Adaptive critic designs for discrete-time zero-sum games with application to H(infinity) control.

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Abstract

In this correspondence, adaptive critic approximate dynamic programming designs are derived to solve the discrete-time zero-sum game in which the state and action spaces are continuous. This results in a forward-in-time reinforcement learning algorithm that converges to the Nash equilibrium of the corresponding zero-sum game. The results in this correspondence can be thought of as a way to solve the Riccati equation of the well-known discrete-time H(infinity) optimal control problem forward in time. Two schemes are presented, namely: 1) a heuristic dynamic programming and 2) a dual-heuristic dynamic programming, to solve for the value function and the costate of the game, respectively. An H(infinity) autopilot design for an F-16 aircraft is presented to illustrate the results.