Chun-Min Chang

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Microsoft AI Residency Program February 28, 2018
Cambridge, UK

Dear Hiring Manager,

I am writing to express my strong interest in the 2018 Microsoft AI Residency program in UK. As you will see from my resume, both my work experience and professional skills are a perfect match for this position. More importantly, I am passionate about tackling real-world challenges with cutting-edge machine learning techniques. The opportunity to work with prominent researchers and engineers in Microsoft sparks my motivation to apply for this program.

Currently I am a 2-nd year PhD student in the department of electrical engineering and computer science at National Taiwan University and also a machine learning engineer in Data Insight and Research Laboratory at Academia Sinica. My research interest focuses on deep learning, particularly on model compression and energy-efficient inference. Last month I proposed a novel channel-prioritized training procedure for convolutional neural networks to enable dynamic tradeoff between varying computation resource and performance demands, sacrificing 3% accuracy in exchange for 99.4% parameters reduction. The result was submitted to the workshop track of international conference on learning representation ICLR 2018.

My another research interest lies in the AI applications, especially in healthcare and clinical diagnosis. I was responsible as the technical lead for the following projects: (1) early detection of neuro-degeneration by raw fMRI images, (2) non-invasive glucose measurement via ECG and PPG signals, and (3) kidney functionality prediction using ultrasonic images. I am confident that both my work and project experiences demonstrate my technical skills and enable me to work in diverse communities.

I am really excited about the opportunity to discuss my qualifications with you in greater depth. I can be reached by phone, email or Skype, all listed on my resume. Many thanks for your time and consideration; I look forward to hearing from you in the near future.

Sincerely,

Chun-Min Chang

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