The Influence and Transformation of Artificial Intelligence on Industrial Design Education

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Abstract. With the progress and development of the times, modern industrial design is also constantly improving, and intelligent technology has officially begun to integrate into industrial design. Designers began to use artificial intelligence to deal with complex data analysis and quickly implement and compare conceptual designs, and select the best solution, and greatly improve efficiency. However, the rapid development of electronic technology and artificial intelligence has also brought new requirements and challenges to future designers. In the field of design, artificial intelligence will make the future design industry more diverse and inclusive. Therefore, the future of industrial design education also needs innovation, and it is necessary to keep up with the development of the times, integrate and innovate.

Introduction

With the advent of the fourth industrial revolution, artificial intelligence has gradually entered our lives. Since AIpha Go defeated Li Shishi in 2016, the world has paid more attention to the development of artificial intelligence. On May 3, 2018, the Chinese Academy of Sciences released the first cloud artificial intelligence chip in China, with a theoretical peak speed of 128 trillion fixed-point operations per second, reaching the world's advanced level. On November 22nd of the same year, in the "great revolution - the large-scale exhibition celebrating the 40th anniversary of reform and opening up", the third generation of domestic orthopedic surgery robot "Scorpio" showed the robot simulation surgery. It is the first orthopedic robot in the world to cover the full segment of the spine and pelvic acetabular surgery. The performance index has reached the international leading level. It can be seen that artificial intelligence and advanced machine learning are the development trend of future technology.

The emergence of new technologies has also brought new requirements and challenges to design. How does the development of artificial intelligence contribute to design? Will the arrival of artificial intelligence replace the position of designer? How does the emergence of artificial intelligence make changes to the future design education model? The above questions are all that we need to think about and explore.

We should use artificial intelligence for research and development, simulation technology, and extending human intelligent theoretical methods, and it can be applied to technology and application systems. The purpose is to improve our work efficiency and assist in human progress. The future design is full of inclusiveness and diversity, artificial intelligence will become our creative design tool, and we need to find a way for humans and artificial intelligence to work together [1].

The Development of Artificial Intelligence.

Since the concept of artificial intelligence was first proposed in 1956, the development of artificial intelligence has risen and fallen. Artificial intelligence has experienced a qualitative leap, becoming the world's eye-catching technology focus with the breakthrough of core algorithms, rapid improvement of computing power and massive Internet data support. In industrial design, due to the

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advent of artificial intelligence, CAD was first used in automobile manufacturing, aerospace, and electronics industries, and now CAD is popular all over the world.

The Birth Period of Artificial Intelligence (1956 - early 1960s). After the concept of artificial intelligence was put forward, the research results were successively obtained. These include the proof of machine theorem, the checker program, etc., which set off the first climax of artificial intelligence. In the 1960s, the biggest influence on industrial design was the birth of CAD (Computer-Aided Design). CAD is an interactive graphics research program proposed by the Massachusetts Institute of Technology. Due to the high cost of hardware facilities at the time, only the United States General Motors Corporation and the United States Boeing Airlines used their own interactive mapping system, and CAD has a great role in promoting industrial design.

Artificial Intelligence Trough (from the 1960s to the early 1970s). Some breakthroughs in the early days of artificial intelligence raised people's expectations of artificial intelligence. So people began to try new and more challenging tasks and put forward some unrealistic research and development goals, but many of the research and development goals ended in failure or failure to achieve the desired goal. In the 1970s, the cost of small computers declined, and the American industry began to use interactive drawing systems extensively to promote the further development of the industrial design.

The Initial Application Reriod of Artificial Intelligence (the early 1970s - mid-1980s). The expert system simulates the knowledge of human experts to solve problems in specific fields and achieves success in the fields of medicine, chemistry, and geology. It realizes the idea that artificial intelligence moves from theoretical research to practical application. In the later stage, CAD was developed rapidly due to the application of the PC. It has also appeared in companies specializing in the development of CAD systems, and computer-aided industrial design is slowly becoming popular.

The Period of Artificial Intelligence Development (in the 1980s, 2010-2010). The advancement of network technology will be solved in the early stage due to the continuous expansion of the scale of artificial intelligence applications, the narrow application fields of the expert system, the lack of common-sense knowledge, and the difficulty in acquiring knowledge. The development of Internet technology has accelerated the innovation of artificial intelligence, making artificial intelligence technology more practical. In 1997, the IBM Deep Blue supercomputer defeated the chess world champion Kasparov. In 2008, IBM proposed the concept of "smart planet".

Artificial Intelligence Blowout Period (2011-present). In 2016, the main research of the team of Google's DeepMind company, Demis Hazabis, was "deep learning." According to the working principle of "deep learning", a Go game is developed, which is an AlphaGo robot. It was the first artificial intelligence robot to defeat the human professional Go player and the first to win the World Championship in Go. Alpha Go uses a lot of new technologies, such as neural networks, deep learning, and Monte Carlo search, and it has made a substantial leap in its strength. The artificial intelligence renaissance combined with the development of big data and cloud computing technology makes the direction of artificial intelligence application more practical and closer to industry and life. The next step is to turn to the development of medical institutions and power energy. The current society can already use artificial intelligence deep learning to provide doctors with auxiliary tools. In the future, it is just around the corner to use artificial intelligence technology to overcome modern medical problems.

The Significance of Artificial Intelligence to Design.

With the development of big data, cloud computing, and the Internet, artificial intelligence technology has developed rapidly, including technologies such as perceptual data and graphics processors and deep neural networks driven by computing platforms. It has greatly crossed the "technical gap" between science and application, such as image classification, speech recognition, and unmanned artificial intelligence technology to achieve technological breakthroughs.

Artificial intelligence and computer technology are growing. Computer-aided design is due to

the improvement in computer performance. The design company changed from flat drawing design to a three-dimensional drawing design. Design education also combines computer-aided design and industrial design. All of the above makes the working principle and assembly process of the design artwork more intuitive through powerful 3D modeling functions and virtual assembly and animation simulation. In the past, due to a variety of restrictions, drawing software can only stay in graphic design drawings, lacking realism, and now stereoscopic drawings break through this limitation.

The realization of CAD technology has undergone many evolutions since the birth of artificial intelligence. Nowadays, computers have been able to help designers with many tasks such as calculation, information storage, and drawing. Designers usually start with a sketch, then use a computer to turn the sketch into a worksheet, and then use a computer to calculate, analyze, and compare different scenarios to determine the optimal solution. The development of computer technology makes the design work more efficient and accurate. Today, CAD is not just for drawing and display, it is beginning to enter the more "smart" part of the designer's expertise. Therefore, artificial intelligence can be understood as the ability to make machines replace humans for cognitive, identification, analysis, decision making, and other functions, and to allow machines to help humans solve problems and improve design efficiency.

Artificial Intelligence in the Development of the Design Industry.

Artificial intelligence is a branch of computer science, including robotics, speech recognition, image recognition, natural language processing, and expert systems [2]. In terms of design, whether it is architectural design or industrial design, as the algorithm evolves, more and more research, data processing and analysis work will be done by artificial intelligence. All companies have begun to develop towards technology companies. To integrate with society and enterprises, colleges and universities are necessary for students to master the basic knowledge and practical application of artificial intelligence, deep learning, algorithm development, programming language and so on.

At present, the widely used technology is Convolutional Neural Networks (CNN), which is one of the representative algorithms of deep learning. Among them, neuro-style transformation is a special application of a convolutional neural network. Its function is to create a third image based on two images and make the content and style as close as possible to the image [3-4]。Using this technique, artificial intelligence painting is realized. The program learns through the artist's painting refinement style and then defines the content loss and style loss error function, and then creates the art. In this way, both Impressionism, Abstraction, and Pop Art can be easily created, and are often used for post-processing of photos (refer with: Fig.1).

Figure1. Picture of neuro-style conversion (images from the web)

In 2016, “Double 11”, Luban assisted the store to complete the 170 million Banner design. The system consists of four parts: design framework, element center, actor, and evaluation network. It is visually designed through four levels: development, scene expression, creative insight, and creation trend, and transforms design thinking into data thinking (refer with: Fig.2). Relying on powerful artificial intelligence algorithms and a large amount of data training, the machine learning design can realize the production of 40 million posters without repeating the day. Not only the precise advertising but also the advertising click rate can be greatly improved.

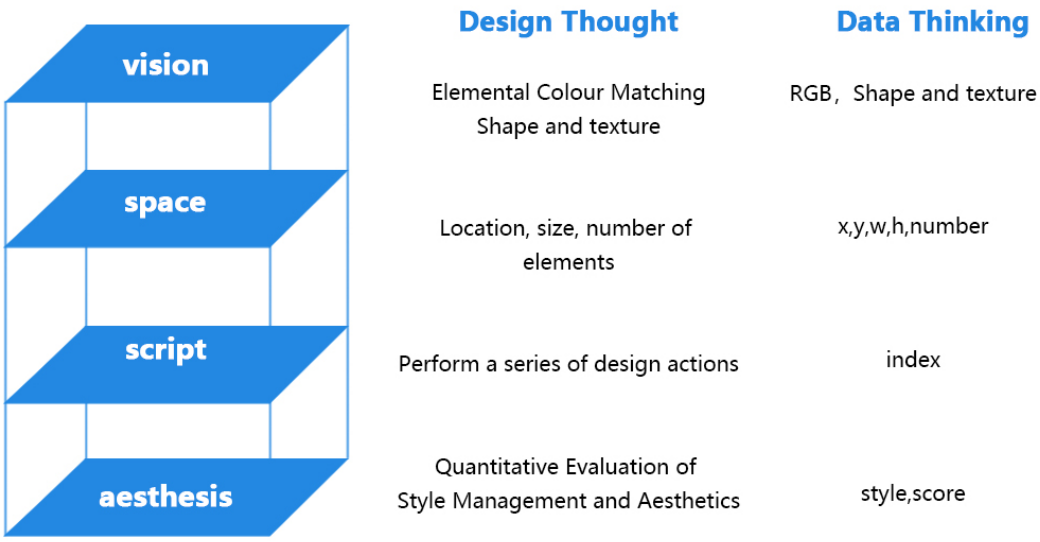

Figure 2. Alibaba-Luban data thinking diagram

So will the emergence of artificial intelligence design replace the designer position? Artificial intelligence will not only surpass humans in solving the problem of ultra-complex pure IQ. Artificial intelligence can be completely replaced by formulating a standardized design system, mass production of flat systems, web and mobile interactive systems, and all mechanically repeatable systems. For the design industry, Baidu interaction designer Xue Zhirong once said that artificial intelligence is also design to a certain extent. Its purpose is to help humans solve problems and create solutions that resemble or even transcend human thinking patterns.

Designers don't have to worry too much about the risk of unemployment in this huge change. Instead, they should actively embrace new technologies and new interdisciplinary knowledge and rationally respond to the enormous impact of artificial intelligence and other technological advances. That's because the new changes don't depend on how powerful artificial intelligence is, but how designers go about self-improvement and innovative design. In recent years, computer hardware and software technology have been changing with each passing day. Technological developments in computer graphics, computer-aided design, virtual reality, and CAD/CAM applications are further advanced. The computer-aided industrial design has made great progress, and the theory and method of modern industrial design have undergone a qualitative leap. This not only expands the application field of computers but also the trend of modernization of industrial design.

The Impact of Artificial Intelligence on Design Education and New Requirements.

Facing the arrival of the industry 4.0, China's "Made in China 2025" action plan released in 2015, strives to transform and upgrade the traditional manufacturing industry, and intelligent manufacturing has become the focus of industrial design modernization [5].

To cope with the future development trend of industrial design, we must be deeply aware that traditional computer-aided design is developing towards artificial intelligence-assisted design. The emergence of new technology models will impact some enterprises in the industry, but it is also the time to change the thinking because creative people can adapt to the needs of the artificial intelligence era [1]. Artificial intelligence will transcend humans but the foundations of various artificial intelligence depend on algorithms that optimize the simulation of human thinking, so innovative design ideas and creative design works are the core competitiveness of future designers. In enterprises, artificial intelligence in the auxiliary industrial design, the proportion of innovative applications is increasing, to better transport talents, we need to update the design education system, concept, model and assessment mechanism of colleges and universities [6].

Industrial Design Professional Teaching Analysis. In terms of concept, the design profession has not developed together with society and technology, and the curriculum has not been updated simultaneously, so the software equipment is still relatively old.

In terms of model, the previous teaching model focuses on explaining the theoretical knowledge of textbooks, ignoring the cultivation of students' independent innovative thinking and hands-on practical ability. Under the class, students can't use the knowledge they have learned in class when they finish their homework independently, and they lack the creativity and concentration to complete the homework. It leads to a low level of job quality, and students do not fully learn the course knowledge in the course, and can not apply it to future practice and work, which will greatly reduce the enthusiasm of the classroom. In terms of content, there is less integration of interdisciplinary knowledge, and students cannot fully compete for project requirements after graduation.

In the assessment mechanism, most of the assessment methods of traditional industrial design courses are based on the final big assignments and the attendance of peacetime to calculate the final score. Such an assessment mechanism ignores the design process of students' understanding, analysis, and resolution, as well as the process of expressing creative thinking. It also ignores the process of students' creative thinking. Innovation is the core competitiveness of designers, so this part cannot be ignored.

Teaching Reform Methods for Industrial Design Majors. Cooperative teaching concept. The combination of artificial intelligence and industrial design is the result of adapting to technological development and social needs. More emphasis in the future is to develop designers with independent innovation capabilities and design practice capabilities. Therefore, the goal of industrial design education reform is to cultivate application-oriented talents with the ability to discover problems, understand problems, and analyze problems. At the same time, the industrial design also needs to cultivate comprehensive creative talents with basic knowledge and application skills in mechanical engineering and design art disciplines, so that there are many solutions in the face of design problems.

We must let teachers integrate with society, increase their opportunities for going out to practice, and update the teacher's knowledge system and keep pace with social development. Secondly, let the students learn to analyze the function of the product, and be good at the object, environment, production process conditions and other factors to improve the design sketch and design. We have transformed our teaching objectives into cultivating students with strong engineering practice, innovation awareness, and good overall quality. Only the coordinated development of knowledge, ability, and quality can become an industrial designer who adapts to scientific and technological progress and social development.

Diversified training. In the teaching mode, we must first let the students understand the meaning and goals of the course teaching, and teachers need to integrate some interactive links when teaching textbook knowledge. Students can be grouped to discuss and express their own opinions, which can promote students' ability to think independently and exchange ideas of groups and give play to students' initiative. After the discussion, the teacher discussed and commented on the various programs, not only avoiding the boring course but also helping students understand the content and focus of the course.

In teaching, the theory is integrated, focusing on multidisciplinary and interdisciplinary knowledge integration. Also, the science and engineering knowledge that needs to be studied should be completed in the form of theoretical knowledge and experimental teaching, and multi-disciplinary cross-disciplinary explanations, such as art and engineering, including engineering, engineering, design and so on. Depending on the design discipline, different large CAD/CAM/CAE software systems, including Pro/Engineer, EDS Unigraphics, EUCLID, Autodesk, we can learn to make product concept design drawings and prepare for later practice. Also, it is necessary to cultivate the emotional thinking of student design, pay attention to user analysis, and cultivate market research ability and data analysis ability.

In the practice of the curriculum, a combination of theoretical practice is needed. The

combination of science and engineering disciplines and art studies emphasizes the experimental teaching of engineering technology and explains the physical mechanisms, transmission autocracies, and couplings that are difficult to understand in the basic knowledge of machinery. Teachers need to lead students to familiarize themselves with the production process and materials application, and to train students' teamwork skills. In the course filling, the cooperation between the school and the enterprise in the field of talent cultivation can be strengthened first, and then the part of the research results of the teacher is taken as the basic subject of classroom practice. Large-scale industrial design competitions at home and abroad can be used as a subject practice to strengthen the application of students' practical skills and professional skills. This not only enriched the teaching content but also realized the seamless connection between talent demand and talent cultivation, which not only enhanced the scientific research strength of the teaching staff but also met the demand goals of the actual technical activities of the enterprise.

Multi-faceted assessment system. In the aspect of the assessment mechanism, to solve the drawbacks of traditional assessment, this paper proposes that we should implement a multi-faceted assessment system. In summarizing the score, we should analyze it from different perspectives. We should mark the problem-solving in group discussion as the basic part in percentage form. The summary of the basic part and the result part can supervise the students to participate in every part of the course, and exercise their ability of problem sorting, design planning, creative landing, and teamwork. It cultivates students'ability to report to leaders and communicate in future work and the ability to design together by groups.

Conclusion

In this article, artificial intelligence is used as the entry point, which expounds the significance and influence of artificial intelligence on design, the future development trend of artificial intelligence and the direction of social development. It also expounds the ideas and methods of industrial design teaching innovation under the influence of artificial intelligence in colleges and universities. Through the new requirements of the society for future designers, we should find a new direction for the transformation of industrial design teaching, build a new and reasonable teaching knowledge system, achieve the purpose of improving the quality of experimental teaching, enhancing students' professional quality and solving various problems of students [7].

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