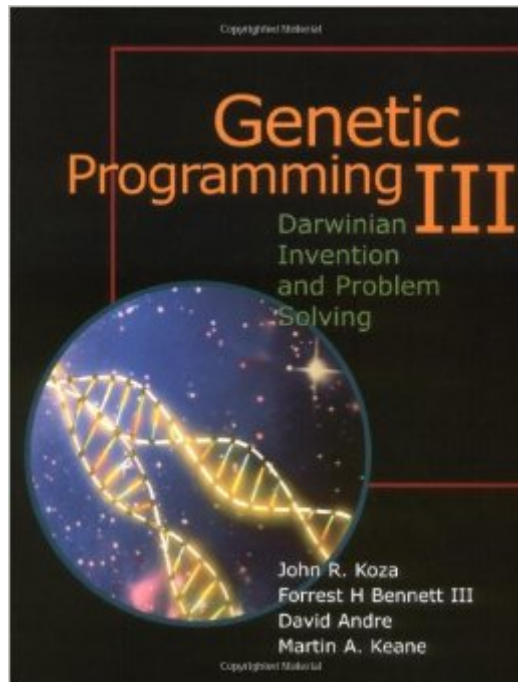# Genetic Programming III: Darwinian Invention And Problem Solving (Vol 3)

Synopsis

Genetic programming is a method for getting a computer to solve a problem by telling it what needs to be done instead of how to do it. Koza, Bennett, Andre, and Keane present genetically evolved solutions to dozens of problems of design, optimal control, classification, system identification, function learning, and computational molecular biology. Among the solutions are 14 results competitive with human-produced results, including 10 rediscoveries of previously patented inventions.Researchers in artificial intelligence, machine learning, evolutionary computation, and genetic algorithms will find this an essential reference to the most recent and most important results in the rapidly growing field of genetic programming. * Explains how the success of genetic programming arises from seven fundamental differences distinguishing it from conventional approaches to artificial intelligence and machine learning* Describes how genetic programming uses architecture-altering operations to make on-the-fly decisions on whether to use subroutines, loops, recursions, and memory* Demonstrates that genetic programming possesses 16 attributes that can reasonably be expected of a system for automatically creating computer programs* Presents the general-purpose Genetic Programming Problem Solver* Focuses on the previously unsolved problem of analog circuit synthesis, presenting genetically evolved filters, amplifiers, computational circuits, a robot controller circuit, source identification circuits, a temperature-measuring circuit, a voltage reference circuit, and more* Introduces evolvable hardware in the form of field-programmable gate arrays* Includes an introduction to genetic programming for the uninitiated

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Customer Reviews

The quest for *Automatic Programming* is the holy grail of artificial intelligence. The dream of having computer programs write other useful computer programs has haunted researchers since the nineteen fifties. In Genetic Programming III -Darwinian Invention and problem solving (GP3) by John R. Koza, Forest H Bennet III, David Andre and Martin A Keane, the authors claim that the first inscription on this trophy should be the name Genetic Programming (GP). GP is about applying evolutionary algorithms to search the space of computer programs. The authors paraphrase Arthur Samuel of 1959 and argue that with this method it is possible to "tell the computer what to do without telling it explicitly how to do it".The main hypothesis of the book is that GP is not only the first instance of true automatic programming but also creative to such an extant that it competes with humans in solving very hard problems and therefore the solutions produced by GP can sometimes be called inventions, thus the name "Darwinian Invention Machine". The book starts by listing sixteen proposed attributes of any automatic programming system. The attribute list begins with obvious properties such as the ability to produce entities that can run on a computer, continues by describing components of full computer programs and ends by expressing fuzzier concepts such as applicability, scalability and competitiveness with human-produced results. The authors argue that GP definitely has most of the 16 attributes and at least to some extent possesses the remaining few. The last attribute, human competitive results, is in turn defined by a list of eight properties where each of them gives enough evidence to conclude competitiveness to results produced by the intellect of a human.

The authors have written a fine book here and it has and will continue to be a source of good information on the subject. What is most interesting about the approach of genetic programming is that it does not make use of the inference methods of formal logic in the search for the correct program. Correctly observing that logical thinking is insufficient for invention and creativity, the authors follow the "logic considered harmful" philosophy in their attempts to get a computer to find a creative/original solution to a problem. And most importantly, they discuss fourteen examples where genetic programming has produced results that are competitive with human-produced results. The book is almost 1200 pages long, but without reading all the examples one could cover the main points in a reasonable time frame. The reader knowing the LISP language will appreciate the discussion more. After a brief introduction to the book in chapter 1, the authors move on to a

detailed discussion of the philosophy and approaches used in genetic programming. They list the five steps that must be done before applying a genetic algorithm to a problem and give an overview of the LISP background needed to understand genetic programming. The authors emphasize that the genetic algorithm is probabilistic in nature, with the initial populations, individual selection, and genetic operation chosen at random. They give flowcharts illustrating a typical genetic algorithm and program, and then show executable programs can be automatically created. A very extensive list of references on genetic programming is given at the end of the chapter. In the next part, the authors discuss how to eliminate the requirement that the programmer specify the architecture in advance to the program to be created.

Genetic Programming III: Darwinian Invention and Problem Solving (Vol 3) Clinical Problem Solving in Orthodontics and Paediatric Dentistry, 2e (Clinical Problem Solving in Dentistry) Clinical Problem Solving in Periodontology and Implantology, 1e (Clinical Problem Solving in Dentistry) Swift Programming Artificial Intelligence: Made Easy, w/ Essential Programming Learn to Create your * Problem Solving * Algorithms! TODAY! w/ Machine ... engineering, r programming, iOS development) Genetic Algorithms and Genetic Programming in Computational Finance Swift: Programming, Master's Handbook; A TRUE Beginner's Guide! Problem Solving, Code, Data Science, Data Structures & Algorithms (Code like a PRO in ... engineering, r programming, iOS development) Java Artificial Intelligence: Made Easy, w/ Java Programming; Learn to Create your * Problem Solving * Algorithms! TODAY! w/ Machine Learning & Data ... engineering, r programming, iOS development) Javascript Artificial Intelligence: Made Easy, w/ Essential Programming; Create your * Problem Solving * Algorithms! TODAY! w/ Machine Learning & Data ... engineering, r programming, iOS development) Php: Programming, Master's Handbook: A TRUE Beginner's Guide! Problem Solving, Code, Data Science, Data Structures & Algorithms (Code like a PRO in ... engineering, r programming, iOS development,) Python: Programming, Master's Handbook; A TRUE Beginner's Guide! Problem Solving, Code, Data Science, Data Structures & Algorithms (Code like a PRO ... engineering, r programming, iOS development) Artificial Intelligence: Made Easy w/ Ruby Programming; Learn to Create your * Problem Solving * Algorithms! TODAY! w/ Machine Learning & Data ... engineering, r programming, iOS development) The Design of Innovation: Lessons from and for Competent Genetic Algorithms (Genetic Algorithms and Evolutionary Computation) Programming And Problem Solving With Ada 95 Matlab, Fourth Edition: A Practical Introduction to Programming and Problem Solving Matlab: A Practical Introduction to Programming and Problem Solving Problem Solving and Programming Concepts (9th Edition)

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