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Book Review

Artificial Intelligence in Management:
Self-Learning and Autonomous Systems as Key Drivers of Value Creation

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Artificial Intelligence in Management: Self-Learning and Autonomous Systems as Key Drivers of Value Creation
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Autonomous systems have been a hot topic in Artificial Intelligence (AI) studies for decades, and researchers have proposed an increasing number of applications of AI in social science like business management. Inspired by reinforcement learning, a highly challenging but promising AI approach, it is hoped that autonomous systems will be able to learn and optimize by themselves. The systems are applicable to a wide range of cases from simple game-playing to robots which can efficiently operate in totally new situations.

According to the author's experience, a majority of managers are open to implementing AI systems and have the necessary resources. But they are usually unable to develop projects that would rationally utilize Al in generating business values. Meanwhile, there are many providers that offer such systems to organizations of all scales.

Based on comprehensive studies of over a hundred real cases, the author explores reinforcement learning as an essential component of contemporary information technologies, illustrates its practical applications in activities in a value chain, and investigates how it impacts various industries. AI in Management, the theme of this book, will help project managers, administrators and investors design and evaluate new autonomous systems. Researchers are also likely to come up with new ideas by thoroughly studying the models proposed in this book.

This book describes a fairly universal model of value generation in organizations utilizing the potential of autonomous technologies. The publication is divided into an introduction and five chapters. Each chapter centers on an essential aspect of AI, and all readers will definitely benefit a lot from reading the entire book deeply. Reader are guided through the world of AI step by step, from basic

concepts and methodologies, algorithms, applications, real-world case analysis, to future development. Practical implementations of reinforcement learning (RL), including algorithms and software as well as some really intuitive insights can be found in many literatures (Morales, 2020; Lapan, 2020). RL has also been applied to the programming and management of information and communications technologies (ICT) infrastructures. A widely known example is PARK, an environment simulator that many different IT systems use for agents training with RL (Mao et al., 2019).

The introductory section initiates the book by discussing the development from intelligent machines to self-driven organizations. It is believed that a source of human competitive advantage over animals roots in our capacity communication and abstract thought. For decades, AI has excited fiction writers, scientists, and business managers, and experts in other fields as well, and researchers have long been actively seeking for new methods and value generation structures which are applicable to organizations. In order to discover and exploit the potential of an integrated information technology system, people should have some comprehension of how the system operates. Decision makers in companies typically identified two major requirements: (1) discovering the advanced technologies that brings the highest potential (2) modifying the existing strategies so as to better utilize the potential of AI and prepare for the upcoming changes. In order to fulfill these requirements, they should know well the practical applications of intelligent technologies in business management.

Chapter 1 familiarizes the readers with the fundamental methodologies that constitute the foundation of autonomous systems. First, this chapter presents the basic theories of AI and machine learning (ML), discusses the key methods and techniques, describes their underlying principles, and suggests possible applications. Then the question is explored how intelligent systems (ISs) can learn through interactions with the environment. A collection of these methodologies, known as reinforcement learning, is essential to modern ISs Intuitively understanding these fundamental ideas is very useful for discussion of the potential and intrinsic constraint in autonomous solutions. This chapter is ended with a variety of definitions of autonomy applicable to prevalent systems, which naturally leads to the topics in the subsequent chapters.

A large part of this book including entire Chapter 2 focuses on practical AI applications in real life. The impact of autonomous systems on ICT has been rather complex. This chapter is divided into two parts, the first part is limited to only one aspect, the technologies necessary for the development of effective autonomous solutions, while their impact on ICT will be presented in the second part of this chapter. This chapter begins by presenting the key technologies underlying modern ISs, particularly, those enabling perception and situational awareness, communication, and security, based on about hundreds of analyzed case studies. Then, the author discusses various AI applications and autonomous solutions and shows what values ISs can bring in multiple key functional areas of organizations and industries such as asset management, marketing, logistics, manufacturing, sales, customer service, and IT system management. Finally, this chapter is ended with a consideration of the possible impact of AI on industries, from manufacturing and construction, through transport, agriculture, energy sector to finance and health care. Nearly 200 cases presented in this chapter builds a foundation for the subsequent identification of best practices applicable to IS implementations.

The practice of Al implementation is similar to that observed in large IT systems. The main danger arises from the misconception that technologies are capable of generating business value. In order to achieve their goals, people must realize that success is based on proper implementation of change, not only in terms of preparing employees but also optimizing operating procedures, organizational structures and culture. Based on the case studies in Chapter 2, Chapter 3 proposes business cases and strategies for implementing previously discussed solutions. First, the author presents optimal autonomous systems implementations, classifies their potential values, and puts forward a universal model for designing business cases in contemporary organizations. The text shows the practical aspects of AI deployments from start, implementation to fixation of change, and

summarizes the values generated by AI by dividing them into revenue-generating, cost-reducing, and risk-minimizing. The last section presents the AI resource management model based on the analogy to human resource management, which is a useful comparison for utilizing AI in organizations. The primary purpose of this book is helping managers and effectively generating value from ISs and solidifying the consequential changes in their organizations, which hopefully can be achieved with the conclusions of this chapter.

Autonomous technologies have affected both individual companies and even their industries. Organizations communicate and exchange an increasing amount of data. And the data come in more and more diverse forms. Technological advancement is constantly accelerating, and is therefore bringing in niches for new companies, innovative business models and consequently different value structures. The major topic in Chapter 4 is the future trend in the development of intelligent technologies relevant to modern management. The analysis is started with the possible impact of autonomous technologies and AI on organizations, market sectors, and people. A brief description is presented about the structures such as distributed AI and cognitive networks, as well as some particularly appealing research discoveries. The next section discusses new favorable competences and the impact of intelligent machines on people's position in organizations. Part of the proposed plans can possibly set the trends for forthcoming technological development and help to construct novel autonomous systems with the capabilities of constant learning and self-improvement. This chapter is ended with the perspectives of fundamental and applied researches and their probable influence on management science.

The last chapter concludes the book with outlook on a potential role that advanced autonomous technologies will play in life and work for the foreseeable future. Finally, some future work is also recommended for readers who specialize in this field. The author believes that in the near future, we will be expectedly surrounded by more and more autonomous things which are capable of not only operating effectively but also continuously self-improving. A vital aspect of our further development will likely become the gentle art that wisely balances the consumption of benefits offered by technologies with their active development and utilization in generating new values. Learning musical instruments may enable people to hear entirely new sounds in a well-known piece of music, similarly, developing Al systems can hopefully help people to better understand and utilize intelligent solutions.

Overall, this publication is a very useful guide for organization administrators who hope to optimize operation management with proper applications of AI. For readers who have already known AI and management science, and is trying to integrate AI into management for new strategies and modes, or who want to extend their knowledge of AI in management, this book must be an ideally enlightening resource and will serve as an inspiring guide for future studies. A primary purpose of this book, as said by the author, is to raise the awareness of the ideas that underlie such AI technologies and the values they can possibly generate, in order to encourage informed experimentation.

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