机器人与自主系统论坛
Robotics and Autonomous Systems Seminar

Safe Learning and Verification for Robot Control

报告摘要 Deep neural networks have widely been used in robot control systems, e.g., for perception, for approximating dynamics, and for approximating control laws. Existing learning approaches cannot guarantee hard constraint satisfaction. We will introduce some of our recent work in leveraging energy-function-based safe control and constrained reinforcement learning to achieve hard constraint satisfaction during and after learning. On the other hand, another important question is how can we verify the deep neural networks are correctly learned. We will introduce some of our recent work on sound neural network verification to certified learning-based robot controllers.

个人简历 Dr. Changliu Liu is an assistant professor in the Robotics Institute, School of Computer Science, Carnegie Mellon University (CMU), where she leads the Intelligent Control Lab. Prior to joining CMU, Dr. Liu was a postdoc at Stanford Intelligent Systems Laboratory. She received her Ph.D. in Engineering together with Master degrees in Engineering and Mathematics from University of California at Berkeley and her bachelor degrees in Engineering and Economics from Tsinghua University. Her research interests lie in the design and verification of intelligent systems with applications to manufacturing and transportation. She published the book "Designing robot behavior in human-robot interactions" with CRC Press in 2019; and the book "Algorithms for verifying deep neural networks" in Foundations and Trends in Optimization in 2021. She is the founder of the International Neural Network Verification Competition launched in 2020. Her work has been covered by IEEE Spectrum, ATI news, Robotiq Blog, etc; and has been recognized by NSF Career Award, Amazon Research Award, Ford URP Award, Advanced Robotics for Manufacturing Champion Award, and many best/outstanding paper awards.

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