

Research on the Application of Artificial Intelligence in Design Courses

-- Take the Scene Application of "Knowledge, Analysis and Example"

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Abstract. In today's increasingly integrated artificial intelligence technology and design field, especially in the education of design science, the introduction of AI technology is not only an innovation of technology application, but also a subversive reform of traditional education methods. In the exploration of the technology used for intelligent graphic processing and font design, font, as a special logical structure of graphic relations, has similar research methods. This study combined with the intelligent word map research discusses the application of AI in design, especially in the font design teaching scenario of three key application direction, namely "distinguish" (course foundation: font, character form, word structure recognition) "analysis" (font knowledge of font style migration form analysis) "research" (around font research, form the application scenarios, font to product method multidimensional design research path, and course evaluation system), this study of AI in the design teaching construction curriculum framework, innovative teaching methods, fusion teaching content, improve the teaching evaluation system to explore.

Keywords: Artificial Intelligence; Design Curriculum; Construction of Curriculum Framework; Innovative Teaching Methods; Integration of Teaching Content; Improvement of Teaching Evaluation System.

1. Introduction

In the 2024 China Two sessions, the emphasis on AI and education, and the "new quality productivity" issues promoted by General Secretary Xi, mainly focus on how to better use artificial intelligence technology to promote the modernization of education, improve the quality of education, and cultivate innovative talents to meet the needs of the future society. The meeting stressed the need to deepen the integration and innovation of artificial intelligence and education and teaching, explore new models of intelligent education, and promote the digital transformation of education. This includes using artificial intelligence technology to optimize the allocation of educational resources and improve the efficiency of education and teaching, using big data and cloud computing technologies to accurately analyze students' learning situation, realizing personalized education, strengthening the application of AI in education management and evaluation, and promoting the modernization of education governance system and governance capacity.

The three dimensions of this study, which have positive significance in constructing curriculum framework, innovating teaching methods, integrating teaching content, improving teaching evaluation system and strengthening practical teaching:

1.1 The Convolutional Neural Network, From the Word Figure Relationship of Intelligent Feature Recognition to the Font Form Characteristics of Intelligent Application, More Clear Learning Purpose, Stimulate Students Learning Initiative

convolutional neural network is based on the principle of perceptron development, the core of the convolution neural network structure is extracted through the convolution image features, and font design course, through the intelligent extraction of font, more efficient to let students understand the font main font features. When applied to image feature extraction, its basic structure includes feature extraction layer and mapping layer, the advantage is to directly input 3 d data form of image, reduce

the need of the original signal preprocessing, and through the weight sharing simplify the complexity of the recognition model: a, convenient students familiar with the model relationship, and the actual repetitive experiment use, second, help students quickly identify and analyze the style and form of large font design system, greatly improve the learning efficiency and understanding depth.

1.2 Based on Small Sample Font Style Migration Model MS-EMD and Stable Diffusion, the Integrated Application Scheme of Fast Font Style

in this study, the innovative small sample font style migration model based on MS-EMD and Stable diffusion. The model architecture includes several key components of style encoder, content encoder, mixer, decoder and discriminator. By designing themes for different font, teachers introduce the form style and content reference image, and with the interdependence of form style and content, they learn the characteristic representation through the form style and content style encoder. Let the students fully understand the process of style transfer, and skillfully judge the use method of the model. The mixer generated by this font adopts the bilinear model strategy to effectively combine the characteristic representation of style and content. The decoder then generates the final target image based on this combined representation. MS-EMD model is one of the introduction of multiple style encoder, to support the realization of more to more style migration task, this design not only promotes the deepening of the style characteristics of learning, students also through directly to different style font coding, significantly improve the speed and efficiency of font fusion, for students quickly grasp the course target knowledge, especially for course knowledge, experiment size large font design courses, has great help.

This course also absorbs the concept of integrated learning. In a specific style transfer task, students are allowed to calculate the average of the output of multiple different style encoders as the style representation input of the mixer, in order to understand the style application of multiple perspectives of the AI model. This method effectively enhances the generalization ability of the model to font generation, and shows the high efficiency and practicability under the condition of small sample learning. This small volume design guidance idea is more suitable for the application of phased design courses. Through the guidance of AI, students can find out and develop their own design style more quickly, and promote the development of personalized learning and creation.

1.3 By Identifying Data Images in Deep Convolution Network (CNN)

using the experience scale method, combining the artificial intelligence generated content (AIGC) technology and the specific application of MIDJourney and Stable diffusion, summarizes a set of research paths around the application scenarios, font and product methods; it can effectively improve professional application efficiency: AIGC technology, especially in the field of image and text generation, has demonstrated its potential in design creativity. Students can automatically generate font designs with a specific style through the AIGC based on a simple description. This technological advance brings endless possibilities for font design, enabling rapid iteration and experimentation to create original and attractive fonts. MIDJourney And other applications reflect how to integrate technology into the teaching and creative process. By providing an interactive platform, students and designers can explore the relationship between fonts and the visual art, further broadening their design thinking and approaches. Such tools not only enhance the learning experience, but also encourage innovative, interdisciplinary thinking. This study focuses on the integration of technology and art, allowing students to learn how to use AIGC and other technologies for creative design. Through hands-on projects, students can learn how to apply technology to font design and how to translate ideas into practical products. Meanwhile, this study emphasizes the combination of theoretical knowledge and practical skills. By studying the history, theory of fonts, and its role in different cultures and application scenarios, students can gain a deeper understanding of the importance of font design and apply this knowledge in practice. Finally, the curriculum should encourage students to attempt and iterate on an innovative design. The rapid prototyping capabilities provided by AIGC

technology can help students experiment with their own ideas, learn from failure, and constantly improve their design.

1.3.1 Comparison of Subject Scenarios

intervention of problems and solution strategies and teaching positioning and scientific research vocabulary; improve the correlation and systematization between compulsory courses and elective courses: In the process of integrating AI technology into font teaching, we may face a series of problems, such as technical threshold, cultivation of innovation ability, and the development of students' critical thinking. To solve these problems, educators need to design specific teaching strategies, such as providing technical training, stimulating students' innovative thinking, and cultivating students' critical thinking ability through case analysis. In terms of teaching orientation, the purpose of integrating AI technology into font design teaching is not only to improve technical skills, but more importantly, to promote the development of students' innovative thinking and problem-solving ability through the application of technology. This requires educators to integrate scientific research vocabulary and concepts in the curriculum design, such as "interdisciplinary research" and "innovative design methodology", so as to improve the scientific and systematic teaching.

2. Research Objectives:

2.1 Main Problems to be Solved:

2.1.1 Build the Theoretical Framework of Cutting-Edge Technology for Small Volume AI Teaching and Problem-Oriented Teaching Method ((Problem-Based Learning, PBL) in Terms of Course Design

design problem-centered projects or cases to encourage students to learn around practical problems. Through the support of AI technologies, such as intelligent recommendation systems, students are provided with resources and tools related to problems to help them conduct in-depth research and exploration of solutions. In terms of student participation: students are encouraged to take the initiative to learn, discuss problems through group cooperation, and use AI tools (such as data analysis and pattern recognition) to analyze problems and propose solutions. This approach not only promotes students' critical thinking and innovation abilities, but also enhances their collaboration and communication skills. In terms of the role of teachers: teachers, as guides and facilitators, use AI technology (such as learning analysis) to monitor students' learning progress and difficulties, provide personalized feedback and guidance, help students overcome learning barriers, and guide students to deeply explore the core of the problem.

2.1.2 Challenges and Strategies of the Integration of Technical Threshold and Teaching

Facing the difficulty of the integration of technical threshold and teaching, the key lies in how to effectively use artificial intelligence (AI) technology to optimize the allocation of educational resources, improve the accessibility of resources and the personalized adaptability of teaching content. The research suggests that the threshold for teachers and students to contact with high and new technology should be lowered through systematic technical training and practice projects. Specifically, machine learning algorithms and big data analysis technologies can be used to dynamically adjust teaching resources and content based on students' learning progress and preferences, so as to realize the optimal allocation of resources. In addition, the introduction of adaptive learning system to ensure that AI technology can be effectively integrated into the teaching process of font design, so as to promote the innovation of teaching methods and the improvement of educational quality.

2.1.3 Optimization Strategy for Learning Efficiency and Depth

Convolutional neural network (CNN) and small sample learning model are used to accelerate students' mastery and application of complex font design knowledge. This method aims to enhance the depth and breadth of learning. CNN's strong ability in the field of image recognition and processing can help students understand the visual elements of font design faster, while small sample learning technology improves the learning efficiency in the case of data shortage, which is crucial to improving the quality and efficiency of design teaching. Educators can stimulate students' innovative thinking by introducing how AI technology is applied in the design field (e. g., through algorithm-driven design cascade idea management, AI-assisted font creativity process). For example, show how AI creates novel design elements in font design, font application design, or how to use AI to improve user experience design.

2.1.4 Methods of Personalized Learning and Innovation Ability Cultivation

Discuss how to apply big data and cloud computing technology, and realize the personalized teaching path according to students' personal learning behaviors and results. The introduction of AI technology not only provides students with a customized learning path, but also creates a rich design and experimental environment, so as to cultivate students' personalized design style and innovative ability. Through the application of integrated learning and multi-style integration technology, innovative teaching content and methods are introduced to promote the development of students' innovative thinking and problem-solving ability. Guide students to critically evaluate the role of AI technology in the design process, including its strengths, limitations, and possible ethical issues. Through case studies and discussions, ask students to think about how to use AI technology responsibly, and how these technologies can influence future trends in design.

2.1.5 The Application of Interdisciplinary Research in Teaching

study how to AI technology and font design, image processing discipline knowledge depth fusion, the interdisciplinary technology application strategy, for example, the convolution neural network applied in image recognition, combining the design principle of the actual project operation research, to strengthen the combination of theory and practice, expand the students' discipline vision and innovative thinking. Students are encouraged to use scientific design methodology and combine AI technology for innovative design practice, so as to optimize teaching efficiency and deepen academic understanding.

2.1.6 Use AI for Intelligent Data Analysis and Educational Decision-making Optimization

Use AI technology to conduct intelligent data analysis, optimize the educational decision-making process, and realize the efficient management of educational resources and the scientific evaluation system. Provide practical applications through connections with corporate cooperation projects and social resources

3. Research Status and Trends at Home and Abroad

With the rapid development of artificial intelligence generated content (AIGC) technology, its application in the field of design education has attracted wide attention from both academia and industry. In 2022, AIGC technology is considered one of the top five technology influences in the world. As the educational practice of design discipline, it is experiencing unprecedented changes. During the national two sessions in 2024, the emphasis on AI and education issues made us full of expectations for the development of this field. From Design Science, UNESCO (UNESCO), Sustainability journals and EDUCAUSE Review, we can see that the teaching links of "knowledge (identification), analysis (analysis) and research (research)" in design education are gradually integrated into AI technology. The market application field of design discipline and the application prospect of AIGC technology in many fields are increasingly expanding. Generative AI (such as GPT

and other AI models) is making art creation more diverse, free, and efficient. AIGC technology can generate art works, design elements or creative ideas with cultural characteristics by analyzing and learning a large number of cultural heritage data ——, including images, text, audio and other ——, so as to provide innovative inspiration and rich creative resources for design education. Through the comprehensive use of these technologies, the teaching of design science can provide students with a richer and more interactive learning environment, but also poses a new challenge for educators: how to use AI technology to improve the quality and efficiency of education while maintaining the originality and artistry of design. This requires not only the educators to be skilled in the application of technology, but also requires their innovative thinking about the teaching content and methods. The intersection of art design and artificial intelligence also raises new problems in design teaching method and practice.

On the topic of AI-driven design and its span, Engawi, Gere and Richards explored the concept of AI-driven independent brand in AI Games and The Impact of AI on Graphic Design: Exploring the Challenges and Possibilities of AI-driven Independent Brands. Scholars have studied in-depth the future potential of combining graphic design and artificial intelligence, providing forward-looking insights into how designers need to adapt to the AI-driven environment and create responsive brand strategies. This is directly related to the benefits of AI in understanding brand dynamics and consumer interactions. As the boundaries between inside and outside the design field gradually blur, interdisciplinary education and scientific research cooperation are particularly important. Scholars such as Dr. Fan Ling and John Maida believe that design is not only a field of technology or art, but a comprehensive discipline that integrates humanities, society, culture and imagination. This way of thinking promotes the intersection of design and artificial intelligence, big data, software engineering and other fields, aiming to cultivate innovative talents who can meet the needs of the future society.

In artificial intelligence technology and design discipline thinking and outlook analysis of related literature: H unde and Woldeyohannes in the computer aided design (CAD) future outlook-from the perspective of artificial intelligence, extended reality and 3D printing review reviewed the potential application of artificial intelligence in CAD, which usually depends on CAD software type design and development of design education has implications. In the Exploration of the Application of AI Elements in Graphic Design, Li Siyang further emphasized the integration of AI elements in design, which can be regarded as a tool for students to identify and analyze design trends and the evolution of font design under technical response. Li Yi and Tang Yong discussed how AI can support the creation and manipulation of visual elements in The Intelligent Features Figure Design based on Convolution Operation and Liu Yaqing in The Design of Graphic Design Assistant System based on Artificial Intelligence. Such systems can assist in the analysis and development of fonts by suggesting design changes or by automating part of the creative process. Shi Xiaoyan, Zhou Zequan, Zhao Jian and their team provided insights on color in font design in De-Stijl: Promoting Graphic Design together with Interactive 2D Color Board Recommendation. Their research may influence the way font design is taught, emphasizing the role of AI in color selection and coordination, which is crucial in the application field of font design. Murray-Rust, Lupetti and colleagues provide designers with a practical way to understand and interact with AI. This is crucial for experiential learning in the font curriculum. Motivators and Barriers of Artificial Intelligent (AI) Based TeachingAhmed, S; Khalil, MI Din, FMB summarizes the factors associated with the emergence of AI greatly improving the efficiency of design, helping us to integrate a lot of design information. But how to make a certain design decision through the causal relationship and trend changes between these data and information? What kind of design can be called a good design? These are all questions worth our deep thinking, and the author gives relevant topics. Literature chronology of AI Technologies and Methods in the field of font design:

From the perspective of design decisions in the age of artificial intelligence and data, Navigating Design, Data, and Decision in an Age of Uncertainty points out that rationalism in the twentieth century regards design as a problem-solving activity with clear and fixed goals, and is more business-oriented material facts. However, as the world evolves, design focuses not only on shaping material

reality, but also on understanding and influencing human behaviors and experiences. While AI can attempt to make causal inferences through specific architectural and technical decisions, AI itself does not essentially distinguish between relevance and causality. While AI can discover patterns and associations in the data, human interpretation and judgment are crucial for establishing causal relationships. Traditionally, designers navigate the decision space through a mixture of intuition, experience, and expertise. The data era introduces a more nuanced approach. The data is converted from a decision resource to a complete contextual component of the design process, namely a collaborator. Students' psychology for teaching design with artificial intelligence approaches for enhancing teaching Wang, L Introduction AI has transformative potential in education to facilitate identification, analysis and research. AI can serve as a tool for educators to provide students with a comprehensive understanding of current design trends, consumer behavior, and automated systems. However, it also challenges educators to reess their curriculum to include AI literacy and address the application of such technologies to creative thinking.

Table 1. AI Literature chronology of techniques and methods in the field of font design

a particular year	Research contents	Method	Expected effect
2015	Create artistic images through the separation and combination of intelligent image content and style	VGG-network,CNN	Fts generate high-quality images, separate them and recombine them
2015	Transfer the font design style using a non-parallel corpus	Seq2Seq model	Learning from non-parallel data, the proposed design content is highly correlated to human judgment
2016	Text features represent and use these features to synthesize the images	Natural language representation and image synthesis	Generated a content image containing multiple objects, including several dimensional font features of the font design
2016	Find the representation of the font and image changes	Deep convolutional neural networks	Can produce new, percepmeaningful images
2016	Style migration in the NLG system	The RNN model with the LSTM encoder and decoder	In its system, the resulting results generated (soundness, coherence, effectiveness) remain to be determined
2017	In texts, structure preservation and semantic accuracy	Photo-realistic regularization and semantic segmentation	They prevent painting-like effects, and the images appear visually more satisfying
2017	Style interpretation	Zero-lens style interpretation	The BLEU score was 20.09% and the PINC score was 74.04%
2017	Apply the visual art style transfer methodology to the field of natural language	Text classification, Seq2Seq style migration	Through the combination of generation, the features of two images: one with lower level features (color and texture), and the other with capture content (advanced features) are combined again to produce new design content, and style migration.

In conclusion, in the integration and application of AI, the rapid development of technology, especially AI technology, is reshaping the teaching and practice of design disciplines. Artificial intelligence can not only help designers to be more efficient in the process of discovering, analyzing and solving problems, but also can intervene in the whole life cycle of font products, providing more personalized and accurate service experience. For example, the application of artificial intelligence technology can extract the intelligent features of the word and graph relationship through the

convolutional neural network, and realize the rapid style migration through the small sample learning model, so as to improve the learning efficiency and innovation ability. In terms of innovation and reform of design education, the integration of AI technology is not only a technical innovation, but also a subversive reform of traditional design education methods. This requires design educators to carry out in-depth exploration and reform in the aspects of constructing curriculum framework, innovating teaching methods and improving teaching evaluation system. At the same time, it is also necessary to strengthen the connection between design disciplines and other disciplines, and improve the system and integrity of education. In terms of digital transformation in design; with the development of artificial intelligence, big data and cloud computing technologies, digital transformation in design has become the general trend. This not only changes the way designers work, but also brings new teaching content and research direction to the design discipline. Design education needs to keep up with the pace of technological development and cultivate students' digital thinking and skills to meet the needs of the future society.

4. Study Content, Study Methods, and Progress Schedule

4.1 Study Contents:

The research hopes to start with two aspects of theoretical practice. Theoretical aspects: The first is to use the convolutional neural network, From the intelligent feature identification of word and graph relations to the intelligent application of font form features, More clear about the purpose of learning, Stimulate students' initiative in learning; The second is that; MS-EMD based on the small-sample font style migration model, The encoding of different styles of fonts to realize the fusion application scheme of fast font style; Strengthen the training of applied compound talents; The third is to identify the data images through the deep convolutional network (CNN), Using the experience scale pair approach, Combining artificial intelligence-generated content (AIGC) technology with specific applications such as MIDJourney, Summarize a set of research around fonts, Form the research path of multi-dimensional design ideas such as application scenarios, fonts and product methods; Can effectively improve the professional application efficiency; The fourth is the comparison of the subject scenes; Problems and their solving strategies and teaching orientation and the intervention of scientific research vocabulary; Improve the correlation degree and systematization between compulsory courses and elective courses of various majors; In the practical aspect, Focusing on the relationship between Chinese characters and Latin characters in cultural heritage protection, By sorting out the historical development relationship of Chinese characters, Put forward the prominent formal elements in the change of style migration, Form a new aesthetic value of the research, The Oriental font culture in the perspective of cultural heritage and digital communication to form students' homework structure.

In the development of the course, To explore the application of AI in design science by combining intelligent word mapping research, Especially in the three key application directions in the font design teaching scenarios, That is, "discrimination" (course basis: identification of font, font and word structure) "analysis" (analysis of font style migration and form sense of font knowledge points) "research" (around font research, To ming research path of multi-dimensional design ideas such as application scenarios, fonts to product methods, And the curriculum evaluation system), Three dimensions of this study; In exploring teaching reform in constructing curriculum framework, innovating teaching methods, integrating teaching content, improving teaching evaluation system and introducing social resources to strengthen practical teaching, details are as follows:

4.1.1 Framework Adjustment and Reform of the Curriculum Plan:

The current font design course in visual communication design is conducted among lower grade students, Font design course After the general course education, The two professional courses of the subject (visual design, multimedia) have formed two completely different business directions with the media as the main form, And the professional content of font design occupies an important

position in the whole visual transmission system, Emted in the exploration of other curriculum systems of vision, Font design also takes the primary communication mode and a certain cultural communication attributes, Therefore, appropriate AIGC and style migration content import are required in the setting of the relationship before and after the course, It is feasible to form the role of $1 + 1 + 1 > 3$ (including professional basic courses, professional compulsory courses and elective courses) to appropriately expand the subject knowledge of AIGC, CNN and style transfer platform. In addition, on the premise of not changing the total number of class hours of the professional training program, the number of weekly class hours should be appropriately controlled to extend the total class period. The professional courses revolve around the backbone of AIGN experiment. The course selection of the same semester emphasizes the teaching relevance and systematization among different courses.

In terms of teaching application scenarios, when deeply understanding the principle of painting technology, we have noticed that it has similarities to the design method mentioned in the Font Design. This method divides the design process into two stages: "assumption" and "plan". First, it focuses on the collection and classification of perceptual materials, and first focuses on the summary and refinement of rational materials. This approach not only helps designers to transform their creative work, but also inspires more creative possibilities. Drawing technology, relying on data processing and algorithm, through the image style transformation and text-driven pre-training, enrich the inspiration source of designers, and improve their design efficiency and quality of works. Further, when this concept is examined at design education and research, modeling neural network (CNN) and small sample style migration technologies, such as MS-EMD and stable diffusion, as well as content generation technologies show their value in the practice of font design. These methods not only deepen the students' understanding of the theory and practice of font design, but also significantly improve their learning efficiency and innovation ability through the practice and project homework. In addition, the methods adopted can enhance students' awareness of digital fruit protection, and enhance their innovative thinking and critical analysis skills in the field of design. To sum up, the application of artificial intelligence technology in design teaching not only improves students' technical operation ability, but more importantly, improves students' innovative thinking and problem solving ability. This interdisciplinary integration introduces innovative teaching strategies and research paths for design education, proving the efficiency and practicality in the face of small sample learning conditions.

4.1.2 Teaching Settings and Content Arrangement:

This course discusses the application of AI in design science, Especially in the three key application directions in the font design teaching scenarios, That is, "discrimination" (course basis: identification of font, font and word structure) "analysis" (analysis of font style migration and form sense of font knowledge points) "research" (research on font, To ming research path of multi-dimensional design ideas such as application scenarios, fonts to product methods, And the curriculum evaluation system), Three dimensions of this study; In exploring teaching reform in constructing curriculum framework, innovating teaching methods, integrating teaching content, improving teaching evaluation system and introducing social resources to strengthen practical teaching, Has positive implications in many aspects:

First, "discrimination" (identification): the course objective: to enable students to identify different fonts, shapes and characters, and to understand their historical background and application scenarios. Course content: Combining AIGC image processing technology, such as the algorithm of separating content and style, this course will let students master how to distinguish and classify different font styles through detailed case analysis and practical exercises. In addition, by introducing sequence-to-sequence (Seq2Seq) style transfer technology, students will learn to understand the variable factors in font design, including dynamic changes in glyphs and innovative methods to construction. And optimize the teaching method: using example-driven learning and interactive teaching, combined with online tools and software for practical training of font recognition. Organize design workshops

and on-site teaching activities, such as visiting design studios, to enhance students' understanding of font design practices.

The second is "analysis" (analysis) in the course objectives: to cultivate students' critical thinking and innovation ability in the field of font design, especially in the sensitivity and application ability of style transfer and formal analysis. The principle and practice of —— image style transfer and graphic pre-training technology in the course content. Through the comparative learning of "mat" map "and" feeding " technology, how AI helps designers to transform creative ideas into specific images, and points out the advantages and limitations of these technologies in the actual design process. Through specific experimental cases, such as using MIDJOURNEY, Stable diffusion and other AI painting software for design practice, students will explore how to effectively use these technologies to expand the design thinking and material library. Through practical workshops, design challenges, and project-oriented assignments, students are encouraged to deeply participate in the whole process of font design. Students are encouraged to explore the migration path from one font style to another through the combination of manual drawing and digital tools, and at the same time, to promote students' teamwork and communication to promote the collision and development of innovative thinking.

Table 2. Table of Integration and Innovation of Museum Service Systems

Layer	Service Environment	Service Function	Service Content	Service Goal (Core)
Future (Long-term)	Strategic Coordination	In-depth Research and Exploration	Feedback Mechanisms Optimization	Multidimensional educational objectives, Cross-platform content integration, Interactive educational methods, Diverse learning experiences, Customized learning support, Educational resource dynamics
Now (Short-term)	Service Innovation	Personalized Educational Pathways	Dynamic Content Adjustment	AI content customization, Learning path personalization, Adaptive learning algorithms, Real-time content update, Personalized learning interfaces
Core	Technological Integration	Diversified Learning Platforms	AI-based Adaptive Learning	Real-time data-driven management
External	Practical Application	Intelligent Interactive Experiences	Real-time Behavioral Analysis	N/A

4.1.3 Research (Font Design Application Research Route)

Guide students to explore the transformation of font design in different application scenarios, from font to product design methods, and the formation of multi-dimensional design ideas. Course content: Explore the intersection of font design and brand recognition, interface design, user experience and other fields. And font design and design software and the supply and demand, in digital font market, for example, due to the complexity of professional font production and high authorization fees, professional font design is relatively conservative and limited, both to meet the psychological demand of text aesthetic feeling, and to meet the needs of people in the aspect of visual communication. But the rise of open source font project reduces the font threshold, when the main font resources become more popular, consumers for the design of these font inclusive will increase, for the design of open source font will appear new direction, in the new design of the new track, AI design technology can give full play to the advantages, provide more creative, power open source font design practice development. In teaching, the teaching of font design can be closely combined with these technology and market trends, guiding students to understand the business and technical orientation of font design

through practical case teaching. Tutorials can include basic theories of font design, the use of font-making software, and how to leverage open-source resources and AI technology to create personalized fonts. In addition, the course of font design should also emphasize the cultivation of innovative thinking, and encourage students to explore and experiment with different shapes and layouts, so as to not only learn technical operation, but also learn how to translate ideas into practical applications.

The change of production technology and font design industry in font design can play a role in promoting each other. It is the purpose of the innovation of font design in the font. The innovation of the new generation of font editing software also promotes the exploration process of character form in font design. In teaching, introducing these advanced tools and methods can enable students to learn how to respond to and make use of technological advances in the industry. AI design technology focuses on the output of human creativity, and its application in education can catalyze and transform creativity into productivity. The author believes that this is also the original intention and goal of integrating AI design technology into the teaching of font design. Finally, we discuss how font design affects product perception and users' emotional response. Study the design evaluation system deeply to measure the effectiveness of the font design.



Figure 1. From designing a font to the rendering proc

4.2 Study Method:

4.2.1 The Quantitative Study of Randomized Controlled Trial (RCT) Data is Used to Test The Effect of AI Technology Application Through Experimental Design, and Compare The Differences between Teaching Using AI Font Design and Traditional Teaching Methods

Using a randomized controlled trial (RCT), students were randomly assigned to the experimental group using AI technology and the control group without AI. Changes in learning outcomes were assessed by pre-post testing (pre-test and post-test). Students were evaluated before and after the beginning of the experiment, and behavioral data were collected during the learning process, such as learning time and homework completion, etc. In the experimental class, a control group of two parallel classes can also be formed. Methods: compare test scores using t-test or analysis of variance (ANOVA). Secondary analysis: To explore the relationship between the learning time, participation and learning results of font design.

The specific content of the font experiment in the experimental group is as follows: In the course, after the font design of specific styles and contents combines the reference image, the style encoder and the content encoder respectively process the font design, and use the conditional dependence between them to learn the respective feature representation. This step ensures that font design style features and content features can be accurately captured and distinguished. Stage 2: The bilinear model as a mixer is used to integrate the characteristic representation of style and content, so as to produce an intermediate representation that integrates the specified style and content characteristics.

Eventually, the decoder receives the fused representation and generates the final target image, fully displaying the expected style migration effect. In the process, Stable diffusion, MS-EMD and other models are used for multiple style encoders. This design supports many-to-many style transfer tasks, which greatly enhances the flexibility and efficiency of the model in learning and applying different style features. By using multiple style encoders in parallel, the model can directly learn and encode a variety of different styles, which facilitates rapid and efficient font style fusion. Moreover, based on the concept of integrated learning, the present model adopts an innovative approach in the specific style transfer task, namely, combining the output of multiple style encoders and calculating their average value to form the input of the mixer. This method not only improves the generalization ability of font generation, but also ensures the visual coherence and aesthetics of the final output, making the generated font more attractive and practical. Through this detailed and systematic description, we can clearly understand how the font style migration model can achieve the complex and diverse style migration tasks by integrating multiple style encoders as well as utilizing the bilinear hybrid model. This not only improves the innovation of design, but also expands the possibility of font design in practical application.

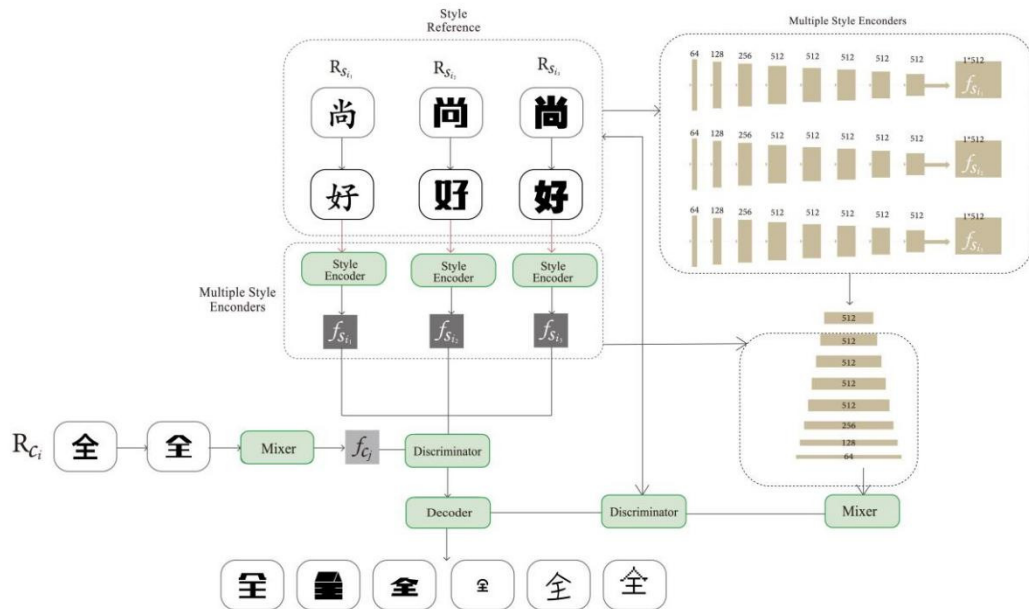


Figure 2. A Design System for Generating Compact Text

4.2.2 In This Study, By Integrating Deep Learning Techniques and Statistical Analysis Methods, We Aimed to Explore the Influence of AI-Assisted Teaching on the Learning Effect of Font Design

The first step of the study is to select and preprocess the font images with clear style characteristics as the training data, including the standardized image size and adjusting the color depth to ensure the consistency of the data. Then, deep learning models such as convolutional neural networks (CNN) are used to extract the style features of these fonts, such as stroke thickness, inclination, and decorative elements. At the same time, another model is responsible for extracting the structural features of fonts, such as character shape and arrangement, to ensure the identifiability of characters when the font style changes. The feature fusion stage uses the bilinear model as a "mixer", which integrates the feature representation of style and content to produce a new feature set, which contains not only the style information but also the content information. Furthermore, by adjusting the weights of the style and content encoders, we are able to customize the style tendencies and content fidelity of fonts to achieve highly customized design output. In the font generation stage, the decoder accepts the fused feature representation and constructs the font image using the generative adversarial network (GAN) or other generative model. To ensure the visual consistency and aesthetics of the

generated fonts, the decoder design needs to be optimized. Training multiple style encoders simultaneously and combining their output through integrated learning methods not only enhances the diversity and innovation of font generation, but also improves the practicality and attractiveness of the design. The final output evaluation and optimization phase, using objective evaluation metrics such as clarity and style consistency scores, as well as subjective aesthetic evaluation by design experts, to evaluate the generated font quality. Based on the collected feedback, the model was then iteratively optimized, including optimizing the network architecture and adjusting the training algorithm parameters to improve the model performance and output quality. Through this comprehensive research method, students in the experimental group can make highly innovative and personalized font design with the help of AI, and reveal the potential of AI technology in improving learning efficiency and creative expression. This not only demonstrates the application prospect of AI in art and design education, but also provides an empirical basis for further research and development of educational technologies in the future.

5. Summary

In the growing field of artificial intelligence (AI) and design, especially in design education, the integration of AI technology is not only a technological innovation, but also a subversive reform of traditional education methods. This study explores the application of AI in font design courses through three key teaching scenarios, namely "identification", "analysis" and "research".

Identification (identification): This basic link focuses on the identification of fonts, glyph and structure. Through intelligent feature extraction by convolutional neural network (CNN), students can efficiently identify and understand the main features of various fonts. This method not only improves the pertinacity of learning, but also stimulates students' enthusiasm for learning.

Analysis (analysis): At this stage, students analyze and experiment on the font style and its conversion in different media. The small sample font style migration models such as MS-EMD and Stable Diffusion were adopted to quickly realize the fusion application of different font styles. This process helps students develop critical thinking and innovation, and enhance their understanding and mastery of complex design systems.

Research (research): The study explores the multidimensional design path from font design to product development. Combining technologies such as MIDJourney and Stable Diffusion, students can generate a creative and aesthetic font design. This approach enables students to have a deeper understanding of how to apply theoretical knowledge to practical scenarios and promote the combination of theory and practice.

Conclusion: The integration of AI technology into font design education significantly improves the learning experience, and provides innovative tools and methods for font recognition, analysis and research. This study contributes to the construction of an integrated educational framework combining technological innovation and humanistic care, aiming to develop students able to meet the challenges of the future design industry.

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