

Yi Lin/Kyle Gao, Ph.D. Candidate

y56gao@uwaterloo.ca

github.com/kyle-gao

Education

Ph.D. candidate, Geography, University of Waterloo, April 2021-Current.

Supervisor: Dr. Jonathan Li

Master of Science, Accelerator Physics program, University of Victoria, September 2017-July 2020.

Thesis: "A Study on HL-LHC Beam-Beam Resonances Using a Lie Algebraic Weak-Strong Model"

Supervisors: Dr. Shane Koscielniak, Dr. Dean Karlen

Honours Bachelor's degree in Mathematics, Mathematical Physics Co-op program, University of Waterloo, September 2011-April 2016.

Graduated with Distinction.

Research Interests

My recent work has been in Deep Learning, specifically, Computer Vision and its application to Point Clouds and Aerial Imagery. I'm also interested in Point Cloud Quality Assessment and Compression.

Honors and Awards

- Student Grant for International Particle Accelerator Conference (IPAC 2020), 2020.
- UVic Graduate Award, 2017-2020.
- Graduated with Distinction B.Math (Hon), 2016.
- Placed on Dean's Honours List for 6 terms, 2011-2016.

Publications

- "A region-based deep learning approach to instant segmentation of aerial orthoimagery for building rooftop detection", K. Gao, M. Chen, S. N. Fatholahia, H. He, H. Xu, J. M. Junior, W. N. Gonçalves, M. A. Chapman, J. Li. Submitted to Geomatica, Sep 2021.
- "Waterloo Building Dataset: A city-scale vector building dataset for mapping building footprints using aerial orthoimagery", H. He, Z. Jiang, K. Gao, S. N. Fatholahi, W. Tan, B. Hua, H. Xu, M. A. Chapman, J. Li. Submitted to Geomatica, July 2021.
- "Airborne Multispectral LiDAR Point Cloud Classification with a Feature Reasoning-based Graph Convolution Network", P. Zhao, D. Li, Y. Yu, H. Wang, K. Gao, H. Guan, J. M. Junior, J. Li. Submitted to the International Journal of Applied Earth Observation. July 2021

- “Hyperspectral and Multispectral Image Fusion by Jointing Spatial-Spectral Dual-Dictionary with Structured Sparse Low-rank Representation”, N. Chen, B. Zhang, H. He, K. Gao, L. Sui, J. M. Junior, J. Li. Submitted to the International Journal of Applied Earth Observation. July 2021
- “A RandLA-Net-based Approach to Semantic Segmentation of 3D Objects in MLS Point Clouds of Large-scale Urban Roadways”, X. Lu, D. Chen, Z. Wang, H. Ma, L. Cheng, M. Li, X. Ma, Y. Chen, J. M. Junior, K. Gao, J. Li. Submitted to IEEE Transaction on Intelligent Transportation Systems.
- “EGUN-ELBT reference trajectory correction in presence of ambient field”, D. Kaltchev, K. Gao. TRIUMF Beam Physics Notes. May 2014

Research Experience

Graduate Research Assistant, Geospatial Sensing and Data Intelligence Lab, University of Waterloo, November 2020-Present

- Researched and implemented and benchmarked Classical and Deep Learning Change Detection Algorithms.
- Trained deep learning models for Super Resolution of Land Cover maps.
- Implemented Data Pipelines for High Resolution aerial images.
- Lead student group for Change Detection Contest.

Graduate Research Assistant-Computational Physics, Accelerator Physics Group, TRIUMF, 2018-January 2020

- Studied Beam-Beam resonances of the Large Hadron Collider using Lie algebra methods.
- Derived and implemented new algorithms to predict resonances based on particle bunch dynamics.
- Derived a new resonance reduction condition based on relative bunch phasing.
- Presented findings in weekly group meetings.
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Research Assistant-Experimental Physics, Quantum Physics Group, National Research Council, September-December 2014

- Set up and performed experiments on Quantum Dot semiconductors in a near absolute zero environment.
- Collected, cleaned, and analyzed experimental data.
- Wrote reports on experiments; presented findings in weekly meetings.
- Discussed papers in weekly reading groups.

Research Assistant-Computational Physics, Accelerator Physics Group, TRIUMF, January-April 2014

- Developed algorithm modelling electron beams in TRIUMF’s Electron Linear Accelerator.
- Implemented algorithm which minimizes beam orbit deviation.
- Co-Authored and presented a report on beam optimization techniques.

Research Assistant-Computational Physics, Human Monitoring Laboratory, Health Canada,
September-December 2013

- Performed Monte Carlo simulations on radiation detection.
- Researched and applied Statistical methods to reduce variance in Monte Carlo N-Particle simulations (MCNP), increasing performance by an order of magnitude.
- Automated file editing and conversion with Batch Scripts.
- Implemented MPI and OMP parallelization of MCNP software on supercomputers.

Research Assistant-Computational Physics, University of Waterloo, January-April 2013

- Developed a Python tool querying SQL database, performing data engineering, visualization, interpolation, and coordinate transformation on galaxy survey data.
- Created a web interface for the aforementioned Python tool.
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Teaching Experience

- Guest Lecturer: GEOG474, Spring 2021: Intro to Machine Learning, University of Waterloo
- Lab Supervisor: GEOG316, Fall 2021, University of Waterloo. PE216, Fall 2017, University of Victoria
- Teaching Assistant: GEOG316, GEOG371, University of Waterloo. PHYS116, PE216 University of Victoria

Skills/Proficiencies

- Proficient in Mathematics/Statistics (Graduate level).
- Skilled at Research and Analysis.
- Experienced with Deep Learning (Models and Optimization Techniques); especially interested in the application of Transformers to Computer Vision.
- Experienced with Data Engineering, Data visualization.
- Good communicator; fluent in English, Mandarin, French.

- Proficient Languages: Python, MATLAB, Mathematica.
- Proficient Frameworks and Libraries: TensorFlow (Certified), Scikit-learn, Pandas, Matplotlib.
- Some experience with SQL, MongoDB, C++, CUDA, Fortran, Lisp, Maple, Pytorch, Cloud Computing (GCP, AWS)