC Taiwan Online Programming Contest — *2016*
Silver Medal, International Geography Olympiad — *2012*

Extracurricular Activity

NTU Electrical Engineering Student Association — *Taipei, Taiwan*
Coordinator of Academic Affair — *Sept. 2016 - Jun. 2017*

MakeNTU
- Co-organized the largest student Makathon in Taiwan with 200 participants and 10+ corporate sponsorship.
- Links: website, FB fansite, Video.

Provided Academic Service
- EExplore: an event where professors introduce every research area in EE department to freshman.
- Lab Intro: a week of continuous lab introduction by the corresponding professor to recruit interested undergraduate researchers.
- Others: online course selection, online textbook bookstore, makerspace, etc.

Skills

Natural Languages: Chinese (native), English (TOEFL 109, GRE 326/3.5)
Programming Languages: Python, C/C++, Shell, Javascript, Matlab, LaTeX
Operating System: Linux (Arch Linux & Ubuntu), Windows
Deep Learning Libraries: Tensorflow, PyTorch, Keras