Jesse Sun

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EDUCATION

University of Waterloo <div align="right">Waterloo, ON</div>

Bachelor of Computer Science, Honours, Co-op. cGPA: 3.84, Faculty GPA: 3.92 — *Sept. 2018 – Apr. 2023*

- Graduate Courses: Optimization for Data Science (CS794), Continuous Optimization (CO466/666), Stochastic Processes (STAT433/833), Intro. to Machine Learning (CS480/680)
- Undergraduate Courses: Advanced Probability (STAT240), Applied Probability (STAT333), Algorithms (CS341)

EXPERIENCE

Machine Learning Engineer Intern — Jan. 2022 – Present
BetterUp — *San Francisco, California*

- Recommendation systems team.

Undergraduate Research Fellow — May 2021 – Aug. 2021
University of Waterloo — Advised by Yaoliang Yu — *Waterloo, Ontario*

- Researched generative models using optimal transport.
- Developed and validated the proposed approach for probabilistic time-series forecasting on large multivariate time-series datasets using LSTM backbone for encoding the temporal covariates.

Research Intern — Sept. 2020 – Dec. 2020
University Health Network — Advised by Bo Wang — *Toronto, Ontario*

- Actualized novel self-supervised pre-training method for 3D point clouds in PyTorch via persistent homology.
- Improved classification accuracy of PointNet and Dynamic Graph CNN (DGCNN) models on the ModelNet40 dataset by up to 2% relative to fully supervised counterpart.
- Contributed in data collection, pre-processing, and developing a temporal convolutional network (TCN) for daily forecasting of COVID-19 cases in regions from tabular data for the global XPRIZE Pandemic Response Challenge.

Research Intern — Jan. 2020 – Apr. 2020
University Health Network — Advised by Bo Wang — *Toronto, Ontario*

- Built and migrated novel image segmentation framework for automatic scar quantification.
- Automated pre-processing pipeline to clean and generate ground truth masks for scars in hypertrophic cardiomyopathy patients' MR images based on manual pixel intensity heuristic used by clinicians.

Research Intern — May 2019 – Aug. 2019
University Health Network — Advised by Bo Wang — *Toronto, Ontario*

- Spearheaded research in deep segmentation models for automatic ventricular segmentation from MR image.
- Proposed Shape Attentive U-Net model that leverages attention layers and a joint shape stream trained via regression on Canny edges for improved ventricular segmentation.
- Improved state-of-the-art on ventricular segmentation datasets SUN09 and AC17 by up to 3% in Dice score coefficient.

PUBLICATIONS (* DENOTES EQUAL CONTRIBUTION)

1. **Conditional Generative Quantile Networks via Optimal Transport**
   Jesse Sun, Dihong Jiang, Yaoliang Yu.
   Under review.

2. **Automated Left Ventricular Scar Quantification in Hypertrophic Cardiomyopathy Patients with an Interpretable Machine Learning Model**
   Zeinab Navidi Ghaziani*, **Jesse Sun***, Raymond Chan, MD, MPH, Kate Hanneman, MD, Amna Al-Arnawoot, MD, Harry Rakowski, MD, Barry Maron, MD, Bo Wang, PhD, Wendy Tsang, MD, MSc
   Canadian Cardiovascular Conference 2020 and American Heart Association Scientific Sessions 2020.

3. **SAUNet: Shape Attentive U-Net for Interpretable Medical Image Segmentation**
   Jesse Sun, Fatemeh Darbehani, Mark Zaidi, Bo Wang
   International Conference on Medical Image Computing and Computer Assisted Intervention 2020, MICCAI 2020.

TECHNICAL SKILLS

Languages: Python, R, C++, C, Java
Tools: PyTorch, numpy, TensorFlow, Ripser, JAX, OpenCV, MXNet, GluonTS, pandas, scikit-learn, Slurm

Awards and Scholarships

President's Research Award ($3,000 CAD)	2021
Cheriton School of Computer Science, Undergraduate Research Fellowship ($15,000 CAD)	2021
Software Engineering Entrance Scholarship ($4,000 CAD)	2018
Math Faculty Entrance Scholarship ($10,000 CAD) *[Declined]*	2018
University of Waterloo President's Scholarship of Distinction ($2,000 CAD)	2018
Hacking Good 2017 Finalist ($1,000 CAD)	2017

Talks and Presentations

Computer Vision Reading Group — Fall 2021
Presented at *University of Waterloo Data Science Club.*

MICCAI 2020 Oral and Poster Sessions - Shape Attentive U-Net — Oct. 2020
Presented at *MICCAI 2020.*

Self-Supervised Training of Graph Convolutional Networks — Aug. 2020
Presented at University Health Network.

Graph Convolutional Networks and Applications for Drug Discovery Tasks — Apr. 2020
Presented at University Health Network.

Shape Attentive U-Net — Jan. 2020
Presented at University Health Network.

Neural State Machines: Learning by Abstractions — Nov. 2019
Presented at University of Waterloo Data Science Club.

Intro to Neural Networks and Optimization — Oct. 2019
Presented at University of Waterloo Data Science Club.

Sanity Checks in Computer Vision — July 2019
Presented at University Health Network.

EfficientNet: Rethinking Model Scaling for Convolutional Neural Networks — June 2019
Presented at University Health Network.

Leadership and Service

Reviewer: ICML 2022
Clubs: University of Waterloo Data Science Club - Vice President of Education.

Interests and Other Info

- Self-teaching functional analysis through 'An Introduction to Functional Analysis' by James C. Robinson.

- Completed a sub-4-hour full marathon during training in preparation for the (cancelled) 2020 Toronto Marathon.