

IEEE ADPRL 2014 Committee

Adaptive dynamic programming (ADP) and reinforcement learning (RL) are two related paradigms for solving decision making problems where a performance index must be optimized over time. ADP and RL methods are enjoying a growing popularity and success in applications, fueled by their ability to deal with general and complex problems, including features such as uncertainty, stochastic effects, and nonlinearity.

ADP tackles these challenges by developing optimal control methods that adapt to uncertain systems over time. A user-defined cost function is optimized with respect to an adaptive control law, conditioned on prior knowledge of the system and its state, in the presence of uncertainties. A numerical search over the present value of the control minimizes a nonlinear cost function forward-in-time providing a basis for real-time, approximate optimal control. The ability to improve performance over time subject to new or unexplored objectives or dynamics has made ADP successful in applications from optimal control and estimation, operation research, and computational intelligence.

RL takes the perspective of an agent that optimizes its behavior by interacting with its environment and learning from the feedback received. The long-term performance is optimized by learning a value function that predicts the future intake of rewards over time. A core feature of RL is that it does not require any a priori knowledge about the environment. Therefore, the agent must explore parts of the environment it does not know well, while at the same time exploiting its knowledge to maximize performance. RL thus provides a framework for learning to behave optimally in unknown environments, which has already been applied to robotics, game playing, network management and traffic control.

The goal of the IEEE Symposium on ADPRL is to provide an outlet and a forum for interaction between researchers and practitioners in ADP and RL, in which the clear parallels between the two fields are brought together and exploited. We equally welcome contributions from control theory, computer science, operations research, computational intelligence, neuroscience, as well as other novel perspectives on ADPRL. We host original papers on methods, analysis, applications, and overviews of ADPRL. We are interested in applications from engineering, artificial intelligence, economics, medicine, and other relevant fields.

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