Chen-Chia Chang

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Research Interests

Electronic Design Automation (EDA), Machine Learning and its Application

Education

Duke University *09/2020 - PRESENT*
Ph.D. Student in Electrical and Computer Engineering *Durham, NC*
Advisor: Prof. Yiran Chen

National Taiwan University (NTU) *09/2015 - 01/2020*
B.S. in Electrical Engineering *Taipei, Taiwan*

Research Experience

Computational Evolutionary Intelligence Lab (Prof. Yiran Chen) *09/2020 - PRESENT*
Graduate Research Assistant, Duke ECE

- **Neural Architecture Search Based Routability Prediction [ICCAD 2021]**
  - Proposed a **NAS method to automate the design of ML model** without human interference.
  - Outperformed all previous works and shortened the design duration of ML model for EDA into 0.3 days.
- **Routability Prediction applying Federated Learning**
  - Proposed and implemented a **federated learning method** to train model on a real world scenario.
  - Provided a secure way for sharing gradients within different clusters of data to enhance the model ability.

Electronic Design Automation Lab (Prof. Yao-Wen Chang) *01/2018 - 01/2020*
Undergraduate Research Assistant, NTU EE

- **Initial Detailed Routing (2nd place in 2019 ISPD Contest)**
  - Proposed and implemented the **robust detailed routing engine** considers global guides on large scale designs.
  - Routed benchmarks with 1 million nets within 12 hours and 64 GB while considering industrial DRC constraints.
- **System-level FPGA Routing with Timing Division Multiplexing [ICCAD 2021]**
  - Proposed and implemented a two-stage algorithm to realize FPGA-routing and TDM assignment.
  - Provided a strictly decreasing algorithm with solid proof to outperform all the previous works.

Applied Logic and Computation Lab (Prof. Jie-Hong R. Jiang) *01/2018 - 01/2020*
Undergraduate Research Assistant, NTU EE

- **QBF Certification: From Countermodel to Resolution**
  - Proposed and implemented a proof transformation method to convert countermodel to LQU refutation proof.
  - Provided the more compact resolution proofs than the ones directly derived from the state-of-art QBF solver.

Publications

1. **Chen-Chia Chang***, Jinyu Pan*, Tunhou Zhang, Zhiyao Xie, Jiang Hu, Weiyi Qi, Chun-Wei Lin, Rongjian Liang, Joydeep Mitra, Elias Fallon, and Yiran Chen, "Automatic Routability Predictor Development Using Neural Architecture Search" in Proc. IEEE/ACM International Conference on Computer-Aided Design (ICCAD), 2021. (*equal contribution)
2. Wei-Kai Liu, Ming-Hung Chen, Chia-Ming Chang, **Chen-Chia Chang**, and Yao-Wen Chang, "Performance-Driven System-Level FPGA Routing with TDM Optimization" in Proc. IEEE/ACM International Conference on Computer-Aided Design (ICCAD), 2021.

Honors & Awards

2019 **Outstanding Performance Scholarship**, National Taiwan University
2019 **Top 5, Honorable Mentions**, IEEE/ACM ICCAD CAD Contest - Problem C
2019 **2nd Place**, ACM ISPD Initial Detailed Routing Contest
2018 **2nd Place & Best Popularity Award**, Arm Design Contest

Skills

Programming C/C++ (wrote a 15000+ lines code project), Python, Verilog, LaTeX
VLSI tools Cadence Innovus, Quartus II, FPGA Prototyping
Deep Learning Toolkits Pytorch, Tensorflow, Keras