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ABILITY OF EFFICIENT EVALUATION OF KNOWLEDGE-BASED MANAGEMENT STRATEGIES

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Abstract

The problem of efficient evaluation of knowledge-based management strategies in oligopoly simulating games is considered. In general, this problem seems computationally intractable. The conditions under which the solution may be found with available computational resources are formulated and their substantiation is discussed.

Introduction

We study Strategic Planning (SP) problems in supposition of the presence of adequate computer models allowing to test different strategies to select the best of them, Here we refer only to the Value War model, Chussil and Reibstein, (1994), aimed to simulate oligopoly market strategies and evaluate their performance for variety of possible scenarios. Value War's sample of strategies employed by the competitive companies to run all your company's prospective ones to find the best. The important problem is in the methodology of comparison of the results of strategies competition or in the effective strategy search.

The evaluation methods of the control strategies are most studied in the field of gaming, particularly in chess,. Very promising approach in assessing the SP skill in business education is being developed in Thavicilwat (1996)

However the united approach to the strategy evaluation does not exist yet. The links between different evaluation models are not established. The used models are often not formalized and not adequate enough. No common approach to the criteria analysis and development exists. The criteria which adequately evaluate the control or management efficiency need as a rule large computing resources (time and/or space). Therefore the important problem is in building criterion which could evaluate with maximal possible precision provide by the given resources.
Our Idea in strategies evaluation is based on the organization of special type of tournaments of tested strategies. It has been analyzed in two person's antagonistic finite game with perfect information, Pogossian (1983)

Here we try to progress in the computationally plausible methods of evaluation of SP effectiveness for management problems presented by their simulation models like Value War.

EVALUATION OF STRATEGIES BY LOCAL MEASUREMENTS

Strategy evaluation is a "Global" measurement in a sense that it depends on the values of all terminal nodes of the strategy. At the same time in practice we are able to make only local measurements. Thus, to be effective it is necessary to restrict the problem, considering the additional properties of the strategies. We discuss on of such attempts below.

Let us consider the problem of optimal strategy search for some company in oligopolistic competition like the one in the frame of Value War.

Assuming that companies make decisions simultaneously we can represent strategies by finite AND/OR tree, where moves from OR nodes refer to our company and moves form AND nodes allow to distinct the resulting influence of all other competitive companies in current market situation

Each branch of the tree, a game, is interpreted as a description of the process of competition for some fixed combination of the companies' strategies.

For selected evaluation criterion each game is associated with corresponding number as the value of competitive strategies performances in that game.

Given criterion, say profit, the efficiency of each of our company's strategies ideally might be quantitatively evaluated using the share of values (profits) of that strategy's all possible game sin the robin-round tournament with all possible combinations of the competitors strategies.

Introducing in some natural way a concept strategy f wins (loses to) strategy g we could (ideally) order all our strategies and distinct their strength by their location in that linear ordering.

Given pair of our strategies, f and g, is it possible to determine their interdisposition in that linear (global) ordering using only local, computationally available resources?

We describe some natural sufficient conditions when the answer is positive.

We say that strategies in our linear ordering are essentially improvable, if for some evaluation operator they satisfy the following condition:

it is possible to indicate a constant b (small enough compared to the number m of all strategies in the ordering) such that for any i, $0 < i < m +1$, all strategies located to the left of the segment [i+b, i-b] win the games against samples of competitors' strategies, which were won by the strategy with location i; the strategies located to the right lose; the strategies within the segment may both win and lose.

The following theorem is true.

THEOREM. Given a class F of essentially improvable strategies and strategies f and g from F, if there are b samples of competitors' strategies such that f wins and g loses games against each of them, then f is stronger than g, i.e. the location of f is better than g in that linear ordering.

Thus, given the strategy f, the question of its strength relative to the strategy g is reduced to the construction of the special tournament and estimation of the parameter b. Even without such estimation of b it is possible to state that with increasing the number of testing samples the probability that f is stronger than g increases too.

This statement supplies also the necessary basis for an experimental investigation of the above assumption and complete justification of the idea.

CONCLUSION

How acceptable for management strategies is the demand to be essentially improvable?

The complete and direct justification of the idea we think is possible by constructing the class of such strategies for selected management problems. We work now in this way. Here we can only express our expectation of the positive result by the following arguments.

First, management strategies are essentially knowledge-based. It is evident when we analyze the methodology of the business or marketing plans construction. So experienced manager differs from a novice by an amount of knowledge he has gained before.

Second., the skill of a manager is determined not only by the amount of acquired homogeneous knowledge but primarily by the hierarchy of abstractions such that each new level is possible on the base of some categories of the previous ones. Just this property seems correlates maximally with an ability to be essentially improvable.

And at last, in the real management practice there are graduation and classification of the manager's skill which are reflected directly by the system of their payment.

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