

■ Preface to the Third Edition

Ten years have elapsed since the first publication of this book. In that decade of time, evolutionary computation has matured from a fringe element of computer science to a well-recognized serious endeavor. Although specific numbers are difficult to estimate, it would not be unreasonable to believe that over 10,000 papers have now been published in evolutionary computation. In 2001, the *IEEE Transactions on Evolutionary Computation* placed fourth in impact factor ratings in the category of computer science/artificial intelligence among all such journals that are analyzed by the Institute for Scientific Information (Thomson ISI), and it continues to place among the top publications year after year, while the number of submissions to the journal continues to increase. It has taken some time to achieve this degree of recognition, and it is certainly welcome.

Five years ago, I published the second edition of this book, and noted that evolutionary computation and artificial intelligence (AI) remained mostly disparate activities. Unfortunately, that is still true. Furthermore, other alternative approaches to machine intelligence, such as neural networks and fuzzy systems, still remain outside the mainstream of AI. Surely, these areas are well known, but not as well practiced within what constitutes “traditional” AI.

In contrast, within engineering organizations such methods are being embraced. This is particularly true within the Institute of Electrical and Electronics Engineers (IEEE), the world’s largest professional organization. The IEEE recently approved a request by the IEEE Neural Networks Society to change its name to the IEEE Computational Intelligence Society, emphasizing the important contributions from fuzzy logic, evolutionary computation, and other branches of machine intelligence based on inspiration from nature. At the time of this writing, there are over 5,000 members in this new computational intelligence society. Publications often illustrate the practical application of computational intelligence tools to challenging real-world problems, and there could be no greater evidence of success.

Much of what I offered in the preface to the second edition still holds for this third edition. I encourage you to read that preface, as well as the preface to the first edition, to review the motivation that underscores the philosophy offered in this

x PREFACE TO THE THIRD EDITION

book. This new edition has several revisions and additions that highlight recent research and references, as well as an expanded Chapter 5, which provides the most up-to-date review of research on using evolutionary computation to allow a computer to teach itself to play checkers and chess. I thank the IEEE for allowing me, under its copyright provisions, to reprint sections of Chellapilla and Fogel (1999a, 1999b, 2001) and Fogel et al. (2004) in that chapter. In addition, each chapter is now followed by a series of questions and sometimes also programming activities aimed at the student or practitioner. Some of the questions are offered for consideration, and there may be no perfect answer; others involve mathematical development or experimental research. I encourage you to give all these questions and activities your attention.

I would like to thank Cathy Faduska and Chrissy Kuhnen at IEEE for their support during this project, as well as the technical reviewers, and especially my brother, Gary, for his assistance in revising the material in Chapter 2. As with the earlier editions, the purpose of the book will be served if it continues to advance interest, experimentation, and analysis in the growing field of evolutionary computation. Despite the explosion of activity in evolutionary computation, there is still much to learn and much to do, and I hope this book helps you advance the frontier of what evolutionary computation is capable of achieving.

REFERENCES

- Chellapilla, K., and D. B. Fogel (1999a). "Evolving Neural Networks to Play Checkers without Expert Knowledge," *IEEE Trans. Neural Networks*, 10:6, 1382–1391.
- Chellapilla, K., and D. B. Fogel (1999b). "Evolution, Neural Networks, Games, and Intelligence," *Proceedings of the IEEE*, 87:9, 1471–1496.
- Chellapilla, K., and D. B. Fogel (2001). "Evolving an Expert Checkers Playing Program without Using Human Expertise," *IEEE Transactions on Evolutionary Computation*, 5:4, 422–428.
- Fogel, D. B., T. J. Hays, S. L. Hahn, and J. Quon (2004). "An Evolutionary Self-Learning Chess Playing Program," *Proceedings of the IEEE*, December, 1947–1954.

DAVID B. FOGEL

La Jolla, California
September 2005