Research on the Integration and Development of Modern Book Design in Artificial Intelligence

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Abstract. Books are the material carriers for human beings to express ideas, spread knowledge and transmit experience, and are the spiritual wealth and crystallization of wisdom created by human beings. Along with the rapid development of artificial intelligence technology in recent years provides a promising path for book designers. This paper divides the production process of modern books into: design and publication, focusing on the application of artificial intelligence technology in the design and publication of modern books. Typeface, graphics, color and arrangement; selection, writing and editing are used as entry points for all-round analysis. The algorithm of artificial intelligence has significant advantages and can accomplish the target task better, but lacks emotional design. The association of AI technology and books makes the development of future book design more diversified and provides new models and ideas that can be referred to for book design.

Keywords: Book design · Artificial Intelligence · Book publishing · book binding

1 The Concept of Modern Book Design

Beijing Open Book Information Technology Co., Ltd. Released the 2020 China Book Retail Market Report on January 7, 2021, based on sampling data provided by more than 10,000 physical bookstores and online bookstores nationwide. The report shows that, affected by the epidemic, the size of China's book retail market yardage in 2020 is 97.08 billion yuan, and the size of new book varieties reaches 170,000; from 2015 to 2019, China's book retail market maintains a growth rate of more than 10%, and the size of China's book retail market yardage in 2019 is about 102.27 billion yuan [1]. With the increasing development of the Internet and new media, the book industry is facing unprecedented opportunities and challenges, and wisdom empowerment, meticulous cultivation, and focus on content quality are indispensable factors in the future development of books.

A book is a collection of text, graphics and other information bound into a book, which is used to record, store and transmit human knowledge and tell human civilization. From the selection of a book to the hands of readers, a book will go through two major stages: "publication" and "design", as shown in Fig. 1. After the author submits

the manuscript, it enters the editing and processing stage, in which the editor carefully reviews the manuscript, finds the problems of misspelled words, misuse of punctuation marks, incoherent phrases, speech disorders, and errors in logical expressions, and modifies them one by one; in addition, it is necessary to adjust unreasonable frame settings, standardize the format of footnotes and references, verify historical facts, and retouch the color.(Fig. 1).
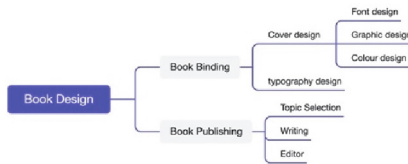

Fig.1. Modern book design main process

With the improvement of paper manufacturing efficiency, the reduction of printing costs, and the rapid development of electronic information technology, book design has undergone a radical change in nearly a century, even much faster than at any other time in history. In particular, the rise of artificial intelligence and Internet technology has had a huge impact on paper books. Some believe that the advent of the information age will lead to the demise of traditional paper books.

2   Overview of Artificial Intelligence

Artificial intelligence is a branch of computer science, which tries to understand the nature of intelligence and produce a new intelligent machine that can respond in a similar way to human intelligence. Since the day artificial intelligence was born, theoretical research and technical means have become more and more mature, and the field of application has been expanding, so we can imagine that the technological products brought by artificial intelligence in the future will be the "container" of human intelligence. Artificial intelligence can simulate human consciousness information, but also can simulate the human mind.

At present, artificial intelligence technology has been in the design, education, finance, transportation, health care, home, games and entertainment and other fields to achieve technology landing, and the application of scenarios are increasingly rich. For example, in the field of intelligent design, the rapid development of a new generation of information technology represented by artificial intelligence will have a revolutionary impact on the traditional design concept and system. This will further unleash the huge potential of design in the process of promoting the development of human society. "Artificial intelligence + design" is setting off a revolution in the design world.

3   Application of Artificial Intelligence in Book Design

With the rise of e-books (such as kindle), and then the emergence of smart phones and other mobile terminals, people's habits of receiving information have rapidly changed, and people are increasingly inclined to use fragmented time to receive information on

video screens. Book designers have also combined information technology, artificial intelligence algorithms and other ways to enrich the expression of paper books, a series of in-depth thinking and design practice.

3.1 Artificial Intelligence in the Type Design of Book Binding

The cover text of books generally consists of basic elements such as book title, author name and advertising slogan. In today's increasingly important copyright, the font design of the book title can no longer be directly selected from the existing font library. Directly choose font library fonts, one is the risk of infringement; second, the font library fonts lack of relevance and uniqueness, which will inevitably lead to the book cover font is difficult to distinguish.

3.1.1 The Current Situation of Artificial Intelligence Font Creation

As we all know, the book title can play a decisive role in the reader's willingness to buy, so an excellent book title font design will often be able to seize the opportunity. 2018 April the first set of artificial intelligence Chinese character font - Ali intelligent black surface. In 2019, the Founder's Handwriting App can be expanded into a set of personal handwritten fonts based on algorithms by writing only 100 words. All of these represent that artificial intelligence generating Chinese character technology is gradually becoming popular. Artificial intelligence technology has developed so far, and the methods of Chinese character generation based on learning models can be broadly divided into two types: explicit learning models and implicit learning models [4]. Explicit learning models have clear expressions and definite meanings for each step, and it is difficult to generate a new font that differs significantly from the existing font style once a certain amount of human intervention is removed.

3.1.2 Artificial Intelligence Character Building Properties

Implicit learning models do not have specific expressions, and it only focuses on learning the most significant features in fonts. 2014 Goodfellow et al. proposed GANs (Generative Adversarial Networks) in the current field of automated Chinese character generation is more research [5]. The essence of GANs to generate Chinese characters is a migration technique from one font image to another, and the process is roughly as follows: the existing character set samples are set as the source data and the target font samples are set as the target domain, and the model is used to deeply learn the font features of the source data and embed the style parameters of the target font samples in order to achieve the transformation of a few target Chinese characters expanded into the target Chinese character database derived from many Chinese character generation training models. In summary, pushing AI character creation to better consistency and readability has become the preferred way to generate Chinese characters by computer automation at present.

3.2 Artificial Intelligence in Book Binding Graphic Design

The graphic design of book covers is an integral part of book binding, and the graphics represent the author's creativity and ideas in a clear and intuitive way. Image recognition

is an area in which AI technology excels. A few years ago, Google, the German Theo Institute for Integrative Neuroscience, Microsoft and others developed artificial intelligence with powerful graphics processing capabilities. [6] In 2018, Alibaba launched a poster design AI system at UCAN conference, which is named "Luban", and it integrates the analysis of buyers' buying tendency, product information and design requirements, etc. The system effectively applies AI to the field of poster and cover design. The system will be effectively applied to the field of poster and cover design, realizing the intelligence of graphic design and greatly enhancing the efficiency of designers. "The "Luban" artificial intelligence system is mainly composed of four parts: design framework building, element selection, actuator and network evaluation feedback, etc. Through the application of the system, we can find that the effect of artificial intelligence for graphic design is very significant. "system has designed a large number of high-quality works in the process of application for more than two years [7].

3.3   Artificial Intelligence in Color Matching in Book Binding

Due to the traditional Chinese culture's preference for quiet and low-key temperament, designers often do not prefer contrasting color matching in their design practice, so the role played by color for book covers is often overlooked. People perceive different colors to produce different associations, so the use of color matching involves human psychological influences. Design software such as Ps, vector illustration software Ai, typography software Id, and vector graphics processing software CorelDRAW provide selectable color modes: such as RGB mode and CMYK mode. This provides the possibility for the application of artificial intelligence in color design.

Zhou Chuyi (2021) of Zhejiang University proposed a cognitive coding system for AI-assisted design iteration regarding AI-assisted design iteration. Based on a case base of digital design styles, PyTorch's cycleGAN was used to train the model, and 40 color schemes were output for novice designers' reference [8]. Through the analysis of the experimental data, it was found that AI assistance can improve the frequency of cognitive activities in graphic design iterations, which can ultimately improve the fluency of design and stylization of design outcomes.

3.4   Artificial Intelligence in Book Binding for Typography Design

Typographic design is the spatial ordering of graphic, textual information, color and other elements in a clear-cut, well-organized and rapidly communicated spatial order, in the conventional way of horizontal visual flow, vertical visual flow, diagonal visual flow, curved visual flow, center of gravity visual flow, indication visual flow, repetitive visual flow, scattered visual flow, etc. In 2013, Microsoft Research Asia and the Academy of Fine Arts of Tsinghua University cooperated to develop a technology on typographic automation, trying to follow people's visual flow and arrange the content in an organized manner according to visual space, visual color, visual text, etc., so that the typographic effect meets people's aesthetic requirements for typographic design. This research creatively proposes a prototype of a computable automatic typesetting framework that combines the aesthetic principles of design with computable image features. The prototype integrates the prior knowledge of experts in visual presentation, text

semantics, design principles, cognitive understanding and other fields, and optimizes a series of key issues such as visual weight of text and picture, visual space counterweight, color harmony factor in psychology, the importance of information in visual cognition and semantic understanding in the same multimedia computing framework [9].

3.4.1 The Application of AR, VR Virtual Technology

AR and VR technologies have been more widely used in the children's book market. Some domestic publishers and technology companies have already developed books in this field, such as the China Children's and Teenagers' Press and Publishing Corporation and Zhejiang Children's and Teenagers' Publishing House [11]. The National Geographic World Hidden in Maps was once recommended to children by a geography teacher who wrote a 5000-word long letter by hand. As the reader's word-of-mouth continued to soar, the set became popular on the Internet and appeared on VIA Live in the following months, setting a book sales record of 20,000 sets in 5 min. National Geographic China Hidden in the Map" is a book that combines science and art, and makes geographic knowledge more three-dimensional through map + hand-drawn large map + actual map + satellite remote sensing image map. Over 200 beautiful local characteristics of architecture, terrain and landscape maps. Stimulate children's interest in learning geography knowledge at the same time, but also lead children to grow insight and broaden their horizons. With the AR learning free APP, so that the learning of geography knowledge becomes real and more interesting.

3.4.2 The Application of Modeling, 3D Printing and Other Technologies

Under the strong development of contemporary computer science, designers can visualize their inspiration with the help of a large number of design software. Compared to the traditional human art creation which takes up to months or even years, electronic technology can help designers to complete their creations quickly and efficiently, and mass produce them through molds. For example, designers can use computer modelling and 3D printing technology to create the models that designers need so that readers can immerse themselves in the details told in the book [10]. Nowadays, more and more book designers seize the wave of domestic three-dimensional books, while using 3D printing technology to boldly try and launch all kinds of fun and creative books.

4 The Application of Artificial Intelligence in Book Publishing

4.1 The Application of Artificial Intelligence in Book Publishing in the Selection of Topics

The terminal of book publishing and distribution must be the reader, the distance between the designer and the reader is too far, forming a one-way process of book publishing that the reader can only passively accept, which is one of the pain points of the traditional selection process. Book designers need to obtain data on readers' needs, and then select titles for publication and distribution, which must experience a longer time cycle, while the traditional way of obtaining data will bring lag to some books with rapid changes in

market demand. It can be seen that data will be the source of future productivity, and the design selection direction determined by outlining audience needs through data will be more accurate, and then based on artificial intelligence and big data to effectively record readers' preferred style.

4.2   The Application of Artificial Intelligence in Writing in Book Publishing

In ancient times, people recorded written and visual content by handwriting, and books published close to modern times were only widely disseminated until the advent of printing, which gradually became popular. In September 2015, Tencent developed Dreamwriter, a manuscript robot that can generate manuscripts in a very short time, and Through more than two years of development, Dreamwriter has been able to expand from its initial focus on finance by automatically learning to generate templates for movies, cars, games and many other fields. In addition to this, writing robots that focus on event description and analysis of data will also be put into use on media. Poetry and novels that require more complex rhetoric and grammar can also be done by robots, such as the poetry-writing robot Xiaobing developed by the Microsoft (Asia) Internet Engineering Institute.

4.3   The Application of Artificial Intelligence in Editing in Book Publishing

The editing of information structures and the design of visual interfaces are among the core of book design. "The layout and content redesign for the reading terminal; according to the mainstream terminal and its own content style, constantly optimize the reading application; various content and layout issues in the reading application design, such as the trade-off of text, the ordering of images, the priority order of display and the overall style, etc., all need to have professional designers together to plan. "A clear editorial structure not only facilitates readers to find the target information, keyword search is enough to make a book stand out, and can help readers step by step progressively by towards quality reading.

5   Conclusion

Artificial intelligence technology has excellent advantages and meets the needs of the times, it can efficiently accomplish the set target tasks. Through the above analysis of the practical application of AI in design and publishing, we can find that: first, AI can assist human beings to complete some of the work set by the program at the present stage, but it cannot fully replace human creative thinking; second, AI can complete huge data processing and analysis in a very short period of time, but it cannot well combine humane analysis and incorporate thoughts and emotions; third, in the field of AI, it is not yet possible to complete the analysis of the data in a very short period of time. Third, in the field of artificial intelligence is still in its infancy, whether in the development of technology or in the update of software still need to invest a lot of development efforts. Nowadays, books are regarded as an integral product for research and development, and book designers should have an overall concept and active participation in the overall

physical space of books, intervene in the whole process of planning, design and publication, design and control the whole process, so that the content and form of books can be perfectly combined and complement each other.

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