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## Reinforcement Learning Methods for Risk-Sensitive Investment Management

Tuesday, August 13, 2024 11:00 AM (30 minutes)

We investigate the benefits of relating reinforcement learning (RL) with risk-sensitive control. Our starting point is the duality between free energy and relative entropy, see e.g. Dai Pra et al. (1996). It establishes an equivalence between risk-sensitive control and standard stochastic control problems with an entropy regularization term.

This approach has two major advantages:

i) it does not require a preliminary change of measure 'a la Kuroda & Nagai (2002));

ii) it is naturally consistent with the use of a regularization/penalization term in the literature that connects reinforcement learning with stochastic control, e.g. Wang et al. (2019). In this sense, it also allows for a risk-sensitive interpretation of the entropy regularization in RL.

We furthermore show how this connects to the existing literature on risk-sensitive investment management (Kuroda & Nagai, 2002; Davis & Lleo, 2008, 2020, 2021), whereby cases with unknown parameters or with partial observation showcase the advantages of reinforcement learning methods.

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