

TING-WU (RUDY) CHIN

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RESEARCH INTERESTS

On-device Machine Learning: Bringing intelligence such as **computer vision** to mobile devices that are capable of **lifelong learning** with **neural network compression** and **system software optimization**.

EDUCATION

Carnegie Mellon University

Ph.D., Electrical and Computer Engineering

Advisor: Diana Marculescu

August 2017 - May 2022 (Expected)

National Chiao Tung University

M.S. in Computer Science, Advisor: Shiao-Li Tsao

B.S. in Computer Science

2015-2017

2011-2015

RESEARCH EXPERIENCE

EnyAC Research Group, Carnegie Mellon University

Research Assistant (Mentor: Diana Marculescu)

August 2017 - Present

Pittsburgh, PA

- To bring machine learning to mobile devices.
- Improved the efficiency of deep learning-based image classifier and object detectors with *pruning*, *quantization*, and *adaptive execution*.

Microsoft Research

Research Intern (Mentor: Cha Zhang)

May 2018 - August 2018

Redmond, WA

- To improve the accuracy of the compressed convolution neural networks on image classification.
- Developed state-of-the-art filter pruning method on *VGG*, *ResNet*, and *MobileNet* that is *8x* faster in model compression time compared to prior art.
- Implementation using *PyTorch* with real connection removal instead of masking.

AILabs.tw

Software Engineering Intern (Mentor: Jie-Zhi Cheng)

May 2017 - August 2017

Taipei, Taiwan

- To develop a face swapping software that is fast enough for real-time mobile application.
- Improved prior solution by *20x* by approximating the software pipeline with *deep neural networks*.
- Dockerized a face swapping open source project and contributing back to upstream by fixing bugs.
- Implementation with *Caffe*, *OpenCV*, and *OpenGL*.

Trinity Lab, UT Austin

Visiting Student (Mentor: Vijay Janapa Reddi)

August 2016 - October 2016

Austin, TX

- To improve the efficiency of object detection on embedded devices.
- Analyzed the trade-off brought by image resolution on both the accuracy and speed of object detectors such as *Faster R-FCNN*, *R-FCN*, and *YOLO*.
- Based on *NVIDIA's TX1*, and use *OpenCV* and *Caffe*.

COURSE WORK

- Machine Learning •Convex Optimization •Deep Reinforcement Learning and Control
- Advanced Multimodal Machine Learning •Energy-aware Computing

ACHIEVEMENTS

3 rd Place for Siemens FutureMakers Challenge at CMU	Spring 2018
2 nd Place Course Project for Energy-aware Computing (18743) at CMU	Fall 2018
MediaTek Domestic PhD Fellowship (One of five recipients)	Fall 2016
Award of Outstanding Teaching Assistant, NCTU	Fall 2016
Outstanding Award in Programming Language course, NCTU	Spring 2012

TEACHING EXPERIENCE

Hardware Architecture for Machine Learning	Fall 2018
<i>Lead TA</i>	<i>Carnegie Mellon University</i>
– Bootstrapped the materials including slides and homework for the class that is offered for the first time.	
Operating System Design and Implementation	Fall 2015
<i>Lead TA</i>	<i>National Chiao Tung University</i>
– Helped design the homework and gave recitation lectures.	

PUBLICATIONS

Under Review

- **T. Chin**, C. Zhang and D. Marculescu, “Layer-compensated Pruning for Resource-constrained Convolutional Neural Networks,” in *arXiv preprint, 2018 (Submitted to SysML)*.
- **T. Chin**, R. Ding and D. Marculescu, “AdaScale: Towards Real-time Video Object Detection Using Adaptive Scaling,” 2018 (*Submitted to SysML*).

Conference

- D. Stamoulis, **T. Chin**, A. K. Prakash, H. Fang, S. Sajja, M. Boggar and D. Marculescu, “Designing Adaptive Neural Networks for Energy-Constrained Image Classification,” in *Proceedings of the 37th International Conference on Computer-Aided Design (ICCAD), IEEE Press, 2018*.

Journal

- **T. Chin**, C. Yu, M. Halpern, H. Genc, S. Tsao and V. J. Reddi, “Domain-Specific Approximation for Object Detection,” in *IEEE Micro*, vol. 38, no. 1, pp. 31-40, January/February 2018.
- H. Genc, Y. Zu, **T. Chin**, M. Halpern and V. J. Reddi, “Flying IoT: Toward Low-Power Vision in the Sky,” in *IEEE Micro*, vol. 37, no. 6, pp. 40-51, November/December 2017.

Workshop

- **T. Chin**, C. Zhang and D. Marculescu, “Layer-compensated Pruning for Resource-constrained Convolutional Neural Networks,” in *NIPS Workshop on Machine Learning on the Phone and other Consumer Devices (MLPCD 2), 2018 (Oral)*.
- R. Ding, Z. Liu, **T. Chin**, D. Marculescu, R.D. (Shawn) Blanton, “Differentiable Training for Hardware Efficient LightNNs,” in *NIPS Workshop on CDNNRIA, 2018*.
- H. Genc, **T. Chin**, M. Halpern, V. J. Reddi, “Optimizing Sensor-Cloud Architectures for Real-time Autonomous Drone Operation,” in *HPCA Workshop on SCAW, 2017*.

PROFESSIONAL SERVICES

Reviewer, NIPS Workshop on Compact Deep Neural Network Representation with Industrial Applications	2018
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