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Research on the Value and Application of Artificial Intelligence Technology in Product Interaction Design

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Abstract

Through the cognition and research of the artificial intelligence technology system, understand the application status of artificial intelligence technology in product interaction design, discover the innovation brought by artificial intelligence to product interaction design, the new interaction methods generated, and the future artificial intelligence technology Development trends in the field of product interaction design. The author focuses on the AI drinking machine, supplemented by design cases such as Xiaomi smart home and "Little Flying Fish" driving assistant, and comprehensively analyzes the application thinking and performance in the entire design process. In-depth analysis of the practical application of artificial intelligence in product interaction design. Summarize how artificial intelligence drives the development and value of product interaction design.

Keywords

Artificial intelligence; technology system; product interaction design; design application; value.

1. Introduction

Artificial Intelligence, abbreviated as AI. Artificial intelligence was first proposed at the Dartmouth conference in 1956 [1]. Since then, artificial intelligence has received extensive attention, and its meaning has gradually extended outward. Although there is no unified concept definition, there is no difference in technology and content. In "Artificial Intelligence and Its Applications", artificial intelligence is defined as an intellectual behavior that uses computer models for research, and is a technology that can execute creative machines that require human intelligence [2]. The current artificial intelligence is actually the machine intelligence corresponding to the natural intelligence of human beings. It is a device that can perceive the environment and maximize the completion of the task goal.

As can be seen from the definition, the core of artificial intelligence is still completing user tasks. This is not fundamentally different from user-driven, goal-oriented product design and interaction design, where the focus is on the way tasks are accomplished. The logic of artificial intelligence is actively perceived by the machine, and it helps users to complete tasks by reducing and optimizing the unnecessary paths of user tasks [3].

From the perspective of the development of artificial intelligence at this stage, the content it covers can be roughly defined as four parts: machine learning. Natural language processing. Image recognition and interaction. The functional realization of each part is based on the core algorithm of artificial intelligence, which drives the development of artificial intelligence from computational intelligence to perception and cognition through algorithm capabilities.

From the conceptual point of view of machine learning, specifically, the computer makes judgments and effective predictions on objects with the help of various data information and materials initially imported. We can understand that it is an intelligence that can learn

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independently and can make decisions[4]. At present, machine learning is the key technology of artificial intelligence and the ideological "brain" of the artificial intelligence family. The core of machine learning is algorithm, which represents deep learning, artificial neural network and enhancement algorithm. It is precisely because of the core algorithm that many applications of machine learning are possible. In this regard, image recognition using machine learning is a good example, even surpassing humans to some extent.

2. Classification of artificial intelligence technology systems

Natural language processing is a way for computers to analyze, understand and obtain information from human language in a way that simulates human logical thinking, and to capture the language of communication used by humans into machine language that computers can recognize. At present, natural language processing Technological products are changed on the basis of deep learning, rather than traditional coding procedures. Natural language processing is committed to building a bridge between human language and machine language conversion, which is used for text conversion, classification and recognition, word count, and spectrum-to-sound conversion.

Image processing technology allows computers to recognize pictures in human eyes. It is to perform various processing, analysis and extraction on images, and finally identify the target we want to study. In terms of solving more complex problems, traditional computers have insufficient processing power, and direct calculation will bring a large load to the interior. The image processing technology based on deep learning processes image information through network neural algorithms, adjusts A large number of interconnected relationships between internal nodes to achieve the ability and purpose of processing depth information.

Human-computer interaction technology is mainly reflected in the information exchange between computers and people. The traditional information interaction between people and computers mainly relies on interactive devices, including keyboards and mice, handwriting devices, joysticks, position trackers, data gloves, and immersive display devices. In addition to these basic forms of interaction, human-computer interaction technology also includes voice interaction and emotional interaction.

Human-computer interaction technology is mainly reflected in the information exchange between computers and people. The traditional information interaction between humans and computers mainly relies on interactive devices, including keyboards and mice, handwriting devices, joysticks, position trackers, data gloves, and immersive displays [5]. In addition to these basic forms of interaction, human-computer interaction technology also includes voice interaction, emotional interaction, somatosensory interaction, and brain-computer interaction.

3. Artificial intelligence reshapes traditional industries

Artificial intelligence is the technology most likely to bring about a new wave of industrial revolution after the steam engine, electricity and the information age. With the emergence and popularization of products such as smart home appliances, wearable devices and intelligent robots, artificial intelligence technology has quietly entered different fields of people's lives, attracting more and more attention.

1. The field of machine vision recognition

Machine vision recognition mainly simulates the human visual system through computers and intelligent algorithms to determine the specific position, motion state and the purpose of recognizing objects, in order to replace the human eyes. Due to the diversity and complexity of the types of objects, machines do not have high accuracy in recognizing the physical features of people and objects, and continuous efforts and research are still needed. Today, autonomous

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driving assistance systems are the hottest direction in the field of automotive artificial intelligence. It uses computer vision and speech recognition technology to perceive the driving environment, identify occupants, and understand the needs of passengers. This subverts the traditional interaction between people and cars, and reflects that the artificial intelligence voice interaction system brings "shortcuts" to users, achieves de-intermediation of user demand services, and changes the traditional interface driving. Product complexity.

In the field of security, machine vision recognition technology actually solves the problems of video structuring, business intelligence and application of big data in the field of security. Traditional security systems usually record video in real time and store it in memory synchronously. Since there is a large amount of information to process, high costs are incurred, and the processing efficiency of this technology is not high. Artificial intelligence security processes information through technologies such as machine learning and image recognition, and automatically learns and filters according to different complex environments, thereby improving the accuracy rate, intelligently analyzing the monitoring screen, and taking security measures. At present, the leading ones include Jiadu Technology, Hikvision and 360.

2. The field of natural language processing

Natural language processing technology is an important part of artificial intelligence system. It is a science that combines linguistics, computer science, and mathematics. Although it is used to study the language used by people in daily life, it is not to study the language in general, but to develop an effective computing system that realizes the natural language of the computer. This system includes lexical analysis, dependent sentence analysis, word vector representation, DNN language model, word meaning and short text similarity, and sentiment analysis. The essence of natural language technology is to achieve barrier-free dialogue between people and advanced intelligent machines and products. Judging from the current technological development trend, natural language processing technology is widely used in smart homes, emotional companion robots, autonomous driving, and personal assistants. For example, Xiaomi launched the Xiaomi AI speaker "Xiao Ai" in July 2017. The user only needs to say the words "Xiao Ai" to the speaker to wake up the speaker, communicate with it by voice, and complete a variety of preset skills [6]. At present, most of the technology giants including Haier U-home, Alibaba, Tencent and Google have made strategic layouts one after another.

In the field of automatic driving assistance, the "Little Flying Fish" driving assistant launched by iFLYTEK truly opens up the future of screenless interaction. It integrates functions such as navigation, phone calls, entertainment, and chat. The full-coverage voice control system integrating echo cancellation technology, array noise reduction technology, and FM transmission technology truly liberates both hands and allows the driver to return to driving. In addition, leading foreign companies use Google and special

Represented by Sla, they have rich experience in the field of automatic driving assistance systems. In the field of emotional companion robots, the robots for children communicate with children emotionally through machine learning. Although there are many

There are many robot products such as child escort or emotional communication, but it turns out that emotional escort robots still have a long way to go. The application of natural language processing technology in the field of personal assistant is relatively complete. Products such as Microsoft's Xiaoice, Apple's Siri and Google Assistant. At present, the core intelligent voice technology has entered a mature stage of development, which can carry out human-computer interaction with people without barriers, and can process information and give accurate feedback at the same time.

3. Intelligent Robot Field

With the development of intelligence, intelligent technology products represented by artificial intelligence robots are very popular. Although intelligent robots are mainly controlled by

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humans, through their own continuous deep learning, they have an independent and relatively developed "brain", which can make independent decisions, think independently, control themselves, respond accurately and interact effectively.

Intelligent robots are now used in the field of e-commerce. It is mainly reflected in applications such as smart logistics, smart personal shopping assistants and smart recommendation engines. For example, e-commerce platforms such as Amazon, JD.com and Alibaba have used artificial intelligence technology to upgrade the back-end supply chain, logistics, warehousing and website shopping guide services, etc., saving costs to a large extent. While creating more profit space for enterprises, it also improves shopping efficiency and simplifies complex shopping search procedures.

In terms of medical and health care, intelligent robots are used to help doctors ease their daily work, help doctors diagnose and reduce the occurrence of misdiagnosis. Smart robots can even help doctors perform surgery, improving surgical precision. For example, the da Vinci robot can perform minimally invasive and other complex surgeries.

The traditional financial service model is gradually becoming intelligent and personalized. By deepening machine learning, strengthening the emotional perception of artificial intelligence, simulating human service behavior, and realizing personalized service to batch customers. This includes providing users with various decision-making and supervision services such as financial management, forecasting, trading and analysis, helping to avoid financial risks and strengthening financial supervision. The application development of Ant Financial and Ping An Group is more advanced.

Through the above analysis of the application of artificial intelligence in different fields, artificial intelligence will become a kind of social member integrated into all aspects of human life in the future. Just imagine what impact artificial intelligence will have on the field of product interaction design? It is foreseeable that the application of artificial intelligence in product interaction design will also become inevitable.

4. Artificial intelligence drives the development of product interaction technology

1.Concept change and equipment upgrade

The changes brought by artificial intelligence to human-computer interaction are fundamental. The traditional form of human-computer interaction is a gradual transition from the continuous cycle of “input to feedback” to the cycle of “recommendation to selection”. Human-computer interaction will also shift from a one-way subordination relationship to a two-way training relationship. This change will rewrite "design thinking, methodologies, processes, specifications". For some fields, the interactive devices in the traditional physical form will be gradually eliminated, and more use of the interaction method is voice. Voice interaction can meet the use of multiple distances and spaces at the same time, and will not be limited by touch and wear. In the future, more human-computer interaction devices will be centered on robots, replacing part of human work, such as the second-generation "Xiao Ai" AI speaker launched by Xiaomi. It can be connected to multiple electrical devices of Mijia at the same time, with higher accuracy of speech recognition, and can realize the human-machine interconnection mode of "multiple control and harmony with one language", making traditional household air conditioners, TVs, washing machines and refrigerators more efficient. Intelligence; Microsoft's "Xiaobing" emotional robot can accompany the elderly and children, carry out natural conversations and exchanges, become a real family "member", and truly realize the hands-free human-computer interaction. Artificial intelligence is not at the highest level represented by intelligent robots

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Flat is terminated. In March 2017, Neuralink, a Silicon Valley technology vane, plans to develop the first brain-computer interface product within 4 years for the treatment of brain diseases. By developing a biocompatible implantable neural interface, they can implant artificial intelligence into the human brain, replace human natural language communication, and realize a disruptive intelligent human-machine interface technology, that is, brain-computer interaction technology. The research on brain-computer interaction technology is still very cutting-edge, as

In the scene of the movie "The Matrix", if the brain-computer technology is realized, and humans can control everything with their thoughts, it will be an epic great change in the history of the human scientific and technological revolution.

2.The autonomy of human-computer interaction

The future human-computer interaction will comprehensively improve the systematization of autonomous learning, which includes active recommendation, active learning, self-evolution, and self-immunity. Among these four aspects, autonomy is very important[7]. Concept Autonomy is a concept with memory, selectivity, matching and control.

The United States has 1 military command and control system. Its main core is autonomy and active recommendation. Through the commander's assistant module, it conducts autonomous analysis of the current and past battlefield situation, and effectively assists the commander in making decisions in real time, helping the troops to win the war.

In addition, Baidu's AI agent also learns to speak autonomously, similar to the way babies learn to speak. It communicates with people in language, learns speech behavior by imitating the speaker, masters the

Wording techniques. It also makes a sound to the speaker, and corrects speech behavior on its own according to the correction and encouragement of the speaker. Therefore, the interactive autonomy of Baidu AI agent is aimed at acquiring language learning and comprehension ability, forming autonomous learning, memory and Ability to choose.

For many years, the study of the autonomy and initiative of intelligent machines has been a hot and difficult point in the field of artificial intelligence science. It is believed that in the near future, the autonomous evolution and knowledge learning of intelligent machines can be realized for the benefit of mankind.

5. The application of artificial intelligence technology in product interaction design

1.Overview of Product Interaction Design

Product interaction design is a discipline that focuses on interactive experience, and it is also a system design. Since the elements of the interaction system include people, behaviors, usage scenarios and interaction technologies [8], the concept of product interaction design is not the same as human-computer interaction. Human-computer interaction is part of a product interaction design system. The content of product interaction design includes interface design. Interface design focuses more on the form of the design interface, which serves interactive behavior and is also a part of product interaction design. Product design will indirectly affect the final user design, and product interaction design is a design method based on technical means to make products intelligent, and it pays more attention to the interaction process and experience of both parties.

2. Case study of artificial intelligence in product interaction design

At present, artificial intelligence technology is more prominent and widely used in speech recognition technology, image visual recognition technology and home service robots. In this

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way, through the redesign of traditional home appliances, the specific application of artificial intelligence in the field of product interaction design is further analyzed.

The physical operation area of traditional home appliances is generally located in a certain part of the device, which is semi-intelligent, and users need to complete a series of operations to start the device. For example, after the user goes home, he fumbles for the switch of the light in the dark, and the remote control is needed to change the channel and entertainment when watching TV. These are all difficult operations for household products. It can be seen that traditional home appliances still focus on how to improve the physical properties of products, such as appearance, color, structure, etc.; while artificial intelligence home appliances pay more attention to the interactive experience of products, and establish a relationship between "human-machine-product". Interconnected interactive links.

3. The Importance of Speech Recognition and Deep Learning Technology in AI Drinking Machines

In recent years, with the continuous breakthrough of machine deep learning technology, the development of speech recognition has taken a big step, making it a system that can truly understand human speech and even dialect environments. The core of speech recognition is to make machines better understand people's needs, understand commands and take specific actions and responses. At present, the function keys of the popular drinking machines are relatively complex, the touch control of the display panel is not precise, the panel content arrangement is too complicated, the primary and secondary function keys are not prominent and the keys are the same size, etc. This design is undoubtedly a problem for the elderly. Troubled use. In addition, some drinking purifiers do not have a filter replacement reminder, which leads to the long-term non-replacement of the filter element and reduces the service life of the product. Through the gradual maturity of speech recognition technology, it is possible to replace the visual physical buttons and implant artificial intelligence speech recognition hardware to meet the needs of different users. By inputting commands to the smart drinking machine, the voice recognition system will automatically recognize the sound, then reply accurately, and perform the next function output. For example, give the instruction "I need a glass of warm water" and there will be "Ok, it's ready for you right away" feedback. In addition, artificial intelligence technology can be competent for startup, water quality monitoring, and even accompanying communication.

In addition, through affective computing, machines can better understand dialogue intent and deep semantics. Emotions play an important role in human decision-making, social interaction, perception, memory, learning, and creativity. Studies have shown that 80% of the information in human communication is emotional information. From the perspective of cognitive science, emotion itself is a part of intelligence. Since emotion plays an important role in human information exchange, affective computing is an integral part of human-computer interaction. Based on the autonomy of machine learning, it continuously accumulates real-life data, and collects data on emotional support needs such as the time to take medicine on time, the time and frequency of milk preparation, and the temperature of water. On the basis of basically realizing dialogue with people, how to make the drinking machine learn through machine learning to establish a set of solutions that can meet the healthy drinking habits of each family member. A set of personalized service system is proposed. This is undoubtedly an innovation to the traditional water purification product service model.

4. Upgrading the functions of traditional drinking machines

The emotional interaction function can be said to be an innovation in the design of AI drinking machines. The idea of this machine's emotional interaction function is also reflected in Donald Norman's "Design Psychology 3: Emotional Design" . He believes: "The machines of the future need emotions just like humans. When the machines face the same situations as humans, in

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order to deal with the complex and changeable world, the machines will need an emotion - the emotion of the machine [9]." Emotionalization is based on the form of "artificial intelligence chip + Internet" to control the functions that people need, and on the premise of meeting basic functional requirements, other emotional service functions can be expanded. For example, when family members leave the house, it will remind the outdoor temperature and weather today, and add words such as paying attention to changing clothes; when family members return home, it will actively greet the user and brew the temperature. suitable water. In addition, when the elderly need to take medicine, it can remind the elderly to take the medicine in time. For empty nesters, the voices of their children can be recorded instead of the machine itself. Whether it is a daily conversation or when the medicine reminder service rings, the elderly will have a virtual association, feeling that their children are always taking care of themselves, so as to get emotional sustenance[10]. For pregnant women, it can monitor the humidity and temperature of the air, and provide a comfortable environment for pregnant women through timely adjustment of the humidification module; through machine learning, it can record the usual water consumption and frequency of pregnant women, and formulate periodic drinking plans and nutritional adjustments for pregnant women Plans, such as the PH value adjustment of water quality, the formulation of water intake and reminding pregnant women to drink water, etc.; folic acid, vitamins and drugs needed by pregnant women can be placed in the storage box on the drinking machine for easy access, and can be carried out. Real-time monitoring to prevent pregnant women from eating too much or forgetting to take it.

6. Conclusion

Through the analysis and research of artificial intelligence technology and its application, the interaction design method in the era of artificial intelligence is subtly going deep into the application in various fields. Breaking the boundaries of traditional white goods with artificial intelligence technology, it puts forward another attempt as the theme, conducts main case analysis, and obtains the high-end white goods interaction technology under the intelligent machine language that "can listen, speak and interact with nature" The new form summarizes the multi-modal development trend of artificial intelligence technology in various fields.

To this end, this paper redefines product interaction design, and the new intelligent human-computer interaction technology will be displayed through intelligent voice and image recognition. Intelligence and personalization will be the main features of the next-generation product interaction design system. The emotional resonance between humans and machines will become the main core of the symbiotic relationship between humans and machines in the future, and it is also the future of the development of human-computer interaction design. Although the current artificial intelligence is still in the early stage, there are still defects and deficiencies in the interactive mode of emotional communication, but in the future, with the high integration of artificial intelligence and product interaction design, whether it is in the method, method, information of product interaction design The framework and perception level will focus on the theme of "human-machine emotion, human-machine symbiosis, and human-machine form", and develop a multi-channel and multi-dimensional intelligent human-machine interaction model. This kind of change in the intelligent human-machine mode brought about by science and technology will definitely affect the development history of the entire product interaction design.

References:

[1] XIANG Jing. On the Change of Interactive Design in the Age of AI[J]. Science and technology Innovation and Application, 2017(32): 111—115.

[2] CAI Zi-xing. Artificial Intelligence and Its Applications[M]. Beijing: Tsinghua University Press, 2004.

ISSN: 2664-9640

[3] LIAN Shi-you. Introduction to Artificial Intelligence Technology[M]. Xi'an: Xi'an University of Electronic Science and Technology Press, 2000.
[4] XIAO Bo-da, ZHOU Guo-fu. A Summary of the Development and Application of Artificial Intelligence Technology[J]. Fujian Computer, 2018(1): 98—99.
[5] ZHANG Yang-sen. Principles and Applications of Artificial Intelligence[M]. Beijing: Higher Education Press, 2004.
[6] ZUO Zi-lei. Research on the Design of Intelligent Home System Based on Situational Awareness: a Case Study of Xiaomi Smart Home[D]. Wuxi: Jiangnan University, 2017.
[7] NORMAN D. Design Psychology 3: Emotional Design[M]. Beijing: Citic Press, 2012.
[8] LI Shi-guo, HUA Mei-li, JIA Rui. New Mode of Product Design: Interactive Design[J]. Packaging Engineering, 2007, 28(4): 90—92.
[9] QIN Jing-yan. Research on the Influence of Artificial Intelligence on Interaction Design[J]. Packaging Engineering, 2017, 38(20): 90.
[10] FAN Jun-jun, TIAN Feng, DU Yi, et al. Some Thoughts on Human-Computer Interaction in Intelligent Era[J]. Science in China: Information Science, 2018(4): 361— 375.