Analysis Seminar

Entropy-Regularized Stochastic Control and Mean Field Games

By

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Abstract: Starting from controlled Markov processes with an infinite-horizon average-cost objective, we add an entropy penalty that turns the hard minimum in the Bellman equation into a soft minimum, converting deterministic actions into well-behaved stochastic policies.
The same regularization is then lifted to mean field games, where the transition kernel and payoff depend on the evolving population distribution. Under Lipschitz continuity, the soft-min map becomes contractive, so alternating policy optimization with population updates converges to a stationary mean-field equilibrium. Entropy regularization thus offers a concise, scalable bridge from single-agent control to large-population game theory.

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