Risk-Sensitive Markov Decision Processes with Applications to Finance and Insurance

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In the first part of the talk we investigate the problem of minimizing a certainty equivalent of the total or discounted cost over a finite and an infinite horizon which is generated by a Markov Decision Process (MDP). The certainty equivalent is defined by $U^{-1}(EU(Y))$ where U is an increasing function. In contrast to a risk-neutral decision maker this optimization criterion takes the variability of the cost into account. It contains as a special case the classical risk-sensitive optimization criterion with an exponential utility. We show that this optimization problem can be solved by an ordinary MDP with extended state space and give conditions under which an optimal policy exists. Interestingly, it turns out that in case of a power utility, the problem simplifies and is of similar complexity than the exponential utility case, however has not been treated in the literature so far. A simple portfolio problem is considered to illustrate the influence of the certainty equivalent and its parameters. At the end, we will also consider risk-sensitive dividend problems.

The talk is based on joint works with A. Jaskiewicz and U. Rieder