

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

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

- 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*