# Deep Learning and Combinatorial Optimization

February 22 - 25, 2021

Scientific Overview

This workshop will apply deep learning methods to combinatorial optimization problems that typically emerge in finance and revenue management, transportation, manufacturing, supply chain, public policy, hardware design, computing and information technology. Given its high flexibility, approximate nature, and self-learning paradigm, deep learning is particularly attractive to address combinatorial optimization problems. Preliminary but promising advances have already emerged in the Traveling Salesman Problem, MaxCut, Minimum Vertex Cover, Knapsack, Quadratic Assignment Problem and Vehicle Routing Problems. Synergies between the two fields could also lead to the development of new algorithms, especially relevant for applied problems. The workshop will bring together experts in mathematics (optimization, graph theory, sparsity, combinatorics, statistics), combinatorial optimization (assignment problems, routing, planning, Bayesian search, scheduling), machine learning (deep learning, supervised, self-supervised and reinforcement learning) and specific applicative domains (e.g. finance, transportation, hardware design, computing and information technology) to establish the current state of these emerging techniques and discuss the next directions.

Participation

Additional information about this workshop including links to register and to apply for funding, can be found on the webpage listed below. Encouraging the careers of women and minority mathematicians and scientists is an important component of IPAM's mission, and we welcome their applications.
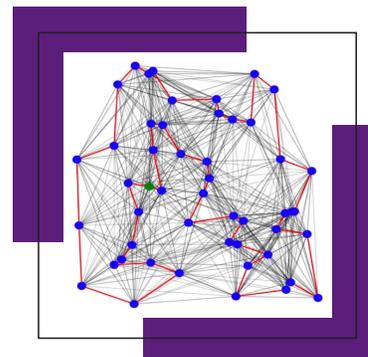
Organizers

Peter Battaglia (DeepMind), Xavier Bresson (NTU, Singapore), Stefanie Jegelka (MIT), Yann LeCun (NYU), Andrea Lodi (Polymtl), Stanley Osher (UCLA), Oriol Vinyals (DeepMind), and Max Welling (University of Amsterdam).

Speakers

Sanjeev Arora (Princeton), Xavier Bresson (NTU, Singapore), Joan Bruna (NYU), Laurent Charlin (HEC Montréal), Kyle Cranmer (NYU), Sanjeeb Dash (IBM), Santanu Dey (Georgia Tech), Bistra Dilkina (USC), Tina Eliassi-Rad (Northeastern University), Emma Frejinger (University of Montreal), Maxime Gasse (Polymtl), Stefano Gualandi (University of Pavia), Oktay Gunluk (Cornell), Joseph Huchette (Rice), Stefanie Jegelka (MIT), Ron Kimmel (Technion), Zico Kolter (CMU), Wouter Kool (University of Amsterdam), Azalia Mirhoseini (Google), Vinod Nair (DeepMind), Sebastian Pokutta (ZIB), Louis-Martin Rousseau (Polytechnique Montréal), Thiago Serra (Bucknell University), Le Song (Georgia Tech), Yunhao Tang (Columbia University), Petar Velickovic (DeepMind), and Ellen Vitercik (CMU).

For more information, visit the program webpage:
www.ipam.ucla.edu/dlc2021