Abstract

Genetic algorithms are evolutionary algorithms that are well suited in searching global solution to varied nature of optimization problems. The inspirations in developing GA are derived from working principle of natural genetics. The operators such as reproduction, crossover & mutation are employed similar to natural genetics. These steps involved elements of probability that make search for optimal solution random making GA stochastic & nondeterministic. There are several initiatives made by researcher in improving the search direction & making it more definitive. Present work aims at suggesting a novel stepwise approach in search interval selection of variables using Genetic algorithm. Three non-linear optimization problems are selected for numerical experimentation with comparative studies of respective solution using conventional methods and GA techniques with & without stepwise approach. Test run are conducted with constant GA parameters and the best function values for five consecutive run are tabulated. Corresponding values of variables decide the search interval selection criteria for step 1. Five elite-GA© run are conducted for step 1 for newly defined search interval of variables. The corresponding values of the variables obtained as in step 1 decide the search interval selection for step 2. Number of steps continues till no further improvement in the
function values is obtained. Based on the result of the present work it can be concluded that
the optimal values obtained for all the three test problems evaluated using the stepwise
approach are better than those obtained using GA without stepwise approach & conventional
techniques. The present work is demonstrative & it is felt necessary to substantiate the claim
by extending this stepwise search interval approach of GA in selection of variables to other
problems of optimization.

References

  Publication Co; 1989.
  York, 2001
  international publishers, 2013.
- Goldberg D. E. , Genetic Algorithms in Search, Optimization and Machine Learning,
  Addison-Wesley Publication Company; 1989.
- Migdalas A. , Toraldo G. , Kumar V. , Nonlinear optimization and parallel computing,
  Parallel Computing 29 (2003) 375-391
- Tang K. , Sun T. , Yang Jg-Yu, An improved genetic algorithm based on a novel
  selection strategy for nonlinear programming problems, Computers and Chemical Engineering
  35 (2011) 615-621
- Aryanezhad M. B. , Hemati M. , A new genetic algorithm for solving nonconvex nonlinear
- Giuggioli Busacca P. , Marseguerra M. , Zio E. , Multiobjective optimization by genetic
  algorithms: application to safety systems, Reliability Engineering and System Safety 72 (2001)
  59-74
- Konak A. , Coit D. W. , Smith A. E. , Multi-objective optimization using genetic
- Toksar M. D. , Güner E. , Solving the unconstrained optimization problem by a variable
- Reese A. , Random number generators in genetic algorithms for unconstrained and
  constrained optimization, Nonlinear Analysis 71 (2009) e679-e692
- Bunnag D. , Sun M. , Genetic algorithm for constrained global optimization in continuous
- Xiang Li, Gang Du, Inequality constraint handling in genetic algorithms using a boundary
- Tsoulos I. G. , Solving constrained optimization problems using a novel genetic
- Martorell S. , Carlos S. , Sa´nchez A. , Serradell V. , Constrained optimization of test
  intervals using a steady-state genetic algorithm, Reliability Engineering and System Safety 67
- Summanwar V. S. , Jayaraman V. K. , Kulkarni B. D. , Kusmakar H. S. , Gupta K. ,
  Rajesh J. , Solution of constrained optimization problems by multi-objective genetic algorithm,
Genetic Algorithm for Constrained Optimization with Stepwise Approach in Search Interval Selection of Variables

Computers and Chemical Engineering 26 (2002) 1481-1492
- Pandharipande S. L. , Artificial Neural Networks: FFEBPN With Software, Central Techno Publishers; Nagpur; June 2008
- Bradley S. , Hax A. , Magnanti T. , Applied Mathematical Programming, Addison-Wesley 1977

Index Terms

Computer Science
Artificial Intelligence
Keywords
Genetic algorithm; non-linear optimization problems; stepwise approach; search interval selection.