Chapter 85
Dynamics in Knowledge

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ABSTRACT

Since the idea of "artificial intelligence with knowledge" had been introduced, so many thoughts, theories, and ideas in various fields of engineering, science, geology, social study, economics, and management methods have been proposed. Those things have been started as an extension of modern engineering control theories and practices. Firstly, expert system by using IF-Then rules came up to at a production spot in manufacturing, and then agent system method by using intelligent software programs for design, planning, scheduling, production, and management in manufacturing. And then after, the idea of "Knowledge" burst into the artificial intelligence field as a real aid for getting any purpose to be accomplished by having augmented the past key knowledge in terms of management (controlling). However, those augmented knowledge methods used to have usages only in a limited small area. In addition to this, lots of works have to be done before making the systems work for a target problem solving. And what is worse, lots of parts of systems have to be customized for a new application. This chapter introduces a new direction and a method in "Knowledge" by inaugurating the brand new idea of "Dynamics in Knowledge," which will behave more flexibly and intelligently in real usages.

INTRODUCTION

As an introduction, here briefly touches upon the conventional methods for engineering controls, an expert system, an agent method in term of management, which will be related with the future advancements.

History of Management Method in Control

One of the earliest open-loop control systems was seen by Hero's device for opening and closing the doors of a temple in the first century at Greece. The opening and closing required inputs to the system were by lighting and extinguishing

of the fire of the altar. By the expanding the hot air under the fire made the water transfer from the container into the bucket. As the result of this, the bucket became heavier because of the incremented and fulfilled water, so that the bucket naturally caused to descend because of its gravity. And so its movement made the door spindles turn by means of a rope, and which could open the door. On the other hand, the door could be closed by moving the water of the bucket back to the container again by cooling the container with extinguishing the fire of the altar so as the pressure was being reduced. Thus the bucket became lighter, and then the bucket was moved down so as the door was closing.

The first significant work in automatic control was James Watt's centrifugal governor for the speed control of a steam engine by controlling the vapor pressure of the tank in stable.

And the frequency-response method made it possible for engineers to design linear feedback control systems that could satisfy lots of the engineering requirements. And then, the root-locus method in control system design was developed, which was working more intimately.

These methods are the major control methods. And then, because of necessity to treat many inputs and outputs, these methods became less significant. And then modern control theories have been developed. In modern control theories, linear control method, non-linear control method, and discrete control method have been developed by using a computer more and more even for complex systems.

After the classical control methods had been developed, the application of modern control theories expanded quite rapidly even in the fields of geology, economics, medicine, and sociology, etc. What is more, with developing of the micro processors process speeds and those software, it has become possible to have a discrete control and an expert system which is able to mimic human skills in manufacturing and management (thought of thinking).

Almost in the same period, Petri Net, Neural Networks, Fuzzy Logic by L.A. Zadeh, GA, Immune Control Method, Chaos, Complexity theory, and others have come up to the world as Intelligent Management Methods. And nowadays these methods are tried to be used in more complex and huge systems as a total management system.

PAST, PRESENT, AND FUTURE SITUATIONS IN PRODUCTION AND MANAGEMENT

Technologically Speaking, It has the Following History and the Future

1. One skilled person production
2. Power assisted by the nature (water) that helped a skilled person production
3. Power aided by artifacts that promoted a skilled person's production
4. Jobs Distributed System for Production
5. Worker Assisted by Mechanics Production for a tiny spot
6. Worker Assisted by Mechanics Production for a spot
7. Worker Assisted by Mechanics Production for an area
8. Worker Assisted by Machine Production
9. Worker Assisted by Mechatronics Production
10. Worker Assisted by Semi-Automatic Machine Production
11. Worker Assisted by Automatic Machine Production
12. Worker Assisted by Robot Production
13. Worker Assisted by Expert System
14. Manager/Worker Assisted by Artificial Intelligent System, (at present.)
15. Manager Assisted by Information Technology and Artificial Intelligent Management System, (in the future.)
16. Manager Assisted by Artificial Intelligent and Information Technology Management System

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