

学术报告会

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地点: 电信群楼2-410会议室

Machine Learning for Real-Time Constrained Optimization

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摘要: Optimization problems subject to hard constraints are common in time-critical applications such as autonomous driving and real-time power grid operation. However, existing iterative solvers often face difficulties in solving these problems in real-time. In this talk, we advocate a machine learning approach -- to employ NN's approximation capability to learn the input-solution mapping of a problem and then pass new input through the NN to obtain a quality solution, orders of magnitude faster than iterative solvers. To date, the approach has achieved promising empirical performance and exciting theoretical development. A fundamental issue, however, is to ensure NN solution feasibility with respect to the hard constraints, which is non-trivial due to inherent NN prediction errors. To this end, we present two approaches, predict-and-reconstruct and homeomorphic projection, to ensure NN solution strictly satisfies the equality and inequality constraints, respectively.

报告人简介: Minghua earned his B.Eng. and M.S. from Tsinghua University's Electronic Engineering Department and his Ph.D. from UC Berkeley's Electrical Engineering and Computer Sciences Department. He is a Professor at City University of Hong Kong's Dept. of Data Science and Associate Dean (internationalization and industry) of College of Computing. He received the Eli Jury award from UC Berkeley in 2007 and The Chinese University of Hong Kong Young Researcher Award in 2013. Also, he won multiple paper awards like IEEE ICME, IEEE Transactions on Multimedia, ACM Multimedia, ACM e-Energy, and Gradient AI Research Award. Coding primitives he co-invented are in Microsoft Windows and Azure Cloud Storage, serving many users. His research focuses on online optimization, machine learning for constrained optimization, and its applications in power systems, transportation, and delay-critical networking. He is an IEEE Fellow.