Foreword

Artificial intelligence (AI) is simply a way of providing a computer or a machine to think intelligently like human beings. Since human intelligence is a complex abstraction, scientists have only recently began to understand and make certain assumptions on how people think and to apply these assumptions in order to design AI programs. It is a vast knowledge base discipline that covers reasoning, machine learning, planning, intelligent search, and perception building.

Traditional AI had the limitations to meet the increasing demand of search, optimization, and machine learning in the areas of large, biological, and commercial database information systems and management of factory automation for different industries such as power, automobile, aerospace, and chemical plants. The drawbacks of classical AI became more pronounced due to successive failures of the decade long Japanese project on fifth generation computing machines. The limitation of traditional AI gave rise to development of new computational methods in various applications of engineering and management problems. As a result, these computational techniques emerged as a new discipline called computational intelligence (CI).

Computational intelligence terminology was originated by Professor Lotif A. Zadeh. Since its inception in early 1990s, the topic has changed to a great extent concerning its content and applications. Earlier it was concerned with the fuzzy sets, neural networks. and genetic algorithms. Now, it consists of granular computing, neural computing, and evolutionary computing along with their interactions with artificial life, chaos theory. and others. Evolutionary computational technique includes genetic algorithms, evolutionary programming, and evolutionary strategies and genetic programming. Artificial neural networks mimic the biological information system. Evolutionary computing algorithms are used for optimization problems, and fuzzy logic as a basis for representing imprecise knowledge.

Computational intelligence tools have attracted the growing interest of researchers, scientists, engineers, and managers in a number of practical applications. These applications include engineering, business, and banking. It has emerged as a relatively new field of research and has been finding more and more applications in various areas. Fuzzy set theory is more useful for reasoning with imprecise data and knowledge. Neural networks are more applicable in machine learning, whereas genetic algorithms are most suitable for the areas of search and optimization but it is not so successful in handling real time problems.

The applications of CI are diverse, including medical diagnosis, data mining, design and manufacturing, production planning and scheduling systems, robots working in hazardous environments, autonomous vehicles, image matching, and control systems, just to mention a few for the service of mankind.

There are several advantages of CI over traditional approaches. These include conceptual simplicity, broad domains of applications, better performance than classical methods on real life problems, use of knowledge management and hybridization with other methods, parallelism, and capability to solve dynamic problems.

A lot of innovation has been noticed in manufacturing and production management in recent years, becoming a very important area in business today. Production management is an interesting mixture of managing people, sophisticated technology, and the applications of computational intelligence. The handbook addresses the latest and most important issues related to production management. This handbook primarily serves as one comprehensive source of information where business managers, professors, and researchers can look for disseminate technology and ideas, and gain knowledge through a variety of research topics including theoretical, experimental, and case studies. It focuses on applications of new developments of computational intelligence tools such as artificial neural networks, genetic algorithms, and artificial immune system and swarm optimization methods to various areas of management.

The present exploration on manufacturing and production management is thoroughly edited and reviewed for which it has become a "hallmark" for the user/readers to pave the way for better managerial perspective. I am inclined to believe that the topics discussed by professors, researchers, and professional managers of international repute would be globally useful for the purpose they have been written.

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