

Risk-Averse Control of Continuous-Time Markov Processes

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We present time-consistent risk-averse control of continuous-time Markov systems. The approach is based on the dual representation of coherent risk measures, differentiability concepts for set-valued mappings, and a concept of strong time consistency. We use the recent concept of a controlled risk multi kernel of a Markov system, which we view as a multifunction and consider its semi derivatives. We call those derivatives a multi-generator: a concept generalizing the notion of a generator of a Markov process. We derive a system of ordinary differential equations for the new continuous time risk measure. The equations generalize the classical backward Kolmogorov equations for Markov processes. We use them for a risk-averse optimal control problem formulation and derive optimality conditions for it. We construct convergent discrete-time approximations to the continuous-time control problem.