A PARAMETER-LESS GENETIC ALGORITHM WITH CUSTOMIZED CROSSOVER AND MUTATION OPERATORS

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Abstract

Genetic algorithm is one of the well-known population based meta-heuristics. The reasonable performance of the algorithm on a wide variety of problems as well as its simplicity made this algorithm a first choice in lots of cases. However, the algorithm has some weaknesses such as the existence of some parameters that need to be carefully set before the run. The capability of the parameters to change the balance between exploration and exploitation make them crucial. Exploration and exploitation are the bases of every evolutionary algorithm. Conducting a balance between these elements is crucial for the success of any evolutionary algorithm. In this research a GA is proposed on which the crossover and mutation rates are removed. A probability vector holds the probability of the alleles for every locus within the individual. The probability is with regards to the contribution of the allele on either increasing or decreasing the fitness of the chromosome. The probability of an allele will increase if the fitness of the chromosome increases by a change or vise versa. The experiments conducted on a wide range of multi-modal and epistatic problems show good performance of the proposed method in comparison to other algorithms in literature.

Keywords: Genetic algorithms, Parameter control, Exploration, Exploitation, Crossover rate, Mutation rate