Optimal tactics and stopping moments in stochastic modeling

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Summary

In this thesis discrete time Markov Decision Processes supporting the decision under uncertainty are considered. Issues are solved using the theory of dynamic programming and principle of optimality. Main goal of this work is to examine the structure and redundancy of the solution.

In the Chapter I. the history of optimal stopping problem was presented. The results were collected regarding the issue of optimal selection of the best object in *full-information case*. Attention was paid to problems with both deterministic and random horizon. Modifications of this topics are main object of interest in the next parts of the thesis.

In the Chapter II an outline of the subject of the space between the release of subsequent records was presented. This is so called *duration of owning the required state*. A special result with a random horizon was derived. As a result of simplification, the essence of the original problem is not lost, but an explicit form of optimal strategy and problem's value is obtained. The solution of a problem with random horizon was presented in Skarupski (2017).

Chapter III presents models related to making decisions under uncertainty. Additional knowledge about future realizations is included in this description and in a natural way allows you to make decisions so that the expected return is „better". In the first example the additional information is to be paid for. In the second model the payment for the possibility of stopping must be done (cf. Skarupski (2018)).

Chapter IV presents models of competition in the problem of optimal selection, in which the fits of individual competitors are different. The players are to choose the best object from the sequence of appearing objects, but they observe these objects distorted by a certain function, and thus both have a different picture of the process' history at their disposal. Considering the player's priority the Nash equilibrium has been obtained. The concept was presented in Skarupski & Szajowski (2018).

The whole is summarized in the form of an add-on which presents the theoretical basis for optimal stopping of Markov chains. It includes results regarding transformation of the problem to a monotone case. It has been shown that the reduction of states allows the use of „myopic" stopping rules (cf. Skarupski (2015)).

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