On the Behavior of one Stochastic Automaton in a Random Environment

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This paper is consider the problem of the behavior of an automaton in a random environment, which is the of finding the optimal choice from a finite set of alternatives under conditions of a priori uncertainty. The environment on the behavior of the automaton reacts with three classes of reactions (encouragement, punishment, indifference), which are input signals for the automaton. The automaton, when analyzing these signals, implements a certain learning algorithm, the result of which is the choice, based on a certain criterion, of the optimal action. A construction (algorithm of behavior) of a finite stochastic automaton functioning in a given environment is constructed. Formulas for the generating function of the probability of a change in the action are obtained and for calculating the probability characteristics of the behavior of the automaton. Is establish the convergence of sequences of finite automata (at the memory capacity of the automaton $n \to \infty$) to the corresponding infinite automata (with a countable number of states) and their possible behavior is investigated.