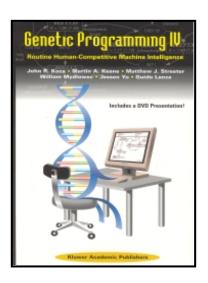
Genetic Programming IV

Routine Human-Competitive Machine Intelligence

by
John R. Koza
Stanford University, CA
Martin A. Keane
Econometrics Inc., IL
Matthew J. Streeter
Genetic Programming, Inc., CA

William Mydlowec Pharmix Corporation, CA Jessen Yu Pharmix Corporation, CA Guido Lanza Pharmix Corporation, CA



25% discount off list price!

Genetic programming (GP) is method for automatically creating computer programs. It starts from a high-level statement of what needs to be done and uses the Darwinian principle of natural selection to breed a population of improving programs over many generations.

Genetic Programming IV: Routine Human-Competitive Machine Intelligence presents the application of GP to a wide variety of problems involving automated synthesis of controllers, circuits, antennas, genetic networks, and metabolic pathways. The book describes fifteen instances where GP has created an entity that either infringes or duplicates the functionality of a previously patented 20th-century invention, six instances where it has done the same with respect to post-2000 patented inventions, two instances where GP has created a patentable new invention, and thirteen other human-competitive results. The book additionally establishes:

- GP now delivers routine human-competitive machine intelligence.
- GP is an automated invention machine.
- GP can create general solutions to problems in the form of parameterized topologies.
- GP has delivered qualitatively more substantial results in synchrony with the relentless iteration of Moore's Law.

Reviews:

"Genetic Programming IV: Routine Human-Competitive Machine Intelligence demonstrates the everyday solution of such 'holy grail' problems as the automatic synthesis of analog circuits, the design of automatic controllers, and the automated programming of computers. To specialists in any of the fields covered by this book's sample problem areas, I say read this book and discover the computer-augmented inventions that are your destiny. To remaining skeptics who doubt the inventive competence of genetics and evolution, I say read this book and change your mind or risk the strong possibility that your doubts will soon cause you significant intellectual embarrassment. "David E. Goldberg, University of Illinois

"The research reported in this book is a tour de force. For the first time since the idea was bandied about in the 1940s and the early 1950s, we have a set of examples of human-competitive automatic programming." John H. Holland, University of Michigan

Visit our website at:

www.wkap.nl

For up-to-date information.



Reviews (continued):

"John Koza and his colleagues have done remarkable work in advancing the development of genetic programming and applying this to practical problems such as electric circuit design and control system design. I strongly recommend it." **Bernard Widrow**, **Electrical Engineering Department**, **Stanford University**

"John Koza's genetic programming approach to machine discovery can invent solutions to more complex specifications than any other I have seen." John McCarthy, Computer Science Department, Stanford University

Contents

- 1 Introduction
- 2 Background on Genetic Programming
- 3 Automatic Synthesis of Controllers
- 4 Automatic Synthesis of Circuits
- 5 Automatic Synthesis of Circuit Topology, Sizing, Placement, and Routing
- 6 Automatic Synthesis of Antennas
- 7 Automatic Synthesis of Genetic Networks
- 8 Automatic Synthesis of Metabolic Pathways
- 9 Automatic Synthesis of Parameterized Topologies for Controllers
- 10 Automatic Synthesis of Parameterized Topologies for Circuits
- 11 Automatic Synthesis of Parameterized Topologies with Conditional Developmental Operators for Circuits
- 12 Automatic Synthesis of Improved Tuning Rules for PID Controllers

- 13 Automatic Synthesis of Parameterized Topologies for Improved Controllers
- 14 Reinvention of Negative Feedback
- 14 Automated Reinvention of Six Post-2000 Patented Circuits
- 15 Problems for Which Genetic Programming May Be Well Suited
- 17 Parallel Implementation and Computer Time
- 18 Historical Perspective on Moore's Law and the Progression of Qualitatively More Substantial Results Produced by Genetic Programming
- 19 Conclusion

Appendix A: Functions and Terminals

Appendix B: Control Parameters

Appendix C: Patented or Patentable Inventions
Generated by Genetic Programming

Bibliography

Order form: Genetic Programming IV: Routine Human-Competitive Machine Intelligence



□ Please send cop(y)(ies) Hardbound, June 2003, 624 pp., ISBN 1-4020-7446-8						
regular prices EUR 1			0/USD 130.00	3/GBP 84.00	DISCOUNT CODE: AAAI-GECCO 2003	
Special 25%disc	count Pric	es: EUR 99.0	0 / USD 97.	00 / GBP 63.0	0 (Offer expires Sept. 30, 2003)	
"fill in the VAT number of your institute/company in the appropriate space on the order form; or add 6% VAT to the total order amount (customers from the UK are not charged VAT).						
\square Payment enclosed to the amount of \square Please			invoice \square	□ me □ my institution/company		
□ Please charge my credit car	d account		an Express □ Visa □ MasterCard / Eurocard			
card no.				CVC*	expiry date	
VAT no.		See back of the credit card: 3 digits following the card number				
title initials		surname				
organization			department			
address						
zip/postal code city			state	country		
telephone fax		e-mail				
signature		date				
		ORDERS FOR BOOKS: All book series are available on continuation order which may commence or be cancelled at any time. New volumes are billed and shipped upon publication. Prices are subject to change without notice.				

Please send your order to:

Customers in Europe, Middle East, Africa, Asia and Australia: Kluwer Academic Publishers, Customer service, P.O. Box 322, 3300 AH Dordrecht, The Netherlands F +31-78-6576474 T +31-78-6576422 (books) E orderdept@wkap.nl W www.wkap.nl Customers in USA, Canada, Mexico and Latin America: Kluwer Academic Publishers, Customer service, P.O. Box 358, Accord Station, Hingham MA 02018-0358, USA F (781)681-9045 T TOLL FREE within US: 1-866-269-wkap E kluwer@wkap.com W www.wkap.com