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Book Review: Foundations of Artificial Intelligence in Healthcare and Bioscience

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Abstract

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Catania LJ. *Foundations of Artificial Intelligence in Healthcare and Bioscience*. Cambridge: Academic Press; 2020, \$150.00, 524 pages, Paperback ISBN:9780128244777, e-book ISBN: 9780323860055.

Keywords

artificial intelligence in health care, public health

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I feel like a foreigner in a strange new land when it comes to the world of artificial intelligence (AI). However, after reading *Foundations of Artificial Intelligence in Healthcare and Bioscience*, I can no longer use the excuse of not learning the language. And fortunately, because the text was written for “healthcare providers, researchers, administrators, scientists, informational technologists (IT), educators, students, and interested laypersons,” no one can have that excuse either.

This voluminous work is divided into two sections, with AI background information in the three chapters in the first section and the remaining five chapters in the second section describing AI applications in healthcare (including chapter 8, which covers the COVID -19 pandemic), an epilogue, a glossary of terminology and a glossary of abbreviations. Finally, each chapter is further divided into subsections, if for no other reason than to take a breath between topics, and to think about what was just learned.

The first three chapters will help someone who is not familiar with computer and artificial intelligence terms and features to become so. What helps support this language acquisition is being able to relate it to a known language; in this case relating artificial intelligence and its subcategories to human intelligence and its anatomical parts. And while artificial intelligence is analogous to human intelligence, a substantive difference, and one which the reader will appreciate when reading the remaining chapters, is that the speed with which healthcare information is processed is almost incomprehensible but is made accessible and useable with AI. Then, to help the reader understand both computer hardware and software and the analogy to the brain, color coded tables and figures supplement the narrative; this is especially helpful for those who are visual learners. This is also the first step to becoming familiar with initials which will be carried throughout the remainder of the chapters, so that OS (operating system, not left eye), API (application programming interface), CPU (central processing unit), I/O (input/output), URL (uniform resource locator) and others will become more “friendly” and more understandable based on the description of their functions. Essentially, this section helps the reader to “look under the hood” to understand how computers and AI do what they do. The remaining chapters use this as the basis for explaining AI’s impact on healthcare.

Chapters 4 to 7 can be read non-sequentially based on the reader's interests. For those interested in health care business administration and how AI can help to automate decision-making and reforms to maximize efficiency in healthcare organizations, Chapter 4 is a good place to start. Here the reader can become familiar with big data analytics and artificial intelligence as well as a brief review of public health and the influence of AI in such areas as geoAI (influencing environmental epidemiology).

The next three chapters (5-7) begin to relate artificial intelligence to diagnosis and treatment, as well as topics which “will relate directly to your career activities, your personal health, and the health and wellness of your loved one(s).” In chapter 5, technologies of imaging, lab testing, and genetic and genomic testing, which are impacted by AI to help the clinician with a timely and accurate diagnosis based on the amount and complexity of information, are emphasized. Chapter 6 covers how artificial intelligence and big data analytics impact various aspects of information gathered to help plan timely treatments and improve rapid dissemination of information. The impact of this on hospital care, nursing care, home health care, nursing homes, and hospice care is discussed. Chapter 7 seems like a merger of the new language that one learned in the first few chapters with a familiar language: discussion of diseases and disorders. Nineteen categories of diseases and disorders are listed in the beginning of the chapter so that specific areas like cancer, diabetes, physical injuries, wounds and disabilities, chronic disease, nutrition, and exercise, etc., can be accessed immediately. No category has an in-depth discussion of the disease or disorder, but rather enough information to appreciate how artificial intelligence influences healthcare for that specific category. And finally, there is a chapter on the COVID-19 pandemic and how AI can analyze data which could help track, diagnose, and treat the SARS-CoV-2 virus in a timely fashion. And, while data gathering for a pandemic is very fluid, learning how to use this information will be important for tackling future pandemics.

Artificial intelligence is becoming more commonplace in healthcare. We need to embrace AI because it is here to stay. I believe, like many of my colleagues, that artificial intelligence will not replace doctors, but will act as a physician extender, enhancing clinical decision-making, and thereby prolonging the quality of life through improved, sustained, and cost-effective healthcare management. *Foundations of Artificial Intelligence in Healthcare and Bioscience* is an excellent place to start.