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Andrea Lodi

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“Heuristics for Mixed-Integer Optimization Through a Machine Learning Lens”

Abstract: In this talk, we discuss how a careful use of Machine Learning concepts can have an impact in primal heuristics for Mixed-Integer Programming (MIP). More precisely, we consider two applications. First, we design a data-driven scheduler for running both diving and large-neighborhood search heuristics in SCIP, one of the most effective open-source MIP solvers. Second, we incorporate a major learning component into Local Branching, one of the most well-known primal heuristic paradigms. In both cases, computational results show solid improvements over the state of the art.

Biosketch: Andrea Lodi is an Andrew H. and Ann R. Tisch Professor at the Jacobs Technion-Cornell Institute at Cornell Tech and the Technion. He is a member of the Operations Research and Information Engineering field at Cornell University. He received his PhD in System Engineering from the University of Bologna in 2000 and he was a Herman Goldstine Fellow at the IBM Mathematical Sciences Department, NY in 2005–2006. He was a full professor of Operations Research at DEI, the University of Bologna between 2007 and 2015. Since 2015, he has been the Canada Excellence Research Chair in “Data Science for Real-time Decision Making” at Polytechnique Montréal. His main research interests are in Mixed-Integer Linear and Nonlinear Programming and Data Science and his work has received several recognitions including the IBM and Google faculty awards. Andrea is the recipient of the INFORMS Optimization Society 2021 Farkas Prize. He is the author of more than 100 publications in the top journals of the field of Mathematical Optimization and Data Science. He serves as Editor for several prestigious journals in the area. He has been the network coordinator and principal investigator of two large EU projects/networks, and, since 2006, consultant of the IBM CPLEX research and development team. Andrea Lodi is the co-principal investigator of the project “Data Serving Canadians: Deep Learning and Optimization for the Knowledge Revolution,” recently funded by the Canadian Federal Government under the Apogée Programme and scientific co-director of IVADO, the Montréal Institute for Data Valorization.