Connor Lawless

CONTACT Cornell University

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Operations Research & Information Engineering

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RESEARCH INTERESTS Operations research, mathematical programming, statistical learning, integer programming, fair machine learning, interpretable ai

EDUCATION

Cornell University

August 2019 - Present

Ph.D. in Operations Research (4.0 GPA)

Ithaca, NY

Thesis Topic: Integer programming methods for trustworthy machine learning

Advisor: Professor Oktay Günlük

University of Toronto

September 2014 - June 2019

B.Asc. in Industrial Engineering (4.0 GPA)

Toronto, ON

Undergraduate Thesis: The Multi-Armed Investor: Modelling investment decisions through the lens of a multi-armed bandit problem (advised by Prof. Chi-Guhn Lee)

Papers

- C. Lawless, O. Günlük. Fair Minimum Representation Clustering. Under review.
- C. Lawless, S. Dash, O. Günlük, D. Wei. Interpretable and Fair Decision Rules via Column Generation. *Journal of Machine Learning Research*, 2023.
- C. Lawless, O. Günlük. Cluster Explanation via Polyhedral Description. ICML 2023.
- C. Lawless, J. Kalagnanam, L. Nguyen, D. Phan, C. Reddy. Interpretable Clustering via Multi-Polytope Machines. AAAI 2022.
- C. Lawless, S. Ntanavaras, A. Wikum. A Two-Stage Approach to Routing with Driver Preferences via Heatmaps. *Proceedings of the Amazon-MIT Last Mile Vehicle Routing Challenge*, 2022.
- C. Lawless, O. Günluk. Fair and Interpretable Decision Rules for Binary Classification. Optimization for Machine Learning Workshop, Neurips 2020.

Patents

H. Burhani et al. Trade platform with reinforcement learning. US Patent Application 16426196

ACADEMIC PRESENTATIONS

Fair Minimum Representation Cluster

- NYC Joint PhD Colloquium

May 2023

Cluster Explanation via Polyhedral Description

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|---|--|-----------------|
| _ | Cornell ORIE PhD Colloquium, Ithaca NY | September 2022 |
| _ | Making Sense of Explainable ML, Lorentz Center at the University of Leiden | $October\ 2022$ |
| _ | Fidelity AI Center Seminar, Remote | $April\ 2023$ |
| _ | Thematic Einstein Seminar on Optimization and ML, Berlin Germany | $April\ 2023$ |
| _ | NYC Operations Day (Poster), NYC NY | April 2023 |
| _ | SIAM Optimization Conference, Seattle WA | May 2023 |
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- International Federation of Operations Research Society Meeting, Santiago Chile

Interpretable Clustering via Multi-Polytope Machines

| - IBM Research Applied AI Seminar, Remote | August~2021 |
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| - Cornell ORIE PhD Colloquium, Ithaca NY | October 2021 |
| INFORMs Optimization Society, Greenville SC | March 2022 |
| - European Conference on Operational Research, Espoo Finland | July 2022 |

Fair and Interpretable Decision Rules for Binary Classification

- ORACL Workshop, Cornell University

 $June \ 2019$

July 2023

- AI for Social Good Workshop, IJCAI (Remote)

January 2021

Machine Learning NeEDs Mathematical Optimization Seminar Series
 European Conference on Operational Research (Remote)
 July 2021
 INFORMs, Anaheim CA
 October 2021

TEACHING EXPERIENCE

Lecturer

Cornell University

Ithaca, NY

- ORIE 5270 - Big Data Technologies

Spring, 2023

ORIE 6125 - Computational Tools for Operations Research

Spring, 2023

Data Science, Head Teacher iXperience

June 2020 - April 2022

Cape Town (Remote)

- Taught one 6 week, one 2 week, and 3 semester long data science bootcamps covering python development, machine learning, and data visualization to 30 undergraduate students from the world's top universities.
- Designed a new seminar on Artificial Intelligence for life-long learners.
- Supervised 30+ remote industry internships for our students at startups located in South Africa, Europe, and the US.
- Previously was a teaching assistant for the course in 2019 in Cape Town.

Guest Lecturer

Cornell University

Ithaca, NY

ENGRI 1101 - Engineering Applications of Operations Research
 ORIE 6140 - Mathematical Modelling of Operational Systems
 November, 2019
 October, 2020

Teaching Assistant

Cornell University

Ithaca, NY

- ORIE5300: Optimization I, Fall 2019

- ORIE47471: Learning with Big Messy Data, Fall 2021

Honours

Outstanding Reviewer, AISTATS

2023

FAccT Doctoral Consortium Attendee

2022

 Accepted to participate in the Doctoral Consortium at FAccT in Seoul, South Korea which included a travel grant to attend the conference.

Ontario Professional Engineers Foundation for Education Gold Medal

2019

 Awarded to the graduating engineering student at the University of Toronto with the top academic average across all engineering disciplines (1st out of 1000+ students).

W.S. Wilson Medal

 Awarded to the top graduating industrial engineering student at the University of Toronto (1st out of 100+ students).

Edward L. Donegan Scholarship (\$100K)

2014 - 2019

 Awarded a full undergraduate academic scholarship to study engineering by the University of Toronto on the basis of scholastic and leadership achievements.

Ben Bernholtz Memorial Prize in Operations Research

2016

 Awarded to the top undergraduate student at the University of Toronto in operations research on the basis of performance in undergraduate optimization courses.

Work Experience

Research Intern IBM Research

May 2021 - August 2021 Yorktown Heights, NY

Worked on the Applied AI team to develop a novel algorithm for interpretable clustering that
works by simultaneously clustering points and constructing a polytope around each cluster to
describe it. Work was accepted to AAAI 2022.

Summer Analyst BlackRock

 $\begin{array}{c} \textit{June 2018 - August 2018} \\ \textit{London, UK} \end{array}$

- Developed a new micro service to disentangle a database dependency from the existing trade management server; reduced downtime of critical system that processed over 1M orders daily.
- Designed and implemented a new group finder and collaboration tool to improve employee moral; project was awarded first place at the internal intern hackathon (out of 10 teams).

AI Scientist Royal Bank of Canada

September 2017 - June 2018 Toronto, ON

- Worked on a team of 3 to build the first reinforcement learning based trade execution algorithm in Canada (patent pending); the algorithm is currently in production and has traded over \$1 billion dollars notionally across Canada and the US between 2017 and 2019.
- Built a custom user interface using React JS and Python to track the algorithm's performance; the interface exposed critical errors in the algorithm, reducing development time, and was distributed to the electronic traders, building trust and increasing the algorithm's adoption rate on the trading floor.
- Presented key milestones to senior management, including the head of RBC Global Markets, and wrote speaking points circulated to the CEO.

Summer Analyst BlackRock

June 2017 - August 2017

Seattle, WA

- Developed a new tool to visualize and analyze customer reporting distribution metrics; currently being rolled out globally on the Aladdin platform to BlackRock's 13,000 employees.
- Rewrote an existing stored procedure to fetch customer profiles; reduced querying time of common use case from 5 minutes to 15 seconds
- Added functionality to sync CRM contacts to sales personnel's phones as part of an internal team intern hackathon; advanced to the national finals (4 out 30 teams) and presented our product to the global head of product management.

Data Science Intern GetSmarter

June 2016 - August 2016

Cape Town, SA

- Developed a ridge regression model to discover that GetSmarter was spending 15% more than they needed on academic advisor support; presented the results to the Director of Education and CFO.
- Integrated data from GetSmarter's database, phone call logs, and CRM system to create the company's first data pipeline for statistical modelling.

LEADERSHIP EXPERIENCE

Co-President

March 2021- Present

Ithaca, NY

Operations Research Graduate Association

- Coordinating departmental initiatives for the Cornell ORIE PhD student body.
- Previously served as the activities planner in 2020.

Managing Director, Start-up You're Next Career Network

April 2020 - February 2019

Toronto, ON

- Led a team of 10 to run Canada's largest Startup Career Fair with 90 startups, and 3000+ students (revenue = \$40,000+)
- Pioneered Entrepreneurship Week, a week-long case competition to expose students to entrepreneurship, that connected 8 startup mentors to 100+ students

Archivist

March 2015 - March 2016

University of Toronto Engineering Society

Toronto, ON

- Led a team of 15 to manage the faculty's historical artifacts; expanded the portfolio to include community outreach, an online services team, and a documentary filmmaking team comprising over 80 volunteers.
- Awarded Project Director of the Year, an award given to the three engineering society project directors deemed to have done the best job with their respective positions over the 2015-16 year out of 22 project directors.

Relevant Skills Languages: English - Proficient

French, German - Intermediate

Programming: Python, R, Java, SQL, MATLAB, C, Gurobi

LaTeX, ReactJS, HTML, Windows/Unix Environment

Development: Git, SVN

Professional

Institute for Operations Research and the Management Sciences (INFORMS)

Memberships Queer in AI Out in STEM