# Chun-Min Chang | Resumé

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## Education

**Graduate Institute of Electrical Engineering**                **National Taiwan University, Taiwan**

Master degree, *3.8/4.0*                                                                                     2013–2015

Master thesis: investigate how simplified models of different fidelity levels affect ranking of solutions and how to allocate computational budget to find near optimal solutions

**Department of Electrical Engineering**                        **National Taiwan University, Taiwan**

Bachelor degree, *3.6/4.0*                                                                                     2009–2013

Selected course: digital visual effect, optimal control, algorithm

## Work Experience

**Data Insight and Research Laboratory**                                **Academia Sinica, Taiwan**

Research assistant                                                                                          2016–present

Concentrate on deep learning, particularly in model compression and energy-efficient inference, and the AI applications in fields of healthcare and clinical diagnosis

Compression and efficient inference in deep learning................................................................

- Proposed a novel channel-prioritized training procedure to sparsify CNNs and enable dynamic inference, attaining a 16x parameters reduction without accuracy drop in experiment of VGG-16 over CIFAR-10

Applications in healthcare and clinical diagnosis.....................................................................

- Developed a 3D CNNs to detect neuro-degeneration by predicting chronological ages using fMRI images, achieving mean absolute error close to 4 and Spearman's correlation coefficient up to 0.95
- Proposed a non-invasive glucose measurement method based on 1D CNNs to handle ECG and PPG signals, accomplishing 93.5% clinically correct decisions and 6.5% uncritical decisions

**Multimedia Networking and Systems Laboratory**                        **Academia Sinica, Taiwan**

Research assitant                                                                                               2015–2016

Work on quantitative data analysis, machine learning, and QoE assessment

- Proposed the very first non-intrusive methodology for quantifying the timing and positioning performance of commodity virtual reality systems, accepted by 2016 ACM Multimedia (acceptance rate: 22%)
- Investigated the relationships between crimes and various geographic, demographic and socioeconomic factors by applying machine learning techniques, accepted by 2017 ACIIDS

**Microsoft Technology Center**                                                        **Microsoft, Taiwan**

Research and development intern                                                                          2014–2015

Focus on cloud services, internet of things and application developments

- Designed and implemented the very first IoT demonstration of applying several Microsoft Azure services in the smart home scenario and developed cross-platform applications by Xamarin

## Skills

**R**: data.table, dplyr, ggplot2, reshape2, stringr                            *for data exploration and visualization*

**Python**: TensorFlow, Keras, scikit-learn, xgboost                      *for machine learning and deep learning*

## Projects

**In-depth study on batch normalization**

Best peer-reviewed project, machine learning and having it deep and structured          June 2017
- Validated the effects on weight regularization, avoiding gradient vanishing, and fast convergence
- Analyzed the distribution of singular values of layer's Jacobian, which showed BN advantages better isometry and norm-preserving property to improve gradients flow through the network

**Video captioning: sequence to sequence**

Course project, machine learning and having it deep and structured          April 2017
- Extracted visual information by existing CNNs; created video embedding and language model by RNNs
- Implemented scheduling sampling to fight against the teacher-forcing effect in supervised learning
- Realized attention mechanism to capture sequence dependency and achieved BLEU@1=0.275

**Machine learning in metabolic system analysis: explanation and prediction**

Joint project, metabolic engineering and synthetic biology laboratory at UCLA          March 2017
- Recognized the bottleneck enzyme kinects in reactions to the robustness of the metabolic pathway
- Provided quantitative insights on how to effectively control enzyme kinects to achieve robustness

## Publications

- Chun-Min Chang, Hung-Yi Ou Yang, Chia-Ching Lin, Chin-Laung Lei, and Kuan-Ta Chen. "Channel-Prioritized Convolutional Neural Networks for Sparsity and Multi-fidelity." *Submitted to the workshop of the 2018 International Conference on Learning Representations.* ICLR, 2018.
- Nathan Kuo, Chun-Min Chang, and Kuan-Ta Chen. "Exploring Spatial and Social Factors of Crime: A Case Study of Taipei City." *Asian Conference on Intelligent Information and Database Systems.* Springer, Cham, 2017.
- Chun-Min Chang, Shi-Chung Chang, and Chun-Hung Chen. "How Simplified Models of Different Variability Affects Performance of Ordinal Transformation." *2017 IEEE International Conference on Automation Science and Engineering (CASE)*, presenetation only, 2017.
- Chun-Min Chang, Cheng-Hsin Hsu, Chih-Fan Hsu, and Kuan-Ta Chen. "Performance measurements of virtual reality systems: quantifying the timing and positioning accuracy." *Proceedings of the 2016 ACM on Multimedia Conference.* ACM, 2016.

## Relevant Links

- Detecting early-stage neurodegeneration using 3D convolutional neural networks
- In-depth study on batch normalization: why batch normalization works so well
- Using machine learning in metabolic system analysis: explanation and prediction
- Channel-prioritized convolutional neural networks for sparsity and multi-fidelity
- Exploring spatial and social factors of crime: a case study of Taipei city
- Performance measurements of virtual reality systems: quantifying timing and positioning accuracy
- Non-invasive glucose measurement method using PPG and ECG signal
- Video captioning: sequence to sequence