

Dual Control Revisited

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Abstract— The term dual control was introduced in the 1960s to describe the tradeoff between short term control objectives and actions to promote learning. A closely related term is the exploration-exploitation tradeoff. This lecture will review some settings where dual controllers can be designed with performance guarantees, both for practical purposes and for a more fundamental understanding of the interplay between learning and control.

The starting point will be the standard setting of linear systems optimized with respect to quadratic cost. However much of modern learning theory is developed in a discrete setting. By investigating similarities and differences between the two frameworks, we will shed light on the dual control problem and discover new promising results and directions for research.

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