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Genetic Algorithms and Machine Learning for Programmers

Create AI Models and Evolve Solutions

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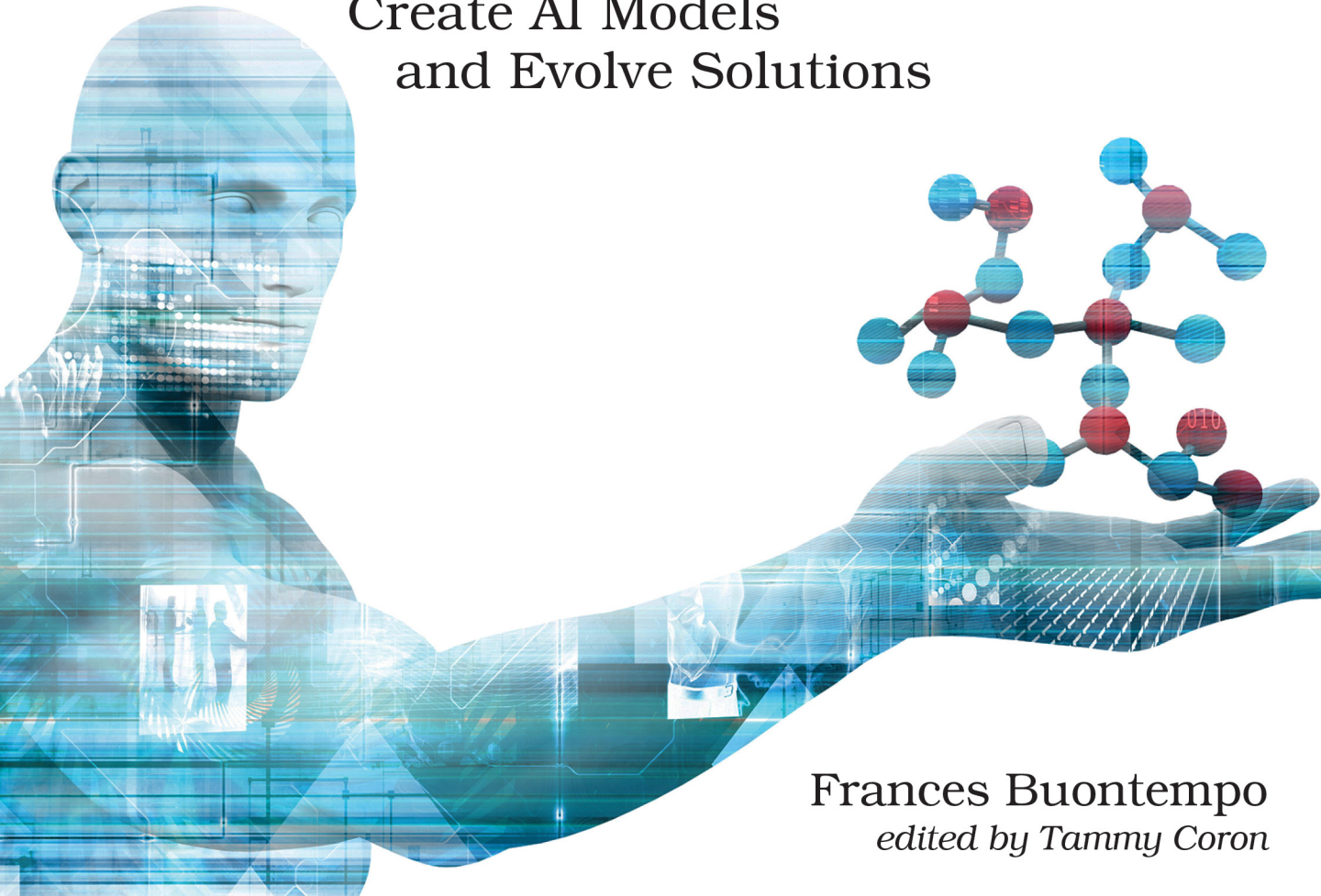
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Genetic Algorithms and Machine Learning for Programmers

Create AI Models and Evolve Solutions

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Preface

Have you ever heard the phrase "Coding your way out of a paper bag"? In this book, you'll do exactly that. In each chapter, you'll examine different machine learning techniques that you can use to programmatically get particles, ants, bees, and even turtles out of a paper bag. While the metaphor itself may be silly, it's a great way to demonstrate how algorithms find solutions over time.

Who Is This Book For?

If you're a beginner to intermediate programmer keen to understand machine learning, this book is for you. Inside its pages, you'll create genetic algorithms, nature-inspired swarms, Monte Carlo simulations, cellular automata, and clusters. You'll also learn how to test your code as you dive into even more advanced topics.

Experts in machine learning may still enjoy the "programming out of a paper bag" metaphor, though they are unlikely to learn new things.

What's in This Book?

In this book, you will:

- Use heuristics and design fitness functions
- Build genetic algorithms
- Make nature-inspired swarms with ants, bees, and particles
- Create Monte Carlo simulations
- Investigate cellular automata
- Find minima and maxima using hill climbing and simulated annealing
- Try selection methods, including tournament and roulette wheels
- Learn about heuristics, fitness functions, metrics, and clusters

You'll also test your code, get inspired to solve new problems, and work through scenarios to code your way out of a paper bag—an important skill for any competent programmer. Beyond that, you'll see how the algorithms

explore problems, and learn, by creating visualizations of each problem. Let this book inspire you to design your own machine learning projects.

Online Resources

The code for this book is available on the book's main page[1] at the Pragmatic Bookshelf website. For brevity, the listings in this book do not always spell out in full all the include or import statements, but the code on the website is complete.

The code throughout this book uses C++ (>= C++11), Python (2.x or 3.x), and JavaScript (using the HTML5 canvas). It also uses matplotlib and some open source libraries, including SFML, Catch, and Cosmic-Ray. These plotting and testing libraries are not required but their use will give you a fuller experience. Armed with just a text editor and compiler/interpreter for your language of choice, you can still code along from the general algorithm descriptions.

Acknowledgments

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1. https://pragprog.com/book/fbmach/genetic-algorithms-and-machine-learning-for-programmers