Learning automata-based co-evolutionary genetic algorithms for function optimization

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Abstract

Co-evolutionary genetic algorithms are being used to solve the problems which are naturally distributed and need the composition of couple of elements or partial solutions to be solved. In these algorithms, the problem decomposes into several elements and for each element, a sub-population is regarded. These sub-populations evolve separately by considering the way of interactions among them. The general solution is the result of composition of some individuals from the mentioned sub-populations. These algorithms are more similar to the natural evolution and can be run in parallel and therefore, are more efficient. Function optimization problem is one of the examples of distributed problems in which co-evolutionary genetic algorithms can be used appropriately. To solve the problem, at the first step, we should know whether the variables of the problem are dependent or not. In each case, a different approach should be taken. But, sometimes the recognition of variable dependencies is too hard because of the complexity or discreteness of the functions. This paper represents a solution using a combination of co-evolutionary genetic algorithm and learning automata to address this problem. Learning automata are able to learn the dependence (or independence) of variables and choose the appropriate approach for each case. Experimental results show that using learning automata improves the efficiency of co-evolutionary algorithms and make them suitable for the optimization of any function.

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