Application of AI in Engineering Management

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Abstract: With the rapid advancement of modern technology and the rapid improvement of computer algorithms, AI technology is gradually infiltrating into all walks of life, and more and more appear in people's vision. AI is highly technical and complex, and the research on AI involves a wide range and deep depth. AI technology can also be applied in the automation and control of engineering management. For example, heavy scientific and engineering calculations can quickly and accurately obtain answers through AI technology. Therefore, AI technology is bound to drive engineering management and requirements that rely on modern technology. Control systems that are monitored in real time and that can be processed quickly and accurately are rapidly evolving. As an important part of the automation and control of engineering management, AI technology has a very important practical significance in the analysis of AI in the automation of engineering management and the application of control. This paper provides some thoughts on the application of AI in the automation and control of engineering management, and hopes to help the production in real life.

1. Introduction

Nowadays, Artificial intelligence (AI) technology has entered thousands of households and has penetrated into all walks of life, bringing great changes to people's lives and improving people's quality of life. AI is a relatively advanced discipline, which is separated from the constraints of traditional technology and works with other subjects to achieve an ever-increasing level of automation technology [1-4]. And in practical applications, its application in many fields has been strengthened. From the actual effect, AI technology can provide reference and reference for the development of engineering management automation technology to achieve a higher level of utilization [5,6]. Therefore, the application of AI technology to the control of engineering management is of great significance and plays a very important role [7-12]. AI technology has been applied to multiple technical levels, which can realize the application of various sensory technologies such as sight, hearing and touch. At the same time, with multimedia technology as the carrier, it has successfully realized the discipline of nonlinear intelligent technology and vigorously developed AI technology for the future humanity. The society has laid a solid foundation for a faster, smarter life [13, 14]. Engineering management is the core of engineering operation. The management mechanism of the project effectively guarantees the efficiency of the project operation and reduces unnecessary links in the project operation. However, in the traditional project management mode, the management efficiency is low, which restricts the smooth progress of the project. The emergence of AI technology has brought hope to engineering management. This paper analyzes AI technology and applies AI technology to engineering management.

2. The Meaning of AI Technology and Engineering Management

With the continuous development of science and technology, AI technology has also been developed, and some high-tech products such as robots have emerged to provide services for human beings. In the 21st century, it together with genetic engineering and nanotechnology as the three cutting-edge technologies, leading the direction of the times. Among them, AI technology is mainly a computer controlled by machine to simulate a manual operation or thinking. The development and

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application of this technology greatly reduces the labor intensity, frees manpower, and reduces production costs. A long-term project. It is through the intelligent recognition and processing system of the robot, which performs machine intelligent operation on the production process and various aspects, so that it can complete some tedious work, improve production efficiency, promote the reduction of production cost, and realize mechanized intelligent production. As an important part of automated production technology, AI technology can make the machine have a human-like thinking mode and the ability to guarantee production. Although the development of intelligent technology is more advanced and technology is more and more developed, it still needs labor. The intervention requires human operation and control to exert its advantages. Compared with the human mind, it is still relatively backward and cannot truly reach the level of human thinking. In recent years, AI has received extensive attention in the field of computers. With the promotion of Internet technology, AI has been applied to different aspects of life such as expert systems, games, intelligent search, robotics, fingerprint and face recognition, and inheritance. Programming, artificial neural networks, and more.

The life cycle of project management includes the decision phase, implementation phase and use phase. The management of the implementation phase, that is, engineering management is the core of modern enterprise management. The dynamic cycle of seeking continuous improvement with the PDCA process method has significant benefits in terms of project quality, schedule and target control. Engineering management includes the survey phase, design phase, and construction phase. The design phase is an important part of project management and the foundation and guarantee for construction. Therefore, the quality of engineering management in the design phase directly affects the interests and processes of the entire project. Engineering management in the design phase often leads to project delay or failure due to its wide scope, multiple cooperation, long cycle, information error and many influencing factors. If there is no real-time and accurate data transmission channel, timely reflect the progress of the project, and analyze the project's risk-based plan, it is difficult to judge the actual situation of the project activity, and it is impossible to make scientific decision-making. Project management combined with AI can achieve continuous improvement of project quality, schedule, cost, resources and risks, solve project delay or failure caused by information deviation and human error in project management process, and improve project management and control ability and product output. Results. The project life cycle is shown in the Figure 1.

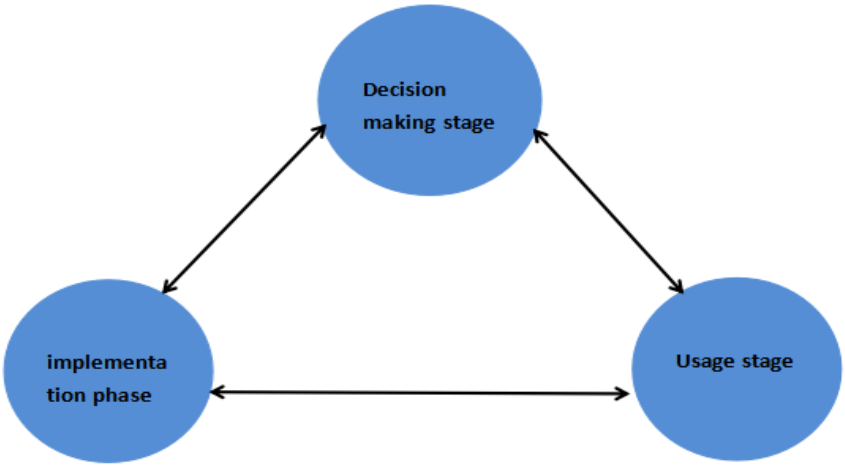

Figure 1. Project Life Cycle

3. Application Theory of AI Technology in Engineering Management

According to the requirements of the actual management of Engineering management, genetic algorithm is the most ideal way to realize the three-dimensional model of Engineering management. Through the application of genetic algorithm, hidden problems in some parts can be found and dealt

with in time. In practical engineering management cases, the accuracy of genetic algorithm must be guaranteed, which requires engineers to make specific requirements for genetic algorithm parameters in engineering management. The requirements mainly include the integrity, perfection and conciseness of genetic coding. Only by meeting the corresponding standards, can genetic algorithm achieve the actual engineering management requirements, and lay the foundation for the establishment of three-dimensional model and the selection of functions in later engineering. Combining genetic algorithm with geographic location information and utilizing the spatial characteristics of geographic location information, this paper provides functions of spatial data display and classification for genetic algorithm, realizes real-time monitoring of Engineering management, and makes genetic algorithm serve engineering management better. For an optimization problem of finding the maximum value of a function, it can be generally described as the following mathematical programming model:

$$\begin{cases} \max f(X) \\ X \in R \\ R \subset U \end{cases} \tag{1}$$

X is the decision variable, $\max f(X)$ is the objective function, U is the basic space, R is a subset of U. Solutions satisfying constraints are called feasible solutions, and set R represents the set of all solutions satisfying constraints, which is called feasible solution set.

In addition, by comparing the genetic algorithm with the monitoring data of the neural network, it is possible to realize more refined operation of the project management, find more problems early, and ensure the orderly and smooth completion of the engineering construction process.

The application of AI in many scenarios is sufficient to prove its strong competitive advantage and development prospects. Project management combined with AI has the following six stages in the design phase:

(1) Data Sorting. The company's data is sorted according to contracts, procedures, specifications, standards, technical documents, lessons learned, etc., and is easily searched according to departments, positions, tasks, preferences, etc. The data is divided into two categories: one is that it does not need processing, and can be directly read by the AI system; the other is that it needs deep cleaning such as labeling and keyword extraction.

(2) Data Analysis. AI matches the identified data with tags, customer requests, and more. At this stage, AI thinks like a human being, and compares and looks for similarities and associations through intelligent cloud storage like a human brain.

(3) Intelligent Push. AI project management will push relevant knowledge and information from time to time according to the engineer's position, tasks, preferences, etc. for employees to select, reference or use.

(4) Self-learning. The employee feeds back the results of the intelligent push of the AI system to the AI system. If the push results are useful, the AI system will continue to push the information to the employee, and if the push results are not beneficial, the AI system will reduce similar pushes. AI project management can improve the accuracy and accuracy of push through continuous learning.

(5) Initial Module. After the AI system has been studied and summarized in the previous stages, the initial module can be generated with the help of technical experts. The initial module is a phased product. The final product consists of multiple stages of products.

(6) The Final Product. Early AI systems can rely on the help of experts to effectively link phase products to the final product. The ultimate goal of AI project management is to directly generate the final product according to customer requirements. The road at this stage is still very long. I believe that the AI project management can be self-learned and summarized in the long run, and finally it can be realized in one step. The schematic diagram of project management is shown in the Figure 2.

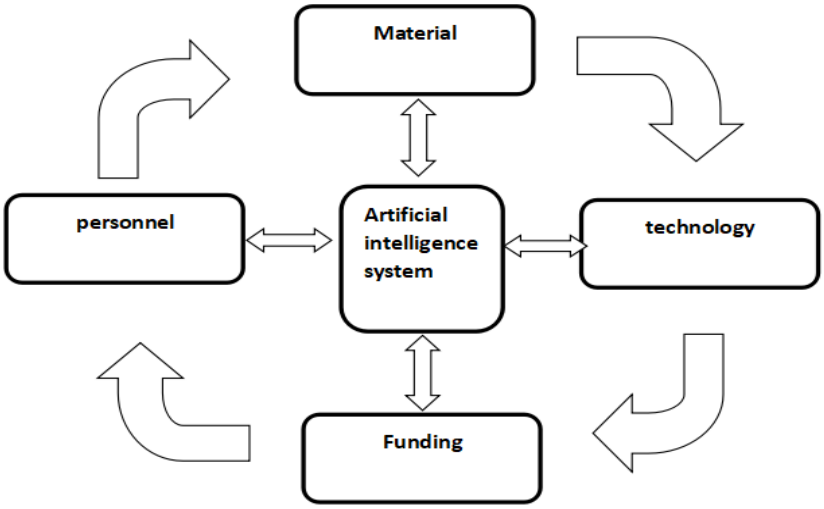

Figure 2. Schematic diagram of project management

AI as a collection of network information technology, big data and cloud computing technology, AI technology, is the technology integration formed by people in the process of using. AI technology itself is the product of the integration and development of various technologies, and is the result of the integration of various technologies. Technology convergence encompasses both the convergence of technology and the innovation of functionality. At present, a single technology has been difficult to meet the diversified development of the society's economy and the diversified needs of people. It is necessary to achieve integration between technologies through technology integration, and to generate technical products that meet the needs of human society and people's needs.

4. The Role of People in the Intelligent Project Management Mode

The attribute of intelligent technology is two-dimensional. It contains both technical attributes and social attributes. According to its attributes, it has two levels: the social value and the role of the technical subject, mainly through intelligent technology design. And inventions, the value they display as a technical tool. Social value refers to the value of the social impact brought about by the application and popularization of intelligent technology in the process of the interaction between intelligent technology and the main body. The social value is realized on the basis of the technical value, and specifically includes economic value, political value, and cultural value. First of all, the technical value of smart technology. As a technical form, intelligent technology is a new technology generated on the basis of its own iterative development. It is a technological tool created on the basis of adapting to social development and people's social needs. People meet people and social development through intelligent technology. Specific needs. Before the intelligent technology is put into use, some potential value of the intelligent technology is limited by the rules of the early design of the technology and is regulated by the internals. When the technology is put into use, the value of the inherent regulation is converted into the actual value. It is the social value we are talking about. From a macro perspective, the social value of smart technology is mainly reflected in its promotion of human society into a smart society. As a new social form, the smart society promotes the transformation and upgrading of human society.

As a project manager, its role is as follows: (1) Team building: use various methods and means to improve the working ability of team members, establish a sense of team belonging, enhance the interaction and cooperation of team members, and improve the overall team. Atmosphere to achieve the process of improving project performance. (2) Promote team communication: Through communication plans, use various forms, multiple means, and multiple channels to promote communication between team members, between teams and the external environment, and establish trust between the two parties to achieve effective communication and The effect of efficient

communication. (3) Encourage the team: Under the premise of ensuring the realization of the project objectives, adapt the local incentives to different team members (these sensitive points include, job satisfaction, work challenge, sense of accomplishment, success and growth, full economic return) Encourage, so that team members can overcome difficulties and achieve goals. (4) Coordination of resources: AI systems can provide optimal solutions, the implementation of these programs, and the resources required for implementation are not guaranteed to be timely and fully in place, so Project managers are still required to coordinate all aspects of the relationship in order to obtain the required resources.

5. Conclusion

The connection between project management work and AI technology, with the technical advantages of AI technology, optimize the process of project management, improve the efficiency of management work, and build a modern and efficient project management mechanism. The article takes AI technology as the research object. On the basis of clarifying the characteristics of AI technology, it absorbs the useful experience of past technology application, and forms the AI technology application system of engineering management level from multiple dimensions, in order to further improve the project management mechanism. Give play to the positive role of engineering in economic production and social life.

References

[1] Yang J, Tong Y, Wang Z, et al. Efficient and effective Bayesian network local structure learning[J]. Frontiers of Computer Science, 2014, 8(4):527-536.

[2] Kouziokas, Georgios N. The application of AI in public administration for forecasting high crime risk transportation areas in urban environment[J]. Transportation Research Procedia, 2017, 24:467-473.

[3] Lin P H, Wooders A, Wang T Y, et al. AI, the Missing Piece of Online Education?[J]. IEEE Engineering Management Review, 2018, 46(3):25-28.

[4] Nema M K, Khare D, Chandniha S K. Application of AI to estimate the reference evapotranspiration in sub-humid Doon valley[J]. Applied Water Science, 2017, 7(5):1-8.

[5] Aguiar P R, Silva R B D, T. M. Gerônimo, et al. Estimating high precision hole diameters of aerospace alloys using AI systems: a comparative analysis of different techniques[J]. Journal of the Brazilian Society of Mechanical Sciences and Engineering, 2016, 39(1):1-27.

[6] Poteralski A, Szczepanik M. The application of AI in the optimal design of mechanical systems[J]. IOP Conference Series: Materials Science and Engineering, 2016, 161(1):012040.

[7] Specht L, Khatchatourian O. Application of AI to modelling asphalt–rubber viscosity[J]. International Journal of Pavement Engineering, 2014, 15(9):799-809.

[8] Cao, Wei Z. The Research on Tactics Application of Table Tennis Matches Based on AI[J]. Advanced Materials Research, 2014, 926-930:2755-2758.

[9] Kekez M, Radziszewski L, Sapietova A. Application of AI Methods to Modeling of Injector Needle Movement in Diesel Engine[J]. Procedia Engineering, 2017, 177(Complete):303-306.

[10] Jalalkamali A, Moradi M, Moradi N. Application of several AI models and ARIMAX model for forecasting drought using the Standardized Precipitation Index[J]. International Journal of Environmental Science & Technology (IJE, 2015, 12(4):1201-1210.

[11] Kamsu-Foguem B, Flammang, Aurélie. Knowledge description for the suitability requirements of different geographical regions for growing wine[J]. Land Use Policy, 2014, 38:719-731.

[12] Mayko, N. V. Error Estimates of the Finite-Difference Scheme for a One-Dimensional

Parabolic Equation with Allowance for the Effect of Initial and Boundary Conditions[J]. Cybernetics and Systems Analysis, 2014, 50(5):788-796.

[13] Braekers K, Caris A, Janssens G K. Bi-objective optimization of drayage operations in the service area of intermodal terminals[J]. Transportation Research Part E: Logistics and Transportation Review, 2014, 65:50-69.

[14] Niu M, Wan C, Xu Z. A review on applications of heuristic optimization algorithms for optimal power flow in modern power systems[J]. Journal of Modern Power Systems and Clean Energy, 2014, 2(4):289-297.