

A genetic algorithm with fuzzy crossover operator and probability.

Abstract

The performance of a genetic algorithm is dependent on the genetic operators, in general, and on the type of crossover operator, in particular. The population diversity is usually used as the performance measure for the premature convergence. In this paper, a fuzzy genetic algorithm is proposed for solving binary encoded combinatorial optimization problems. A new crossover operator and probability selection technique is proposed based on the population diversity using a fuzzy logic controller. The measurement of the population diversity is based on the genotype and phenotype properties. In this fuzzy inference system, the selection of the crossover operator and its probability are controlled by a set of fuzzy rules derived from the fuzzy logic controller. Extensive computational experiments are conducted on the proposed algorithm, and the results are compared with some crossover operators commonly used for solving multidimensional 0/1 knapsack problems published in the literature. The results indicate that the proposed algorithm is effective in finding better quality solutions.

Keyword: Genetic algorithm; Knapsack problem; Crossover; Fuzzy.