Book Review

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Artificial Life Models in Software. Andrew Adamatzky and Maciej Komosinski (Eds.). (2005, Springer-Verlag.) Hardcover, $69.95, 344 pages, 189 illustrations.

Artificial life models in software is a unique book that showcases a variety of freely available software for artificial life simulations. At first glance it may appear to be nothing new, but actually it is quite unprecedented. In these pages readers have a quick overview of what kind of simulation tools are available off the shelf on the Web today and what can be done by using them. It will be valuable for many related to artificial life, especially as an introductory reading for students who are about to plunge into this creative field of research. It will also be a nice informative reference for professional researchers and educators. Moreover, the software models introduced in this book should be quite appealing to nonscientific readers as well, potentially contributing to the outreach of artificial life research to a general audience.

This book consists of thirteen chapters which are categorized into four parts as follows:

Part I: Virtual Living Worlds

Virtual evolutionary ecosystems, mostly with 2D or 3D kinetics (except for Avida).

1. *Avida: Evolution Experiments with Self-Replicating Computer Programs (Charles Ofria, Claus O. Wilke)*
2. *Framsticks: A Platform for Modelling, Simulating and Evolving 3D Creatures (Maciej Komosinski)*
3. *Nerve Garden: Germinating Biological Metaphors in Net-based Virtual Worlds (Bruce Damer, Karen Marcelo, Frank Revi, Todd Furmanski, Chris Laurel)*
4. *GenePool: Exploring the Interaction Between Natural Selection and Sexual Selection (Jeffrey Ventrella)*
5. *Sodarace: Adventures in Artificial Life (Peter W. McOwan, Edward J. Burton)*

Part II: Collective Artificial Life

Multi-agent system simulators and their applications to biological/social/military sciences, education, and art.

6. *Escaping the Accidents of History: An Overview of Artificial Life Modeling with Repast (Michael J. North, Charles M. Macal)*
7. *EINSTein: A Multiagent-based Model of Combat (Andrew Ilachinski)*
8. *StarLogo: A Programmable Complex Systems Modeling Environment for Students and Teachers (Andrew Begel, Eric Klopfer)*
9. *On the Evolution of Sonic Ecosystems (Jon McCormack)*

Part III: Magic of Discrete Worlds

Discrete dynamical system simulators covering cellular automata and other dynamical networks.

10. Exploring Cellular Automata with MCell (Mirek Wojtowicz)

11. Discrete Dynamics Lab: Tools for Investigating Cellular Automata and Discrete Dynamical Networks (Andrew Wuensche)

Part IV: Artificial Life Arts

Application of artificial life to art creation and aesthetics.

12. Simulated Breeding—A Framework of Breeding Artifacts on the Computer (Tatsuo Unemi)

13. Enriching Aesthetics with Artificial Life (Alan Dorin)

Most of these chapters provide self-consistent tutorials of largely programmable, general-purpose simulation platforms (1, 2, 5, 6, 7, 8, 10, 11), while others lay more emphasis on software systems implemented for specific aims (3, 4, 9, 12) or conceptual discussion (13).

As demonstrated by these chapters, a significant portion of artificial life research has been based on computer simulations. It is rather typical, though, that each research group develops its own simulation software from scratch, leading to a one-simulator-per-researcher situation that may have hampered effective development, analysis, sharing, and validation of simulation models and results among researchers. One may expect that *Artificial life models in software* will help develop common knowledge about freely available software for artificial life modeling and simulation, and thereby promote the growth of a common "language" or "tool" within the community. Indeed, this book already contains several examples of such modeling/simulation toolkits that are getting increasingly popular, including Repast, which is now extensively used in biological and social sciences, and StarLogo, which already has a long history of successful applications in education.

In the meantime, however, the establishment of de facto standard popular tools may not be a good thing in itself for future progress of artificial life. It may cause a loss of diversity, or "crazy ideas," in modeling methodologies, potentially resulting in a reduced chance for breakthroughs in theory and application. Because artificial life, from the very inception, has been seeking novel ways to synthesize different forms of life using artificial media, its philosophy is inherently irreconcilable with attitudes looking for easy solutions like grabbing a ready-made tool and applying it for quick problem solving. Readers, especially students, should keep in mind that this book is not intended to serve as a guide to such easy solutions.

The most important thing this book illustrates, in my opinion, is actually the opposite of the popularization of common software tools. Instead, it successfully depicts *the enthusiasm to create life of your own*. Every chapter of this book is full of this kind of aggressive motivation, most genuinely inheriting the original spirit of artificial life proposed by Chris Langton two decades ago. This appears to be unique and refreshing in the context of recent trends in artificial life research, whose foci are tending more toward theoretical biology and evolutionary computation, with less emphasis on creative aspects.

As a reviewer, I think I need to make some critical comments as well. One issue I could raise is that this volume includes no simulation model of artificial chemistry or complex network theory, which are both rapidly growing areas of study. These studies are usually abstract and hence may not be as appealing visually as other studies. Nonetheless, no doubt they are now part of the theoretical foundations of artificial life, and the inclusion of models on these topics would have made the coverage of this book more complete.

Overall, I would like to recommend *Artificial life models in software* to whoever is interested in artificial life, especially young people (whether biologically or mentally) who have unleashed imagination and vigorous curiosity for life-as-it-could-be. It would be gratifying to see a succeeding edition of this volume compiled in the near future, to cover a lot more diverse and creative artificial life models developed by those who are inspired by work presented in the current one to explore the huge possibility space of theoretical life forms we have not seen yet.