Justin Dumouchelle

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Research Areas

- Artificial intelligence, machine learning, operations research, discrete optimization, stochastic programming, robust optimization

Education

University of Toronto

PhD in Operations Research & Machine Learning *September 2021 - present*

- Advisor: Elias Khalil
- Thesis: Neural Network Approximations for Mathematical Optimization

Polytechnique Montréal

MASc in Applied Mathematics *September 2019 - August 2021*

- Advisors: Andrea Lodi, Emma Frejinger
- Thesis: Machine Learning for Booking Control

University of Waterloo

BMath (double major) in Computer Science, Combinatorics and Optimization *September 2013 - April 2018*

Professional Experience

Borealis AI

Machine Leaning Research Intern *July 2018 - August 2019*

- Developed data prepossessing pipeline and supervised deep learning models for time series forecasting.
- Implemented distant supervision and supervised learning techniques to extract numerical data from unstructured text.
- Worked closely with business clients to develop high-impact machine learning systems for financial applications.

Publications

Conference Papers

- **J. Dumouchelle**, E. Julien, J. Kurtz, and E. B. Khalil. Neur2RO: Neural Two-Stage Robust Optimization. *International Conference on Learning Representations*, 2024. [**Paper**, **Code**]
- **J. Dumouchelle**, R. Patel, E. B. Khalil, and M. Bodur. Neur2SP: Neural Two-Stage Stochastic Programming. *Advances in Neural Information Processing Systems 35*, 2022. [**Paper**, **Code**, **Website**]

Journal Papers

- **J. Dumouchelle**, E. Frejinger, and A. Lodi. Reinforcement Learning for Freight Booking Control Problems. *Journal of Revenue and Pricing Management*, 2024. [**Paper**, **Code**]
- M. Gasse, S. Bowly, Q. Cappart, J. Charfreitag, L. Charlin, D. Chételat, A. Chmiela, **J. Dumouchelle**, ..., and M. Kun. The machine learning for combinatorial optimization competition (ML4CO): Results and insights. *Proceedings of the NeurIPS 2021 Competitions and Demonstrations Track*, in *Proceedings of Machine Learning Research (PMLR)*, 2022. [**Paper**, **Website**]

Workshop Papers

- A. Prouvost, **J. Dumouchelle**, L. Scavuzzo, M. Gasse, D. Chételat, and A. Lodi. Ecole: A gym-like library for machine learning in combinatorial optimization solvers. *Learning Meets Combinatorial Algorithms at NeurIPS2020*, 2020. [**Paper**, **Code**, **Website**]

Talks & Presentations

- Internation Symposium on Mathematical Programming (ISMP): Oral presentation, July 2024
- AAAI Leanopt Workshop: Poster presentation, February 2024
- Robust Optimization Webinar (ROW): Oral presentation, December 2023 [**Video**]
- INFORMS Annual Meeting: Poster presentation (**First Place, People's Choice Track**), October 2023
- INFORMS Annual Meeting: Oral presentation, October 2023
- International Conference on Stochastic Programming (ICSP): Oral presentation, July 2023
- Mixed Integer Programming Workshop: Poster presentation, May 2023
- Machine Learning Applications for Supply Chain Management at MIT: Guest lecture, April 2023
- Vector Institute Research Symposium: Poster presentation, May 2023

Teaching Experience

University of Toronto

Teaching Assistant

- MIE245 (Data Structures and Algorithms) in Winter 2024. Held tutorials that helped students better understand the fundamentals of data structures and design, analyze, and implement algorithms.
- MIE335 (Algorithms and Numerical Methods) in Winter 2023. Held tutorials that helped students better understand how to design, analyze, and implement algorithms, and

University of Waterloo

Computer Science Tutor

- CS 466/666 (Algorithm Design and Analysis) in Fall 2018. Reviewed course material, worked through examples, and helped students develop an intuition for the following topics: amortized analysis, approximation algorithms, linear programming, randomized algorithms, and online algorithms.
- MTE 140 (Data Structures and Algorithms) in Winter 2018. Assisted students in understanding fundamental concepts in C++, such as pointers and object-oriented programming. Helped students understand the implementation and analysis of data structures.

Awards

- INFORMS Best Poster Award (People's Choice Track), 2023
- Ontario Graduate Scholarship, 2023

Academic Service

- Reviewing: IEEE Transactions on Pattern Analysis and Machine Intelligence, IEEE Transactions on Network Science and Engineering, Sampling and Optimization in Discrete Spaces (SODS) workshop at ICML.
- Organizer: NeurIPS Competition on Machine Learning for Combinatorial Optimization [**Website**].

Extracurricular Activity

University of Waterloo Varsity Swimming

September 2013 - April 2018

- Captain for the 2016-2017 and 2017-2018 seasons.
- Balanced a full-time course load with a significant commitment to the team.
- 2017 and 2018 Academic All Canadian. Award is given to student-athletes with over an 80% academic average.