

Computers, People, and Thought

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From Data Mining to Evolutionary Robotics

 Springer

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Preface

What This Book Is (Not) About

In this preface, I will initially briefly attempt to answer some observations and potential criticisms that might be made as to the content and style of this book.

On cursory examination of the table of contents of this book, it may be observed that this is not a typical populist AI book. It should be said at the outset that this book was never intended as simply a high-level presentation of the state of the art in AI with all its attendant triumphs and woes. There were a number of books already on this topic at the time of the inception of this project, and there are many more now, quite a lot of which are written by either “non-technical” authors or academics from a different discipline. Rather it was (and is) intended as a focused text, requiring some effort by the reader, but that will hopefully give them a firm foundation of the principles and basics of computing, leading to an appreciation and basic understanding of the recent radical developments in AI and their current and potential impact on humanity.

So, the book is not intended to be “populist”, in that sense, but if the careful reader works their way through it will (hopefully) give them some sense of empowerment, in that they will not only have an understanding of the principles underlying the advanced technologies discussed, but some sense also that they can actually *alter* the course of further developments. This is not to say that the book is not meant to be “entertaining” in a certain sense and to hopefully attract a wide audience. I understand that the 1949 book *Giant Brains* by Edmund Berkeley from which this book draws some inspiration was a bestseller in its day.

Another observation could be made that too much emphasis is placed on logic circuitry and Base3 computation in particular—no current AI systems are based on Base3 arithmetic. However, I disagree that an understanding of computation at the most basic level (including logic gates) does not help the reader understand higher level ideas; also, of course, this book is not “just” about AI but also about the ideas and principles underlying computational processes. I accept that ternary computation

does not form the basis for any current or planned AI system in the public domain, although I would not be at all surprised if work is progressing “undercover” in this area (particularly in the area of ternary nanoelectromechanical relay-based computers which would be impervious to the effects of nuclear radiation), but again this is not really the point. This book is about principles, and ternary computation is demonstrably more elegant and efficient in many aspects than binary. I also make no apologies for reference to my own work in the area; the ternary ALU I designed and built is to my knowledge the only one of its type in existence, and building a replica of this device would form a very interesting (albeit advanced) project for the technically minded reader.

Another possible criticism might be that too much emphasis is placed on game AI, given that few threats to human liberty and dignity are based on game-playing AI. It is true that few of the threats to human liberty and dignity are based on game-playing AI, but right from the inception of AI, games have been both a major application area and a benchmark for AI systems and as such have contributed hugely to the advanced AI and machine learning algorithms we have today. Also, games are interesting in their own right from a human perspective and form one of the major strands of this book. A related comment/criticism might be that: too much emphasis is placed on so-called Good Old-Fashioned AI (GOFAI). Again, this book is primarily about principles, and GOFAI demonstrates basic principles involved in representation and search, both important issues in intelligent system design. GOFAI is also by no means dead—and still forms the core for many current powerful AI engines.

The material relating to Asimov’s laws and the Turing test may be seen as outdated and irrelevant by some, given that no serious scientist or researcher today suggests that we should take either Asimov’s laws or the Turing test literally now. However, there is no denying the huge impact that these concepts have made to modern thinking on the development of “safe” robotic and AI systems, and on the benchmarking of the general intelligence of such systems.

Also, the idea of a citizens’ convocation may be seen as naive and unrealistic. In response, the idea may appear a little naive—but what is the alternative? This section in fact attempts to address a serious issue—the decision on the power of deployment of modern, potentially damaging technologies is currently in the hands of either governments or large corporations, each with their own agenda, and not necessarily for the benefit of the general citizen.

Finally, it may also be argued that there is no place for a discussion on spirituality and religion in a book such as this. This is a valid perspective, and I urge any reader who feels in any way discomfited by this discussion to skip this short section entirely.

What This Book Is About

Following on from my recent focused text *Evolutionary Humanoid Robotics*, I was inspired to write a more general text on AI/Robotics, motivated in part by recent impressive (some might say alarming) developments in these areas.

This may appear at first sight to be a slightly strange book for an unusually wide target audience. I could counter this by the argument that there are perhaps too many books either with too much emphasis on a very particular target audience or books aimed at a very general audience. Not so many texts are aimed at the “middle ground”. This book is aimed squarely at this audience: whether it succeeds or fails in this focus is up to you, the reader, to decide.

So this book aims at a clear and lucid exposition of the core ideas in the AI/cybernetics field aimed at both the student and the moderately educated layman alike. We also aim to go beyond this and to look at ways to potentially shape man’s relationship with technology into the future for the overall benefit of humankind.

To recap, this book is aimed as

- A text for the moderately intelligent layperson willing to engage with the ideas contained within
- A general introduction/motivational text for students in the areas of computer science and engineering
- An undergraduate-level text for computer science students in the areas of intelligent systems and artificial intelligence in games
- An undergraduate/graduate-level text for students in areas other than computer science introducing them to core concepts in computing and intelligent systems
- An introductory text for researchers/academics in unrelated fields looking for a concise introduction to the core topics covered
- An accessible and authoritative up-to-date text for more advanced students/researchers in the areas of AI/IS/CI/robotics

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I would like to acknowledge and express my gratitude to those researchers and pioneers who, over the years, through either (some very!) brief encounters or longer acquaintances have helped shape and mould some of the ideas presented in this book. Of course, none of these should be held in any way accountable for any errors or omissions occurring in this modest text—the blame here rests entirely on my own shoulders. They are also in no way responsible for any of my opinions, which some may consider controversial, contained herein.

Also, many thanks to all those who have facilitated my modest research efforts over the years through financial and moral support. I would like to particularly thank Ronan Nugent of Springer for his patience and encouragement through this project, which has taken considerably longer than originally planned. And finally, to my wife Patricia for her forbearance throughout this project to my many evenings and weekends spent scribbling notes or typing at the laptop.

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