ISSN: 2093-5374 / E-ISSN: 2093-5382

Artificial Intelligence, Virtual Computer Systems, and Interactive Systems: a Holistic Approach to Enhancing Creative Talent in Art Design

Dr. Liyang Zhu[1], and Zhengfa Sheng[2*]

[1]School of Handicraft Arts, Hunan Arts and Crafts Vocational College, Yiyang, China.
https://orcid.org/0009-0003-6549-3619

[2*]Professor, Education Science Research Institute of Hunan Provincial Department of Education, Changsha, China. hnld2008@163.com, https://orcid.org/0009-0000-2929-7731

Received: June 20, 2024; Revised: August 05, 2024; Accepted: September 02, 2024; Published: September 30, 2024

Abstract

With the rapid development and wide application of artificial intelligence, virtual computer systems and interactive systems, they play an important role in improving innovative talents in art and design. The purpose of this paper is to explore the overall approach of using these technologies to improve innovation in the field of art and design as well as to cultivate innovative talents. Firstly, we introduce the current development of artificial intelligence in art and design. Secondly, we explore the application of AI, virtual computer systems and interactive systems in art and design innovation. Artificial intelligence technology can help designers discover new inspirations and ideas by analysing a large number of artworks and design cases; virtual computer systems can provide designers with a virtual creative environment so that they can experiment and create in an infinite space; interactive systems can provide learners with a personalised learning experience, and, through intelligent educational platforms and interactive tools, help them develop their creative thinking and problem-solving skills. By making full use of these technologies, we can cultivate more creative and innovative art and design talents, and promote the sustainable development of the art and design field.

Keywords: Artificial Intelligence, Virtual Computer System, Interactive System, Artistic Design Innovation Ability.

1 Introduction

Under the impact of the epidemic, the world's economic system has been affected, and if China wants to rise up and develop in the post-epidemic era, it needs to continuously strengthen its innovation in order to catch up. By cultivating innovative talents, the comprehensive development strength of the country will be enhanced, and effective competitiveness will be maintained in the world competition. In the reform of China's talent education model, it is pointed out that, as an important part of the talent structure, higher vocational needs to actively carry out the innovation of education model combining schools and enterprises (Castañer & Campos, 2002). To this end, the Chinese government needs to

Journal of Wireless Mobile Networks, Ubiquitous Computing, and Dependable Applications (JoWUA), volume: 15, number: 3 (September), pp. 395-411. DOI: *10.58346/JOWUA.2024.I3.026*

*Corresponding author: Professor, Education Science Research Institute of Hunan Provincial Department of Education, Changsha, China.

develop a scientific and efficient cooperation model, so that enterprises and schools can organically combine to improve the level of innovation (Galenson, 2006).

However, China's training reform coverage continuously emphasizes the innovation of the inteArt and design innovative talents are a special and relatively scarce class of talents (Montanari et al., 2016). The definition of innovative talents is extremely diverse. Innovative talent refers to the talent with innovative ability, able to find a way to crack the problem and achieve innovative results (Murck & Fong, 1991). In the actual teaching of art and design, teachers often focus on the actual operation of the link, focus on the short-term immediate visual effect and professional effectiveness, eager to cross into its specific professional category, while ignoring the importance of professional theoretical knowledge, and even mistakenly believe that the theoretical knowledge is a paper, can not lead the professional practice, even if the theoretical courses are offered, but also just a form of, did not cause teachers and students to pay attention to the importance of (Joy, 2005). However, design art is a comprehensive knowledge system, in which each professional system is built on the basis of theoretical knowledge, theoretical knowledge reflects the development of a discipline's law, history and current situation and the future direction of development. Without the guidance of theoretical knowledge of design, students often fall into metaphysical blind operation, the lack of the most basic theoretical knowledge, their design works will lack of depth, and after graduation can not self-improvement (Sandberg, 2019). At present, some colleges and universities lack excellent teachers in both professional design and teaching practice, especially some schools that follow the trend and set up new art and design majors, there is no corresponding professional teachers, but also eager to enrollment, most of the teachers are graduates of the school to stay in the school to teach, or even the introduction of purely painting teachers (Carayannis & Campbell, 2015), from the painting profession to engage in the teaching of art and design, using purely artistic educational methods to guide the teaching of art and design; some schools in order to increase their popularity (Novak-Leonard et al., 2022). In order to increase their popularity, some schools hire well-known painters in the painting industry to lead or titled to set up the design profession, the quality of their teaching can be imagined. There are also schools with irrational professional teacher echelons, inadequate talent reserves, youthfulness, low education, and no subject leaders (Merolla, 2020). These practicing teachers, even without pre-service training, do not know pedagogy, psychology, can not be skilled in the use of modern educational technology, hastily on the battlefield, negligence of continuous learning and research on the profession, the knowledge system is obsolete, teaching mode is single, in this way, training out of the students' professional quality is not high, and the discipline is lax. This contrasts sharply with the social demand for high-quality design professionals, which is an urgent problem for the current art and design education teacher team in China (Win, 2014). Some colleges and universities due to blind expansion, hardware facilities can not be improved in the short term, poor school conditions, teaching space, teaching facilities, lack of books and materials, there is no internship base, there is no laboratory corresponding to the design profession (Wang & Tien, 2023). Students do not have a base for practical operation, and there is no co-operation with off-campus enterprises to establish a mode of schooling, teachers can not guide students to use the design in practice, and can only be satisfied with the students' creative training on paper. However, art and design should be combined with production, design education can not be disconnected from practical operation, practice is the bridge between theoretical thinking and practical application. Students do not have the opportunity for practical training and operation, lack of hands-on ability and professional innovation, narrow knowledge, can not stand alone, lack of communication and innovation (Li, 2021). There are many other problems such as conservative concepts of talent training, the system and purpose of education is not clear enough, and the construction of disciplines is not standardised, which are fully exposed through a batch of graduates flowing into the society (Cai, 2016). Some design graduates generally low

professional quality, lack of comprehensive design innovation ability, lack of practical experience, no sense of social responsibility, unable to meet the social demand for high-level design talent (Zheng, 2013).

In order to explore the overall method of improving creative talents in art and design, this paper combines artificial intelligence, virtual computer systems, and interactive systems, and proposes creative methods with the help of machine learning and deep learning algorithms and a new method of art evaluation with the help of virtual computer systems and interactive systems, with a view to providing reference for art teaching.

2 Literature Review

Research on the Development Status of Artificial Intelligence

Since the reform and opening up, China's artificial intelligence research has been attached to importance by many researchers. From the perspective of research and development of employment intelligence, its development time is relatively short compared with foreign countries, only a short time of 40 years, in this 40 years, from the first establishment of artificial intelligence discipline in 1981 to the development of artificial intelligence discipline in the direction of systematization and theorization, until March 2018. China's artificial intelligence technology and application fields are developing slowly. Figure 1 shows a timeline of AI development in China.

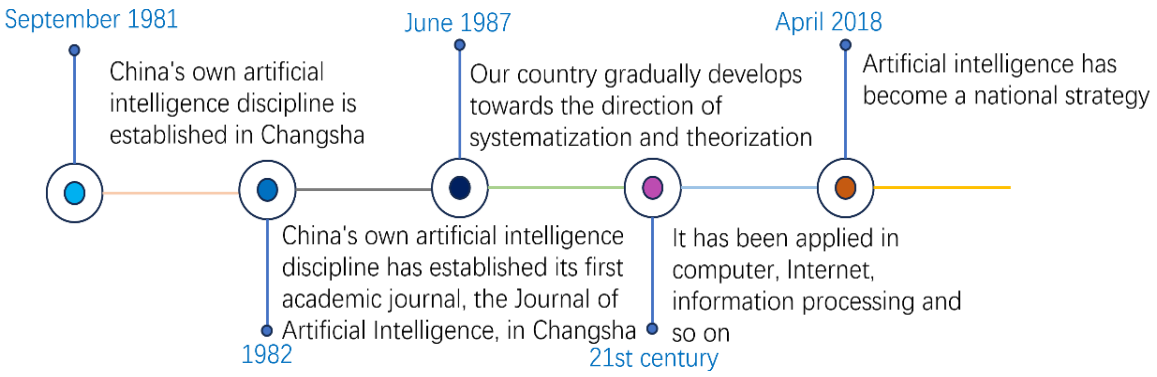

Figure 1: Timeline of AI Development in China

At this stage, China should make efforts to move towards the research and application of weak artificial intelligence technology, and he divided artificial intelligence into three basic directions from the perspective of application value. The use of AI in society will not always maintain the development of viable AI, and AI will be in a weak position, and proposed that the era of "weak AI+" is bound to come (Deng, 2019).

The improvement process of Chinese synthetic brain technology will go through a very tortuous road, but through efforts and struggles, it will surely really find a synthetic genius technology model that meets China's practicality. He paved the way for the development of China's synthetic brain from two aspects: firstly, he summarised the achievements of China's artificial geniuses and gave clear feedback on the cutting-edge development route of synthetic intelligence; secondly, he pointed out the problems in the development of China's synthetic talents and put forward a series of decision-making suggestions. This profoundly affects the future development and softwareisation of the artificial brain.

Artificial intelligence, as the forerunner of machine thinking, and its application will collide with human thinking, and the emotional nature of human thinking will merge with the rational nature of machine thinking to make up for the shortcomings of both. With the increase in the amount of data and application areas, machines will be more inclined to the human thinking of a thousand people. Due to the large number of applications of artificial intelligence, human society will get faster development and eventually achieve a win-win situation (Li et al., 2023).

In China, where mobile Internet is prevalent, with the increase in the amount of raw data and the accumulation of basic AI theory research, the application fields of AI technology will gradually enter the public's view, such as major health, popular education, intelligent manufacturing, etc., and many new fields and new interdisciplinary disciplines will be found in the process of research and practice (Lv et al., 2019).

According to the latest research report of the Chinese Academy of Engineering, AI technology will maximise the efficiency of robot applications, the most notable manifestation of which is that robots will obtain higher quality and efficiency than humans when doing repetitive work (Pan, 2023).

The application of artificial intelligence technology relies on the in-depth research of fake intelligence science, and the continuous transformation toward marketization and humanization. The demand of the market puts forward higher requirements for artificial intelligence technology; on the contrary, artificial intelligence technology provides strong data support for the market demand. The application performance is mainly reflected in the following aspects: First, with the accumulation of market data, the development of the Internet, cloud computing, and big data has promoted the development of artificial intelligence "knowledge base" and the victory of "man-machine battle of Go" is the product of the accumulation and progress of big data; The second is the fusion of data types, such as the combination of image recognition and speech recognition in natural language processing. After the patients with amblyopia are equipped with special equipment, the information processing of image recognition can be converted into auditory signals and finally achieve the "visible state." The third aspect is the combination of artificial intelligence and virtual reality augmented reality to maximize the output of intelligence.

Artificial Intelligence Research in the Field of Education

In an era of rapid development and iteration of Artificial Intelligence, the education sector is bearing the brunt of the impact. Around the world, human destiny is undergoing a new round of social change. Similarly, the widespread application of artificial intelligence in the field of education will drive the transformation of the traditional education industry, break the balance of education, achieve fairness and justice in educational resources, and promote the transformation of educational thinking from test-based education to personalised teaching. The model of "artificial intelligence + education" will eventually achieve universal and customised development. The traditional education industry is currently in a slow upswing, and the deep combination of artificial intelligence and the education industry (Hu et al., 2024), as shown in Table 1 for the development process of artificial intelligence in the field of education, which can be seen, with the development of artificial intelligence, the education side is also actively combining the new intelligent teaching equipment, which can promote the breakthrough of the existing barriers to the development of the process of combining to give full play to the advantages of artificial intelligence and create an intelligent teaching environment. Table 2 shows the main results of the deep integration of artificial intelligence and the education industry.

Table 1: The Deep Integration of Artificial Intelligence and the Education Industry

Time	Application Research
1970s	-Start exploring the use of Computer Assisted Instruction (CAI)
	-Started researching computerized adaptive testing (CAT) systems
1980s	-The emergence of computer-based teaching software and multimedia textbooks
	-Start researching intelligent teaching systems
1990s	-Introducing virtual reality technology for education
	-Start researching personalized teaching systems and learning analytics
In the early 2000s	-The emergence of online education platforms and open online courses (MOOCs)
	-Started researching personalized learning recommendation systems based on data mining and machine learning
Mid 2010s	-Artificial intelligence has begun to be widely applied in the field of education
	-Start researching the application of natural language processing and speech recognition in education
In the late 2010s	-Introducing intelligent tutoring systems and virtual teaching assistants
	-Started researching the application of emotional computing and emotional intelligence in education
Next	-Continue to research and apply new methods and applications of artificial intelligence technology in the field of education
	-Explore more teaching models and educational innovation methods that combine artificial intelligence

The basic concepts and guidelines for AI-enabled education were first summarised in Inside Artificial Intelligence in Education, which argued that efficient and innovative educational processes need to be empowered by AI technology (Yan et al., 2017). The method first allows the machine to learn the changes generated in the human learning process, then guides educational research and instructional design after completion, and finally creates conditions for scientific learning style research.

Table 2: AI and the Education Industry Combine Significant Achievements Achievement

Field	Application Achievements
Intelligent assisted teaching	-Ability to provide personalized teaching based on real-time feedback from students
	-Provide adaptive learning content that can be adjusted according to the different levels of students
Natural language processing	-Intelligent speech recognition and translation, helping students improve their listening and speaking abilities
	-Text analysis and abstract generation, automatic grading of essays and papers
Intelligent Q&A	-Provide students with timely and accurate answers through a semantic understanding of massive data
	-Provide intelligent Q&A services to solve students' problems during the learning process
Intelligent essay assistance	-Automatically assess students' writing level and grammar errors
	-Provide writing advice and guidance to help students improve their writing skills
Virtual experiments and simulations	-Provide a virtual experimental environment for students to conduct experimental operations and observations
	-Simulate various practical scenarios to enhance students' practical abilities
Analysis of student learning behavior	-Analyze students' learning behavior and performance to help teachers understand their learning situation
	-Provide personalized educational suggestions based on analysis results to promote the improvement of student learning outcomes

Research on Artificial Intelligence in the Field of College Art Education

As shown in Table 3, the development timeline of artificial intelligence art in China, the domestic professional papers on the field of artificial intelligence art are rich in data and fruitful in results. Table 4 shows the significant achievements in the field of AI art in China. At present, the related research of artificial intelligence art as a fashionable and trendy topic attracts people's attention, especially the content of artistic creation of thousands of artificial intelligence has triggered a heated discussion from

all walks of life, so many scholars are also "swarm" and express their views and opinions. One of the very important discussion points. It is the artistic problem of artificial intelligence creation, that is, whether artificial intelligence can create real works of art; many scholars have made negative answers based on the discussion of art ontology, the presence of the artist's "body", soul, and human nature in traditional art theories.

Table 3: Timeline of the Development of the Field of Artificial Intelligence Art in China

Time	Research Findings
In the early 2000s	-Research on the application of computer graphics and pattern recognition technologies in artistic creation has begun to emerge
	-Attempting to apply virtual reality technology to the field of art education
In the early 2010s	-Research on Machine Learning for Style and Trend Analysis of Artistic Works
	-Starting to use data visualization technology to assist art education
Mid 2010s	-Further development of facial expression analysis research, beginning to be applied to artistic performance and stage expression
	-Art education resource platforms are gradually emerging, providing more art learning resources and communication platforms
In the late 2010s	-Image and video processing technology has been widely applied, providing more visual effects and post-production tools
	-Virtual reality technology is accelerating its development in the field of art education, providing richer ways of creation and experience
Next	-Continue to research and apply new methods and applications of artificial intelligence technology in the field of art education
	-Further, develop intelligent creative assistance tools and teaching resource platforms
	-Explore more creative and innovative ways to combine artificial intelligence

Table 4: Major Achievements in the Field of Artificial Intelligence Art in China

Field	Research Findings
Artistic creation assistance	-Provide artistic style simulation and generation to help students develop creative skills
	-Using machine learning algorithms to analyze art styles and trends
Data visualization	-Using machine learning and data analysis techniques to transform complex data into visual charts
	-Provide interactive data visualization tools to help students better understand data and trends
Virtual reality technology	-Creating Art Experience and Exhibition Space Using Virtual Reality Technology
	-Provide a virtual art appreciation and creation platform
Image and video processing	-Image recognition and analysis, automatic analysis and annotation of artworks and image materials
	-Video editing and post-production, providing professional-level visual effects processing and editing tools
Facial expression analysis	-Analyze facial expressions and emotions to help students improve their skills in performance and expression
	-Provide real-time facial expression feedback to help students improve their acting and performance abilities
Art education resource platform	-Provide an online art education resource library, including artwork displays, tutorials, and instructional materials
	-Building communities and communication platforms to promote cooperation and communication between art educators and students

Artificial intelligence lacks creativity in art and design; human creativity and imagination are unique categories of human thinking. AI can be used in repetitive work, but AI cannot replace artistic creation (Zhai, 2023).

The biggest difference between the current AI technology and people is that people can perceive cognition, express emotions, and experience thinking, while AI lacks these abilities. The creation of art design incorporates the emotional output and expression of the creator at the time, whereas the so-called

AI art creation process is a form of expression without empathy; finally the author states that AI art design and creation activities in the true sense of the word are still a beautiful dream (Wang, 2019).

Although many scholars have not reached a consensus on the concept of "intelligent art design for employment", they have produced "the negative school of artificial intelligence applied art" and "the positive school of artificial intelligence applied art". Despite the controversy, scholars of the opposing theory do not completely deny the value and influence created by applying employment intelligence in art design.

Artificial intelligence, as an inevitable result of the evolution of human intelligence and the development of science and technology, will bring new developments to art and design. He believes that the development of science and technology will inevitably lead to the birth of new artistic themes, and perhaps by then man and machine will realise a true "human-machine fusion" (Pang & Xue, 2018).

3 A Holistic Approach to Improving Creative Talent in Art Design

Artificial Intelligence and Artistic Inspiration Generation

Art is viewed to be the area that can't be changed by way of synthetic Genius at present due to the fact humans nevertheless trust that the burst of inventive proposal is the result of people's questioning activities, which is the crystallization of repeated deliberation and non-stop summary, and computer systems do now not have the capability to assume subjectively. As a ways as artwork sketch itself is concerned, artwork is the summary reflection of human thinking undertaking and experience. Design, on the other hand, is a purposeful act of creation. From a subjective factor of view, it is real that machines can't actively think; however, via "experience," precis can additionally produce creative suggestions and creativity (Gašević et al., 2023). The distinction between ordinary diagram strategies and synthetic talent sketch is proven in Figure 2.

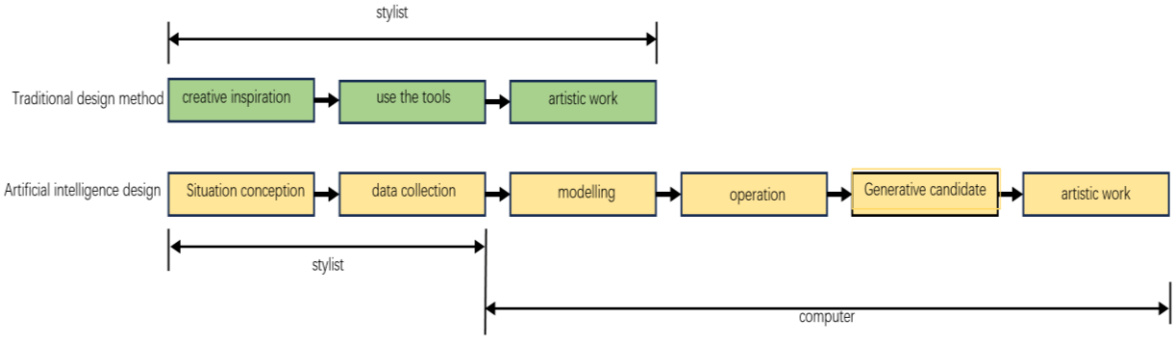

Figure 2: The Difference Between Traditional Design Method and Artificial Intelligence Design in Division of Labor

Artistic advent has usually been the most straightforward structure of human religious activities. The means of artwork is to join human thoughts with each other. Creative works commonly carry to humans a type of aesthetic feeling that can be understood but can't be expressed, and such idea and innovation are mirrored in the shape of algorithms and fashions in synthetic intelligence. Artificial brain is ordinarily expressed in two types in the technology of artwork works: one is through the participation of artists, the usage of the randomness of laptop algorithms, and interacting with people, to mutually whole the advent of artwork works; The different does now not require the direct participation of the artist so that the computing device learns the traits of the artist's works and makes use of the algorithm

to generate artwork works in line with the artist's style, which is theoretically a manner of copying and regeneration, instead than entire creation (Durana et al., 2022). The former is a mixture of clothier and computing device inspiration, while the latter is the "pseudo-artistic inspiration" generated through the desktop throughout the studying process. The use of AI in artwork is no surprise. The French artwork business enterprise Obvious's use of generative adversarial networks to create a work known as "Portrait of Edmond de Bellamy" (Figure 3), which was offered for $432,500, demonstrates the success of AI in the area of artwork and design. However, though this era's approach can reproduce the artwork of the artist's style, due to the dilemma of getting to know data, the content material is noticeably constant and similar, and the innovation is no longer enough, so it can solely acquire superficial creative innovation (Carter, 2022). Instead of deciding on a single photo to replicate a single style, AhmedElgammal's Creative-versus community feeds greater than 80,000 images, representing the requirements of Western artwork over the previous 5 centuries, and lets the machines generate their work, mastering the titles used using artists and artwork historians in the past. You can title your work (Zauskova et al., 2022).

Figure 3: “Portrait of Edmond de Belamy”

CAN proposes a psychological theory: most artists will abandon familiar forms, themes and styles in order to capture people's interest. However, too much innovation can turn audiences off. Therefore, the process of generating works can learn from the artist's style on the one hand, but on the other hand, it will not be too similar, and if the similarity is too high, it will be adjusted autonomously. The works generated in this way (Figure 4) have their own "artistic proposition" but will not turn people off, and according to statistics, 75% of the people think that their works are done by real artists.

Figure 4: Works Generated by CAN

Therefore, this paper proposes a specific method for generating artistic inspiration using artificial digital design. Digitalisation is the foundation and core content of today's innovative design, and is the key to the success or failure of innovative design. Digital technology is the basis of networked technology, parallel technology, virtual technology and other advanced technical means. Digital modelling is the key to digitalization, which has gradually developed from the idea of geometric modelling (wireframe modelling, surface modelling, solid modelling) to the present idea of feature modelling (styling). Feature modelling can not only provide complete product geometry data, but also provide digital information that reflects the process and performance requirements of the product design intent.

Virtualised design. Virtualisation, virtual design, virtual product development and virtual reality technology is based on computer simulation and product life cycle modelling, computer graphics, artificial intelligence, network technology, database technology, parallel technology, multimedia technology and visualisation technology as one of the integrated systems integration technology. Using such a design tool designers can naturally interact with the multi-dimensional information environment through a variety of sensors, and get perceptual and rational understanding from the qualitative and quantitative integrated integrated environment, thus helping to deepen the concept and develop new ideas. It is also possible to represent arbitrary 3D products and the 3D environments in which they are embedded, reconfiguring the interface between people and information technology, whether it is realistic or abstract. The visualisation provided by virtual technology is not only the spatial display of general geometries, but also the visualisation of noise, temperature, force, wear and vibration, etc., and the expression of creative thinking as a visual virtual entity, which promotes the further sublimation of creative inspiration.

Artificial Intelligence and Design Data Integration

At present, the autonomy of the synthetic brain in inventive suggestion is no longer strong, and in most instances, it is used to furnish references for designers. The contemporary susceptible artificial Genius for artwork introduction is data-driven, regardless of the structure of the enter data, a sure quantity of enter records is required as a reference. On the one hand, these statistics can furnish designers with more excellent concept to plan and create; on the other hand, through the processing and evaluation of a giant wide variety of graph data, designers are no longer restricted to the small influence of inventive works, however, pay extra interest to the linkage of results in a massive range. Taking the "Luban" task of Alibaba as an example, through sorting and classifying the fundamental plan data, the plan shape and factors are marked manually, the layout methods and patterns of the designers are refined, and then the key elements are extracted from the high-dimensional facts to generate a format factor library. After that, the generator will analyze the project requirements, use the factors in the component library to create candidate posters, and mix the person ranking mannequin to generate the goal posters (Figure 5 is an instance of the "Luban" diagram information integration). Microsoft Research and the Academy of Fine Arts of Tsinghua University collectively proposed a computable automated graph mannequin. By integrating graph data, it analyzed its visible spatial association and coloration harmony and mixed diagram ideas and cognitive strategies to generate a new web page sketch that meets human sensory relief.

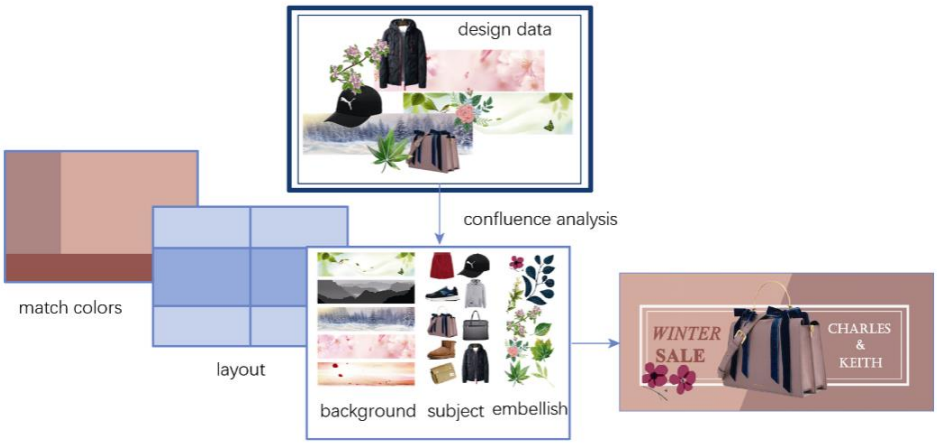

Figure 5: Design Data Integration Example of "Luban"

Artificial Intelligence and Design Data Integration

As the path of design, color is the most important thing affecting customer conduct . Style is a consultant and unique function of the entire work of art. Color is the visible expression of a designer's psychology and works, and it is additionally the primary aspect of human's day-by-day visible perception. Style is a variety of characteristics, which is the expression of the designer's uniqueness, and additionally, the widespread for creative works to be one-of-a-kind from others.

A first-rate tonal resolution will bring stability, harmony and individuality to the work, whereas with direct colouring, subsequent colouring methods would be time-consuming and labour-intensive. On the other hand, recolouring a photograph can breathe new life into a work while retaining its unique form and improving the visual comprehension of the image for illustrative and creative purposes. Therefore, the trouble of colouring pictures occupies an important position in improving the visual perception of the audience, while according to the way of colouring pictures, it can be divided into computer colouring and interactive colouring. Figure 6 shows the palette creation model based on semantic colour extraction.

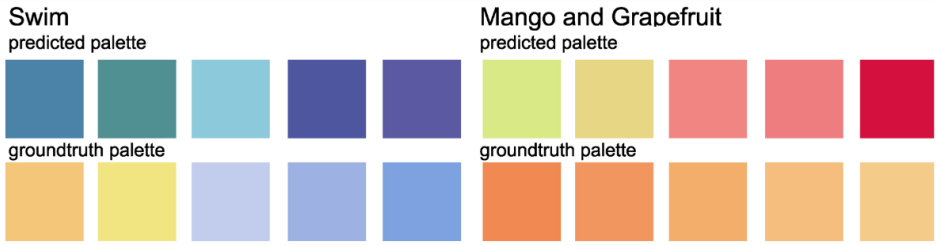

Figure 6: Creation of Palette Based on Semantic Color Extraction

Automatic Coloring

For some scene coloring work with known prior knowledge, the participation of artificial intelligence can enable the computer to accumulate "experience" by learning a large amount of previous knowledge. Taking automatic coloring of gray image as an example, data-driven automatic coloring can be realized. The Convolutional Neural Network (CNN) is used to realize automatic image coloring by combining the global image prior knowledge extracted from the entire print and the local image features calculated

from the image block. The automatic coloring of the grayscale image is shown in Figure 7, where Figure 7 (a) is the original image. Figure 7 (b) is the grayscale image corresponding to the original image, and Figure 7 (c) is the automatic coloring effect.

Figure 7: Colorization Results on Gray-scale Image

Interactive Coloring

Paints Chainer is a line coloring tool that uses Chainer to color sketches semi-automatically. The realization of automatic coloring can save the designer most of the unnecessary repetitive labor, but it requires a lot of prior knowledge, so it will limit the designer's imagination, while interactive coloring can combine the designer's creativity to give the painting more artistic beauty, by combining artificial intelligence technology, it can distinguish the shape boundary of the image. And make the result of color not as direct as using a brush but more delicate, uniform, and expressive. Paints Chainer's semi-interactive coloring opinions are shown in Figure 8, Figure 8 (a) is the initial line draft, and some simple color marks drawn by the user, and Figure 8 (b) is the final coloring effect.

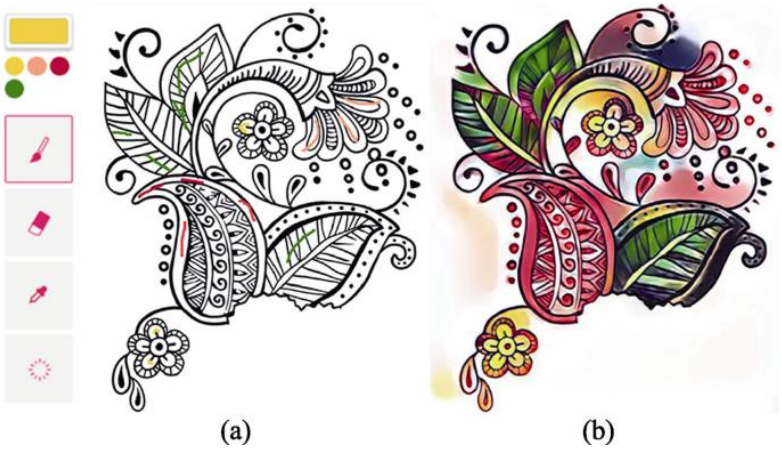

Figure 8: Semi-interactive Colorization with Paints Chainer

Application of Virtual Computer System and Interactive System in Artistic Design Innovation

Virtual Reality (VR), a computer technology that can simulate the natural world and establish a virtual environment, can immerse users in the virtual environment and help people carry out different interactive experiences to stimulate creativity. Any mature VR system must take the user's "first perspective" as the core, and the user can move freely in the 3D virtual environment by operating relevant equipment and interacting with the virtual scene.

Virtual truth technology, additionally acknowledged as nonsecular surroundings technology, is a new stage in the improvement of laptop and statistics technology; it refers to "computer hardware and software program and more than a few sensors, diagrams, laptop and facts technological know-how hair picture era system, as properly as one of a kind clothing, three-dimensional, with a positive audio-visual contact and odor and different perceptual potential of the environment, customers in the assist of these hardware and software program equipment, It can have interaction with objects in this computer-generated "virtual" world in a easy and herbal way. It is the result of complete integration of excessive overall performance pc system, synthetic intelligence, laptop graphics, human-machine interface, stereo image, stereo sound, dimension control, simulation and different technologies. The intention is to create an extra harmonious synthetic environment." In the early 1219's, digital fact science was once broadly concerned, and brilliant development used to be made in specific fields. The attribute of this technological know-how is that the laptop generates an synthetic digital environment, which is a three-d digital phantasm composed of laptop graphics, and produces a sensible "virtual environment" via prolonged pc gadget equipment, so that customers can visually have a feeling of being immersed in the digital environment. This is the experience of Immersion or on-site participation in digital truth science.

In the dissemination of information, virtual reality technology has shown great advantages. Grigore Burdea and Philippe Coiffet pointed out in their book Virtual Reality Technology that virtual reality has three most prominent characteristics, which are the three ones that people often say: interactivity, the illusion of immersion, imagination, namely, interaction, immersion, and imagination.

Excessive Information Transmission

At present, human beings are in an era of information explosion, virtual reality technology is not a combination of multiple media technologies in a simple sense, but as a system technology, to seek the overall advantages of all components. The content of information transmitted by virtual reality technology is unprecedented, through the "eye, ear, nose, tongue, body, mind," "sound, color, aroma, taste, touch, method".

"Immersion" Brings More Sustained Information Transmission

The degree of attention often reflects the degree of continuous acceptance of information. The "immersive" nature of virtual reality technology allows users to participate in the time and degree of engagement much higher than other forms of communication. Users can be immersed in the virtual space and can look out from the virtual space, allowing users to communicate with virtual things as they would in real life. With immersion, users can temporarily isolate themselves from real life, free from the interference of the natural world, and thus receive information more directly and with attention.

4 Results

Artificial Intelligence Based Data Integration System Design Parallelised Implementation of R-eclat Algorithm Based on Spark RDD

Spark Framework

Apache Spark is an open source distributed computing framework, with the characteristics of fast operation, scalability and accessibility.Spark belongs to the general framework of cluster computing, which is widely used in a variety of applications.Spark framework includes five modules, namely Spark SQL, Spark Streaming, Mllib, GraphX, and Spark Core.Among them, Spark Core is mainly responsible for resource scheduling, resource management, and data management. Spark Core is responsible for resource scheduling, system updates, and memory management; Spark SQL is responsible for interactive querying of structured data; Spark Streaming processes real-time data streams; Mllib is a library that contains all machine learning functions; and GraphX is a library that handles graphics and parallel computing. GraphX is a library that handles graphics and parallel computing.

Spark RDD

Resilient Distributed Dataset (RDD) is an important data storage structure in Spark Core, which calculates the data resilience of different nodes in a Spark cluster and stores it. Compared with MapReduce, the traditional distributed computing model of Hadoop, SparkRDD can send the results to different counting nodes in the cluster during the data execution operation, which reduces the amount of computation and improves the efficiency of the algorithm.Spark RDD contains multiple RDD operators, and the data in RDD can be transformed by using the elastic distributed method. Commonly used RDD algorithms mainly include conversion and operation algorithms, conversion algorithms include Map, filter and distinct and other 7 items, operation algorithms include collect, take Ordered and foreach and other 5 items.

Parallelisation Scheme of R-eclat Algorithm

When the number of data sets increases, R-Eclat algorithm still takes a long time to scan the data. Therefore, in order to improve the efficiency of R-eclat algorithm, we will parallelise REclat based on Spark RDD algorithm.

The specific process is as follows: (1) input the sample data into the database, and output the frequent 1-item set with support and the transaction set in vertical data format using Spark RDD algorithm; (2) input the transaction set in horizontal data format, create a triangular matrix for storing all the 2-item sets, and then calculate the support counts of all the 2-item sets in different partitions of Spark RDD; (3) input the 2-item set, and calculate the support counts of all the 2-item sets in different partitions; (4) input the 2-item set, and then calculate the support counts of all the 2-item sets in different partitions. Input the 2-itemsets, use R-Eclat algorithm to iterate several times, and finally get the frequent itemset k.

The Process of Using Convolutional Neural Network in Art Design

Firstly, a large amount of artwork data needs to be collected, which can be in different forms such as paintings, photographs, sculptures and so on. Make sure the dataset contains diversity in order to improve the generalisation ability of the model.

Data pre-processing: pre-process the collected artwork data, including image size normalisation, denoising, greyscaling and other operations, in order to facilitate subsequent processing and analysis.

Model selection and training: choose a suitable convolutional neural network architecture, such as VGG, ResNet, or a customised network structure, and then train the model using the collected artwork data. The model parameters are optimised by back propagation algorithm to improve the model's ability to recognise and generate artworks.

Feature extraction: after the training is completed, the trained convolutional neural network model is used to extract key features in the artworks, such as lines, colours, textures, etc., which help to understand the style and content of the artworks.

Style migration and generation: with the features learnt from the convolutional neural network, art style migration can be achieved by applying the style of one artwork to another. Also, new artworks can be generated using convolutional neural networks to create artworks with unique styles.

5 Discussion

Limitations and Potential of Artificial Intelligence in Artistic Creation

Artificial Intelligence is a new technical science that researches and develops theories, methods, technologies and application systems for simulating, extending and expanding human intelligence. The purpose of developing artificial intelligence is to explore the nature of intelligence, develop intelligent machines with human-like intelligence, and extend and enhance the ability and efficiency of human beings in the tasks of transforming nature and governing society. It is predicted that AI will replace more and more human jobs in the coming years. However, AI and machines will not be able to completely replace certain human occupations because AI does not have the capacity for creativity, thought and emotion, co-operation and communication, and abstract thinking. At the same time, AI will also create a lot of work; it will simply change the way people do a lot of work (Mazzone & Elgammal, 2019).

For artificial intelligence, no matter to what extent it can be developed in the future, it can't completely replace human thinking, because human emotion and creativity is very complex, and sometimes it is also non-logical, creators for the expression of unique artistic design concepts, emotions, and creative works, in the process, the creators of their own creation of the behaviour and process of a deep perception and strong practical awareness of the purpose, conditions, methods, etc. of creation. In this process, the creators have a deep perception and strong practical awareness of their own creative behaviour and process, and a clearer understanding and grasp of the purpose, conditions, methods, etc. of creation, and are able to achieve an active creative consciousness. Therefore, subject consciousness is an important difference between art and design works and other people's artefacts (Chen et al., 2020). The deep learning ability of AI does not mean that it can understand the real meaning of art, it lacks the necessary consciousness of subjectivity, and its way of working is in fact a kind of de-consciousness activity, which only captures some of the artistic characteristics of the artist's original paintings and applies these artistic characteristics to new works. Therefore, AI lacks the ability to innovate, it is essentially a data formed by the accumulation of a large number of works, without subjective and objective aesthetics, which determines its limitations in aesthetics. The human knowledge system can be very comprehensive and has a free consciousness, the sparks collided during this period can not be replaced by machines. So it cannot create works of art in the true sense of the word, much less completely replace human work. The current artificial intelligence belongs to the weak artificial intelligence, temporarily unable to have the subjective ability of human beings: inspiration, feeling and sensation,

and can only rely on data and experience to create or solve problems. However, computers have four advantages over humans: 1) they can complete ultra-complex calculations in a very short time; 2) they can do the same thing for a long time without getting tired; 3) they have a good memory, and the accumulated experience can be called up at any time; 4) they do not have subjective factors such as emotions, and they can treat each programme more justly and objectively than humans. These four advantages can enable computers to keep exploring new solutions, accumulating experience, and optimising solutions when solving ultra-complex pure IQ puzzles, and to find out the best solution through exhaustive enumeration and comparison. As the experience accumulated by AI in different fields increases, its insight into the relationship between things will gradually improve, and it will constantly feed back to improve its problem-solving ability. Of course, AI is still in the initial stage of external cognition, but if AI gets inspiration from human history, psychology, and various sciences, continues to learn in depth, and is able to fully understand and apply the knowledge, the application field of AI will be wider, and may bring subversive value to human beings, and will also give art design a new way of creation.

Innovation and Challenges of VR Integration into Art and Design

The integration of virtual reality interactive technology into the field of art and design provides creators with brand new ways of creation and means of expression. Through virtual reality technology, artists and designers can break the limitations of traditional creation and create more vivid and engaging works. In the field of art, virtual reality technology can let the audience experience the art work immersively, thus bringing more colourful art enjoyment. In the field of design, virtual reality technology can help designers show their design concepts more intuitively and make more precise design adjustments, thus improving design efficiency and quality.

Virtual reality technology can also bring broader development space for art and design. For example, artists can use virtual reality technology to create works that cannot be realised in the real world, and designers can realise more personalised and customised designs through virtual reality technology. In addition, virtual reality technology can help artists and designers establish a closer interactive relationship with the audience, and enhance the dissemination and influence of their works (Trach, 2021).

6 Conclusion

This paper discusses the application of artificial intelligence, virtual computer systems and interactive systems in improving creative talents in art and design, and draws the following conclusions: firstly, AI technology provides art designers with powerful auxiliary tools and creative inspirations. By analysing and learning from a large number of artworks and design cases, designers can access a wider range of creative inspirations. Machine learning and deep learning algorithms can simulate the human creative process and generate innovative design solutions. Secondly, virtual computer systems provide an unlimited creative space for art designers. Designers can use virtual reality technology to simulate the effects of various design solutions and more accurately evaluate and adjust design concepts. Finally, interactive systems play an important role in cultivating innovative talents in art and design. Personalised learning experiences and intelligent education platforms can help learners develop creative thinking and problem-solving skills. In summary, artificial intelligence, virtual computer systems and interactive systems provide comprehensive support and methods for improving art and design innovation talents. By making full use of these technologies, we can cultivate art and design talents with creativity,

innovative awareness and teamwork ability, and promote the continuous development of the art and design field.

7 Conflict of Interest

No potential conflict of interest was reported by the authors.

References

[1] Cai, Z. (2016). Zhongguo rengong zhineng 40 nian [40 years of artificial intelligence in China]. *Science and Technology Review, 34*(15), 12-32.

[2] Carayannis, E. G., & Campbell, D. F. (2015). Art and artistic research in quadruple and quintuple helix innovation systems. In *Arts, Research, Innovation and Society* (pp. 29-51). Springer International Publishing.

[3] Carter, D. (2022). Immersive employee experiences in the Metaverse: Virtual work environments, augmented analytics tools, and sensory and tracking technologies. *Psychosociological Issues in Human Resource Management, 10*(1), 35-49.

[4] Castañer, X., & Campos, L. (2002). The determinants of artistic innovation: Bringing in the role of organizations. *Journal of Cultural Economics, 26*(1), 29-52. https://doi.org/10.1023/A:1013516210628

[5] Chen, W., Shidujaman, M., Jin, J., & Ahmed, S. U. (2020). A methodological approach to create interactive art in artificial intelligence. *In HCI International 2020–Late Breaking Papers: Cognition, Learning and Games: 22nd HCI International Conference, HCII 2020, Copenhagen, Denmark, Proceedings 22*, 13-31. Springer International Publishing. https://doi.org/10.1007/978-3-030-50788-6_2

[6] Deng, Z. (2019). Global autonomous driving in 2018: A brilliant industry ecosystem. *Science and Technology Herald, 37*(03), 30-34.

[7] Durana, P., Krulicky, T., & Taylor, E. (2022). Working in the metaverse: Virtual recruitment, cognitive analytics management, and immersive visualization systems. *Psychosociological Issues in Human Resource Management, 10*(1), 135-148.

[8] Galenson, D. W. (2008). Analyzing artistic innovation: The greatest breakthroughs of the twentieth century. *Historical Methods: A Journal of Quantitative and Interdisciplinary History, 41*(3), 111-120. https://doi.org/10.3200/HMTS.41.3.111-120

[9] Gašević, D., Siemens, G., & Sadiq, S. (2023). Empowering learners for the age of artificial intelligence. *Computers and Education: Artificial Intelligence, 4*, 100130. https://doi.org/10.1016/j.caeai.2023.100130

[10] Hu, C. T., Wang, S. L., & Guo, L. (2024). Current situation and reflection of digital transformation of education in China from the perspective of policy tools. *Research on Electrochemical Education, 45*(01), 61-67.

[11] Joy, S. P. (2005). Innovation motivation and artistic creativity. *The Journal of Creative Behavior, 39*(1), 35-56. https://doi.org/10.1002/j.2162-6057.2005.tb01250.x

[12] Li, D., Liu, Y., & Ren, L. (2023). Viewing wisdom from the perspective of artificial intelligence. *Science and Society, 13*(4), 131-149.

[13] Li, M. (2021). From the traditional national style to the artistic development of contemporary conventional art. *Senior Projects Spring 2021*. Retrieved from https://digitalcommons.bard.edu/senproj_s2021/228

[14] Lv, W., Chen, J., & Liu, J. (2019). A quantitative analysis of China's Artificial Intelligence industry policy from the perspective of policy tools. *Research in Science, 37*(10), 1765-1774.

[15] Mazzone, M., & Elgammal, A. (2019). Art, creativity, and the potential of artificial intelligence. *Arts, 8*(1), 26. https://doi.org/10.3390/arts8010026

[16] Merolla, D. (2020). Cultural heritage, artistic innovation, and activism on Amazigh Berber websites. *Journal of African Cultural Studies, 32*(1), 42-59. https://doi.org/10.1080/13696815.2019.1605038
[17] Montanari, F., Scapolan, A., & Gianecchini, M. (2016). 'Free'? The role of relational work in sustaining artistic innovation. *Organization Studies, 37*(6), 797-821. https://doi.org/10.1177/0170840615613373
[18] Murck, A., & Fong, W. (Eds.). (1991). *Words and images: Chinese poetry, calligraphy, and painting*. Metropolitan Museum of Art.
[19] Novak-Leonard, J. L., Skaggs, R., & Robinson, M. (2022). Innovative and artistic: Conceptions of creativity among the American public. *Poetics, 90*, 101599. https://doi.org/10.1016/j.poetic.2022.101599
[20] Pan, Y. (2023). Co-evolution of human and artificial intelligence. *Research and Development Management, 35*(04), 1-4.
[21] Pang, J., & Xue, Y. (2018). The development of artificial intelligence and the future of aesthetic art. *Art Review, 2018*(09), 45-56.
[22] Sandberg, B. (2019). Art hacking for business innovation: An exploratory case study on applied artistic strategies. *Journal of Open Innovation: Technology, Market, and Complexity, 5*(1), 20. https://doi.org/10.3390/joitmc5010020
[23] Trach, Y. (2021). Artificial intelligence as a tool for creating and analysing works of art. *Culture and Arts in the Modern World, 22,* 164-173.
[24] Wang, C. (2019). On artificial intelligence and literary creation. *Journal of South China Normal University (Social Science Edition), 2019*(5), 171-177.
[25] Wang, W. Y., & Tien, L. C. (2023). The influence of artistic innovation atmosphere on artistic creativity based on digital media—Creative motivation as intermediary variable. *International Journal of Information and Education Technology, 13*(2), 320-328. https://doi.org/10.18178/ijiet.2023.13.2.1810
[26] Win, T. S. (2014). Marketing the entrepreneurial artist in the innovation age: Aesthetic labor, artistic subjectivity, and the creative industries. *Anthropology of Work Review, 35*(1), 2-13. https://doi.org/10.1111/awr.12031
[27] Yan, Z., Tang, X., Qin, X., Zhang, F., & Duan, Y. (2017). The connotation, key technologies and application trend of Educational Artificial intelligence (EAI)–Analysis of the REPORT "Preparing for the Future of Artificial Intelligence" and "National Artificial Intelligence R&D Strategic Plan" in the United States. *Journal of Distance Education, 35*(01), 26-35.
[28] Zauskova, A., Miklencicova, R., & Popescu, G. H. (2022). Visual imagery and geospatial mapping tools, virtual simulation algorithms, and deep learning-based sensing technologies in the metaverse interactive environment. *Review of Contemporary Philosophy, 21*, 122-137.
[29] Zhai, Z. (2023). Artificial intelligence and virtual reality: Building tools or building people?. *Philosophical Analysis, 14*(03), 188-195.