Jesse Sun

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Education

University of Waterloo — Waterloo, ON

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 - Recommendation Systems Team — *San Francisco, California*

- Modularized the resource recommendation pipeline for improved scalability for downstream tasks using BentoML running on AWS Fargate clusters and orchestrated via AWS Step Functions.
- Lead the efforts in R&D of a feature store using Feast, Snowflake, Redis, and AWS Lambda.
- Integrated novel modalities of items into the existing recommendation system through extracting and transforming respective features from Snowflake and indexing into existing ElasticSearch framework.

Undergraduate Research Fellow — May 2021 – Aug. 2021

University of Waterloo — Advised by Yaoliang Yu — *Waterloo, Ontario*

- Researched generative quantile models using optimal transport for probabilistic forecasting and uncertainty quantification.

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.
- Improved state-of-the-art on ventricular segmentation datasets SUN09 and AC17 by up to 3% in Dice score coefficient.

Publications and Preprints (* 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

Introduction to Deep Learning Workshop Nov. 2021
Presented at *Dataverse 2021* datathon.

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.