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Artificial Intelligence
Advantages and Limitations of Genetic Algorithms

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Introduction

The GA is a search technique to find optimal solutions to problems, it is a global heuristic search, they are algorithm that can evolve which is inspired by the natural biological evolution, as well as in the inheritance, mutation, selection and crossing. This population uses a population of randomly chosen individuals; each new generation assesses the Fitness of individuals, selecting among them the healthiest that have been modified to form a new population and valuate each of the attempted solutions, so (probabilistically) keep a subset of the best solutions. To extend a new population for iteration of the algorithm, that is to say use these solutions to generate a new population, the algorithm will iterate continuously with the same procedure until the maximum number of generations has been produced, that is to say that it has the best possible generation.

In summary, the following steps are used:

1. Selection population individuals
2. Evaluation
3. Term Condition
   a) Selection
   b) Crossover, and crossover result
   c) Mutations

Advantages

Use a concept about simple genetics to understand. It is modular, separate from the application and supports optimization.

Always an answer; the answer improves with time and Easy exploitation of previous or alternative solutions, flexible building blocks for hybrid applications.

Genetic algorithms have not only been used to solve computer and practical problems in engineering, but also to understand the biology of natural evolution, such as examining a fossil and determining how it has evolved, this example it helps us to understand the advantage of developing these types of systems rather than the

conventional ones, as it not only allows us to obtain solutions to a particular problem but also helps us to understand how it works. Carrying out these experiments with GA instead of taking them to the practical laboratory helps us save time instead of waiting for natural evolution to occur, yielding results in reasonable times.

Another advantage is that it allows to simulate experiments that are not possible in the real world, and for the simulation phenomena that the difficult and complicated to produce, that can be modeled computationally can obtain results and new knowledge on its evolution, for example ", *We can try to measure the "information" contained in a population and try to understand exactly how evolution processes that information to create structures that lead to greater aptitude ".*

Challenges

The function that evaluates individuals can become very costly, ie take a lot of time and resources. A better solution is given by comparing it with other solutions already obtain in each iteration of the algorithm.

It is not always possible to converge in an optimal solution, it can be found that a premature solution is found, causing that in time do not Satisfy the results.

It does not have good scalability given the complexity of the system, many variable type elements make the search space grow exponentially.

Genetic algorithms do not always adapt well to the complexity of problems, also when the population is large and individuals who are exposed to mutation is large there is an exponential increase in the search space.

When the population is too similar to each other, another inconvenience arises because diversity is important in genetic algorithms, because crossing a homogeneous population does not generate new solutions. It is advisable that the population is not homogenous so that it generates new solutions in their descendants.

Bibliography

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