# Gavin Weiguang Ding

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| CONTACT<br>INFORMATION | Email: gavin.w.ding@gmail.com GitHub: github.com/gwding<br>Webpage: gwding.github.io Google Scholar: goo.gl/FfGp8i |

EXPERIENCE

**Senior Researcher in Machine Learning**       Nov 2016 to present
Borealis AI, at Royal Bank of Canada
- Leading research on the adversarial robustness of neural networks
- Leading AutoML research on deep learning hyperparameter optimization
- Participating in fundamental research projects
- Advising machine learning applications in RBC

**Artificial Intelligence Researcher**       May 2015 to Nov 2016
Kindred Systems Inc.
- Build machine learning frameworks and tools for distributed robotics systems
- Prototyped and built the company's first automatic grasping pipeline, which involves deep learning, 3D vision, motion planning and other robotics areas

**Machine Learning Engineer** (part time)       Sep 2014 to Dec 2014
Sightline Innovation Inc.
- Object recognition on assembly line

**Machine Learning Research Scientist**       Jan 2014 to Apr 2015
School of Engineering, University of Guelph
- Insect detection with convolutional neural networks
- Transformation learning with multiplicative models
- Large-scale neural networks with Theano on multiple GPUs

**Research Assistant**       Sep 2010 to Dec 2013
School of Engineering Science, Simon Fraser University
- Automated blastomere detection of cleavage stage human embryo
- Time series analysis on optical mapped ex-vivo zebrafish heart
- Automated cystoid fluid detection in OCT images

EDUCATION

**Simon Fraser University**, Burnaby, BC, Canada

Master of Applied Science       Apr 2013
Medical Image Analysis at School of Engineering Science
- Thesis: *Identification of Pacemaking Region in Zebrafish Heart from Optical Mapping Data*

**Beihang University (former BUAA)**, Beijing, China

Bachelor of Engineering       Jul 2010
Automation at School of Advanced Engineering

PUBLICATIONS

## Machine Learning (peer-reviewed)

1. Kaiwen Wu, **Gavin Weiguang Ding**, Ruitong Huang, Yaoliang Yu, "On Minimax Optimality of GANs for Robust Mean Estimation", *International Conference on Artificial Intelligence and Statistics (AISTATS)* 2020.

2. **Gavin Weiguang Ding**, Yash Sharma, Kry Yik-Chau Lui, Ruitong Huang, "MMA Training: Direct Input Space Margin Maximization through Adversarial Training", *International Conference on Learning Representations (ICLR)* 2020.

3. Yash Sharma, **Gavin Weiguang Ding**, , Marcus A. Brubaker, "On the Effectiveness of Low Frequency Perturbations", *International Joint Conference on Artificial Intelligence (IJCAI)* 2019.

4. **Gavin Weiguang Ding**, Kry Yik-Chau Lui, Xiaomeng Jin, Luyu Wang, Ruitong Huang, "On the Sensitivity of Adversarial Robustness to Input Data Distributions", *International Conference on Learning Representations (ICLR)* 2019.

5. Kry Yik-Chau Lui, **Gavin Weiguang Ding** , Ruitong Huang, Robert J. McCann, "Dimensionality Reduction has Quantifiable Imperfections: Two Geometric Bounds", *Advances in Neural Information Processing Systems (NeurIPS)* 2018.

6. Yanshuai Cao, **Gavin Weiguang Ding**, Kry Yik-Chau Lui , Ruitong Huang, "Improving GAN Training via Binarized Representation Entropy (BRE) Regularization", *International Conference on Learning Representations (ICLR)* 2018.

7. **Weiguang Ding**, and Graham W. Taylor, "Automatic Moth Detection from Trap Images for Pest Management", *Journal of Computers and Electronics in Agriculture* (2016), pp. 17-28.

8. **Weiguang Ding**, Ruoyan Wang, Fei Mao, and Graham W. Taylor, "Theano-based Large-Scale Visual Recognition with Multiple GPUs", *International Conference on Learning Representations (ICLR) workshop*, 2015

9. **Weiguang Ding**, and Graham W. Taylor, " 'Mental Rotation' by Optimizing Transforming Distance", *Neural Information Processing Systems (NIPS) Deep Learning Workshop*, 2014

## Machine Learning (preprint)

10. **Gavin Weiguang Ding**, Luyu Wang, and Xiaomeng Jin, "AdverTorch v0.1: An Adversarial Robustness Toolbox based on PyTorch", arXiv 1902.07623, presented at the *PyTorch Developer Conference*, 2019.

11. Luyu Wang, **Gavin Weiguang Ding**, Ruitong Huang, Yanshuai Cao, Yik Chau Lui, "Adversarial Robustness of Pruned Neural Networks", 2018.

12. Jan Rudy, **Weiguang Ding**, Daniel Jiwoong Im, and Graham W. Taylor, "Neural Network Regularization via Robust Weight Factorization", arXiv 1412.6630, 2014

## Medical Image Analysis (peer reviewed)

13. Donghuan Lu, Morgan Heisler, Sieun Lee, **Gavin Weiguang Ding**, Marinko V. Sarunic, Mirza Faisal Beg, Retinal Fluid Segmentation and Detection in Optical Coherence Tomography Images using Fully Convolutional Neural Network, *Medical Image Analysis (MIA)*, 2019

14. Donghuan Lu, Karteek Popuri, **Gavin Weiguang Ding**, Rakesh Balachandar, Mirza Faisal Beg, Multimodal and Multiscale Deep Neural Networks for the Early Diagnosis of Alzheimer's Disease using structural MR and FDG-PET images, *Scientific reports*, 2018

15. Donghuan Lu, Karteek Popuri, **Gavin Weiguang Ding**, Rakesh Balachandar, Mirza Faisal Beg, Multiscale deep neural network based analysis of FDG-PET images for the early diagnosis of Alzheimers disease, *Medical Image Analysis (MIA)*, 2018

16. Donghuan Lu, **Weiguang Ding**, Andrew B. Merkur, Marinko V. Sarunic, and Mirza Faisal Beg, Multiple Instance Learning for Age-Related Macular Degeneration Diagnosis in Optical Coherence Tomography Images, *IEEE International Symposium on Biomedical Imaging (ISBI)*, 2017

17. Yifan Jian, Sujin Lee, Myeong Jin Ju, Morgan Heisler, **Weiguang Ding**, Robert J. Zawadzki, Stefano Bonora, Marinko V. Sarunic, "Lens-based wavefront sensorless adaptive optics swept source OCT", *Scientific reports* (2016)

18. **Weiguang Ding**, Eric Lin, Amanda Ribeiro, Marinko Sarunic, Glen F. Tibbits, and Mirza Faisal Beg, "Automatic Cycle Averaging for Denoising Approximately Periodic Spatiotemporal Signals", *IEEE Transactions on Medical Imaging (TMI)*, 2014

19. Eric Lin, Amanda Ribeiro, **Weiguang Ding**, Leif Hove-Madsen, Marinko Sarunic, Mizra Faisal Beg, and Glen Tibbits, "Optical mapping of the electrical activity of isolated adult zebrafish hearts: acute effects of temperature", *American Journal of Physiology - Regulatory, Integrative and Comparative Physiology (AJP-REGU)*, 2014

20. **Weiguang Ding**, Eric Lin, Amanda Ribeiro, Marinko Sarunic, Glen F. Tibbits, and Mirza Faisal Beg, "On Identification of Sinoatrial Node in Zebrafish Heart Based on Functional Time Series from Optical Mapping", *35th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)*, July 2013

21. **Weiguang Ding**, Mei Young, Serge Bourgault, Sieun Lee, David A. Albiani, Andrew W. Kirker, Farzin Forooghian, Marinko Sarunic, Andrew B. Merkur, and Mirza Faisal Beg, "Automatic Detection of Subretinal Fluid and Sub-Retinal Pigment Epithelium Fluid in Optical Coherence Tomography Images", *35th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)*, July 2013

### Medical Image Analysis (preprint)

22. Donghuan Lu, Morgan Heisler, Da Ma, Setareh Dabiri, Sieun Lee, **Gavin Weiguang Ding**, Marinko V. Sarunic, and Mirza Faisal Beg, "Cascaded Deep Neural Networks for Retinal Layer Segmentation of Optical Coherence Tomography with Fluid Presence", arXiv 1912.03418, 2019

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REPRESENTATIVE OPENSOURCE REPOS

1. AdverTorch: toolbox for adversarial robustness research, included in official PyTorch ecosystem (550+ github stars)

2. Theano-based AlexNet: first large scale deep learning implementation in Theano (230 github stars)

3. draw_convnet: Python utility for drawing convnet structure (1600+ github stars)

SERVICE

Conference Reviewing
- Conference on Neural Information Processing Systems (NeurIPS)     2018, 2019
- International Conference on Learning Representations (ICLR)     2019
- Computer Vision and Pattern Recognition (CVPR)     2015, 2020
- IEEE International Symposium on Biomedical Imaging (ISBI)     2014, 2015

Journal Reviewing
- International Journal of Computer Vision (IJCV)     2014

HONOURS &
AWARDS

Contest
- Winner, RETOUCH-MICCAI 2017 Contest, (Fourth author) "Retinal Fluid Segmentation and Detection in Optical Coherence Tomography Images using Fully Convolutional Neural Networks"          Sep 2017
- 2nd Prize, China Undergraduate Mathematical Contest in Modeling          Sep 2008
- 2nd Prize, Beihang University Science and Technology Competition          Apr 2008
- 1st Prize, Nationwide Regional Undergraduate Physics Contest          Dec 2007
- 1st Prize(3rd place), Beihang University Physics Contest          Oct 2007
- 2nd Prize, High School Mathematics Contest, Hebei Province          Oct 2005
- 1st Prize(23rd place), High School Physics Contest, Hebei Province          Sep 2005

Academics
- Graduate Fellowship, Simon Fraser University          Aug 2012
- Robar Industries Graduate Scholarship, Simon Fraser University          Nov 2011
- Graduate Fellowship, Simon Fraser University          Apr 2011
- School of Advanced Engineering-Schlumberger Scholarship (5%)          Jan 2009
- Excellent Student Scholarship, Beihang University (1%)          Oct 2008
- China Aerospace Sci & Tech Corp Scholarship          Oct 2008
- Scholarship of Academics, Beihang University (2%)          Dec 2009/2008/2007
- Entrance Scholarship, Beihang University (2%)          Sep 2006