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17. Control Theory and Optimization

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Blackwell optimality in Markov decision processes with a Borel state space

The most sensitive concept of optimality in MDP's is Blackwell optimality (that is, for all discount factors close to 1). We prove the existence of Blackwell optimal policies in models with a Borel state space, compact action sets, bounded and continuous in action rewards and transition densities, satisfying a minorant condition. The proofs are based on Laurent expansions of discounted rewards for stationary policies, a weak-strong topology in the space of such policies, and a lexicographical policy improvement. An extension to the case of unbounded rewards is to be treated in a forthcoming work with A. Hordijk. Reference: A. A. Yushkevich, Blackwell optimality in Borelian continuous-in-action Markov decision processes, SIAM J. Contr. Optimiz.35(1997), 2157-2182.