



Simulating Ecological and Evolutionary Systems in C

By Will Wilson

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Computer simulations are a powerful tool for understanding ecological and evolutionary systems. *Simulating Ecological and Evolutionary Systems in C* models a diverse range of biological processes and systems, including competition, foraging, predation, mating systems, and life-history optimization, by simulating large collections of interacting individuals. Using the programming language C, the book starts with elementary programs modeling stochastic birth-death processes, with programming complexity increasing as the chapters progress. Wilson covers all the important features of C: arrays, files, pointers, and structures, within biologically motivated simulations. Although computer simulations of extremely complicated biological processes are released from rigid mathematical constraints, he places each of the simulations in the context of a mathematical formulation examined either analytically or numerically.

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Editorial Review

Amazon.com Review

Written primarily as a textbook for undergraduates, graduates, and biological researchers, *Simulating Ecological and Evolutionary Systems in C* offers an introduction to writing C programs that simulate common ecological processes, as well as the mathematical models behind them.

This title offers an intriguing mix of several analytical models--expressed in the language of mathematics--that researchers have used over the years to explain such phenomena as predator-prey interactions, how foraging patterns affect a species population, and other biological processes. Throughout the book, readers are invited to try out these rules for themselves by using computer simulations that are written in C. As suggested, analytical models can be verified--and even challenged--by comparing them with evidence that's generated from computer simulations.

While this book offers plenty of mathematical background (it assumes knowledge of calculus and differential equations), it's actually much more accessible when it comes to programming. There's a basic tour of C from the ground up, including the basics of writing and compiling programs in Unix and Windows. Any reader with a willingness to learn C can try out these simulations (which will remind the computer hobbyist of Conway's Game of Life, a well-known simulation). While there are plenty of visualization techniques--through PostScript files--more computer-savvy readers can take these programs to the next level by adding real-time graphics. The text culminates in an introduction to genetic algorithms, an exciting area of recent research in which evolutionary processes are simulated in software.

For the student or specialist, this is a solid academic treatment of an exciting field of biological research. (Each chapter concludes with exercises for the classroom, and a section on sample software projects will help students hone their programming skills on a rich variety of biological problems.) For the game programmer or interested enthusiast, it provides a glimpse into the exciting world of biological simulations and some intriguing algorithms to try out on one's own. --*Richard Dragan*

Topics covered:

- Overview of models for biological systems
- Simulations vs. theoretical models
- Predator-prey interactions
- Tutorial to the C programming language (basic statements, and compiling and running programs)
- Immigration-emigration models
- Discrete time and continuous models
- Using the *vi* editor
- Birth-death example
- Evaluating random number generators
- Visualization techniques for data using PostScript files
- Two species competition models
- Sample programming projects for ecological researchers (including disease dynamics)
- Foraging models
- Integration techniques
- Pollen dispersal in space
- Diffusion algorithms

- Spatial predator-prey models
- Resource allocation for plants (optimal allocation schedules for growth and reproduction)
- Introduction to genetic algorithms and simulations

Review

"This book is a gold mine, if you have the tools and interest to work it...Wilson's treatment of the relationships between analytical and stochastic models is one of the outstanding features of this book a powerful learning tool." Ecoscience

Users Review

From reader reviews:

Maria Bruns:

Have you spare time for the day? What do you do when you have more or little spare time? Yes, you can choose the suitable activity to get spend your time. Any person spent all their spare time to take a go walking, shopping, or went to the actual Mall. How about open or even read a book eligible Simulating Ecological and Evolutionary Systems in C? Maybe it is to get best activity for you. You recognize beside you can spend your time together with your favorite's book, you can wiser than before. Do you agree with its opinion or you have different opinion?

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Steven Barraza:

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Anthony Rouse:

As we know that book is vital thing to add our expertise for everything. By a book we can know everything we really wish for. A book is a set of written, printed, illustrated or blank sheet. Every year had been exactly added. This book Simulating Ecological and Evolutionary Systems in C was filled about science. Spend your time to add your knowledge about your research competence. Some people has different feel when they

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