Abstract

In recent decades, considerable research efforts have been devoted to using machine learning or data mining techniques to automatically discover the parameters in multi-objective functions. Among these techniques, the genetic algorithms have been recognized to be particularly powerful in multi-objective problems. Genetic algorithms play a significant role, as search techniques for handling complex spaces in many fields. These algorithms are based on the underlying genetic process and are optimization algorithms based on the mechanics of natural genetics and natural selection. Initially, the search space solutions are coded using the binary alphabet for a discrete search space. Even though the underlying objective function is a continuous function, genetic algorithms convert the search space into discrete set of points. In order to obtain the optimum point with a desired accuracy, strings of sufficient length need to be
chosen. Genetic algorithms have also been developed to work directly with continuous variables (instead of discrete variables). In such genetic algorithms, binary strings are not used. Instead, the genes of chromosome are represented as real numbers directly. In such algorithms the solutions are very close to the natural formulation. In this paper, an Evolutionary Algorithm is developed for identifying the important parameters essential for the multi-objective problem. The main three operators—reproduction, cross-over and mutation are used to create new population of points. The new population is further evaluated and tested for termination criterion. If the termination criterion is not met, the population is iteratively operated by the above three operators and evaluated. This procedure is continued until the termination criterion is met. In reproduction operation, the rank-based elitism roulette wheel selection scheme is adopted. In cross-over operation, a specific cross over operator for this problem is used. In mutation operation, the random substitution method is used. A computer program for this Evolutionary Algorithm is developed for identifying the important parameters essential for the multi-objective problem. This algorithm is tested by number of cases.

References

Index Terms

Computer Science
Emerging Trends in Technology
Keywords
Evolutionary Algorithm  Multi-objective Problems  Roulette Wheel Selection Scheme