

Deep Learning and Combinatorial Optimization

Monday February 22, 2021

- 7:55 *SESSION CHAIR: Louis-Martin Rousseau (École Polytechnique de Montréal)*
- 7:55–8:00 *Welcome & Opening Remarks: Dean Miguel García-Garibay (Dean of Physical Sciences, UCLA) and Dima Shlyakhtenko (Director, IPAM)*
- 8:00–8:25 **Oktay Gunluk** (Cornell University)
Fair and Interpretable Decision Rules for Binary Classification
- 8:35–9:00 **Ron Kimmel** (Technion - Israel Institute of Technology)
Learning Geometry
- 9:10–9:25 *Break*
- 9:25–9:50 **Sanjeeb Dash** (IBM Watson Research Center)
A method to learn compact logical rules for knowledge graph reasoning
- 10:00–10:25 **Xavier Bresson** (Nanyang Technological University, Singapore)
The Transformer Network for the Traveling Salesman Problem
- 10:35–10:50 *Break*
- 10:50–11:15 **Kyle Cranmer** (New York University)
Quarks, hierarchical clustering, and combinatorial optimization
- 11:25–11:50 **Azalia Mirhoseini** (Google AI)
Learning to Solve Combinatorial Optimization Problems in Systems and Chip Design

Tuesday February 23, 2021

- 8:00 *SESSION CHAIR: Wouter Kool (University of Amsterdam)*
- 8:00–8:25 **Sebastian Pokutta** (Konrad-Zuse-Zentrum für Informationstechnik (ZIB))
Structured ML Training via Conditional Gradients
- 8:35–9:00 **Thiago Serra** (Bucknell University)
Scaling Up Exact Neural Network Compression by ReLU Stability
- 9:10–9:25 *Break*

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- 9:25–9:50 **Yunhao Tang** (Columbia University)
Reinforcement Learning for Integer Programming: Learning to Cut
- 10:00–10:25 **Joseph Huchette** (Rice University)
Neural network verification as piecewise linear optimization
- 10:35–10:50 *Break*
- 10:50–11:15 **Emma Frejinger** (University of Montreal)
Can ML Help in Solving Cargo Capacity Management Booking Control Problems?
- 11:25–11:50 **Le Song** (Georgia Institute of Technology)
A Framework For Differentiable Discovery Of Graph Algorithms
- 12:00–12:25 **Petar Veličković** (DeepMind Technologies)
Reasoning on Natural Inputs

Wednesday February 24, 2021

- 8:00 *SESSION CHAIR: Kyle Cranmer (New York University)*
- 8:00–8:25 **Vinod Nair** (DeepMind Technologies)
Solving Mixed Integer Programs Using Neural Networks
- 8:35–9:00 **Joan Bruna** (New York University)
On Sparse Linear Programming and (simple) neural networks
- 9:10–9:25 *Break*
- 9:25–9:50 **Laurent Charlin** (HEC Montréal)
Exact Combinatorial Optimization with Graph Convolutional Neural Networks
- 10:00–10:25 **Santanu Dey** (Georgia Institute of Technology)
Solving SDPs by using sparse PCA
- 10:35–10:50 *Break*
- 10:50–11:15 **Maxime Gasse** (École Polytechnique de Montréal)
Ecole: A Gym-like Library for Machine Learning in Combinatorial Optimization Solvers
- 11:25–11:50 **Wouter Kool** (University of Amsterdam)
Deep Learning for Combinatorial Optimization: count your flops and make your flops count!
- 12:00–12:25 **Ellen Vitercik** (Carnegie Mellon University)
How much data is sufficient to learn high-performing algorithms?

Thursday February 25, 2021

- 8:00 *SESSION CHAIR: Petar Veličković (DeepMind Technologies)*
- 8:00–8:25 **Zico Kolter** (Carnegie Mellon University)
Fast semidefinite programming for (differentiable) combinatorial optimization
- 8:35–9:00 **Stefano Gualandi** (Università di Pavia)
Discrete Optimal Transport by Parallel Network Simplex
- 9:10–9:25 *Break*
- 9:25–9:50 **Bistra Dilkina** (University of Southern California (USC))
Decision-focused learning: integrating downstream combinatorics in ML
- 10:00–10:25 **Stefanie Jegelka** (Massachusetts Institute of Technology)
Task structure and generalization in graph neural networks
- 10:35–10:50 *Break*
- 10:50–11:15 **Louis-Martin Rousseau** (École Polytechnique de Montréal)
Combining Reinforcement Learning and Constraint Programming for Combinatorial Optimization
- 11:25–11:50 **Tina Eliassi-Rad** (Northeastern University)
Task-driven Network Discovery via Deep Reinforcement Learning on Embedded Spaces
- 12:00–12:25 **Sanjeev Arora** (Princeton University)
How to allow deep learning on your data without revealing your data