

Adaptive Robust Control Under Model Uncertainty

Igor Cialenco, Illinois Institute of Technology

We propose a new methodology, called adaptive robust control, for solving a discrete-time Markovian control problem subject to Knightian uncertainty. We apply the general framework to a financial hedging problem where the uncertainty comes from the fact that the true law of the underlying model is only known to belong to a certain family of probability laws. We provide a learning algorithm that reduces the model uncertainty through progressive learning about the unknown system. One of the pillars in the proposed methodology is the recursive construction of the confidence sets for the unknown parameter. This allows, in particular, to establish the corresponding Bellman system of equations.