Adaptive Evaluation Algorithm for Matching Degree of Art Product Design Elements Based on Big Data

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Abstract: With the wide application of digital and intelligent production methods in the manufacturing industry, it is of great significance to guide enterprises to attach importance to and give full play to the value of manufacturing big data to innovate product process design. This paper aims to meet the application requirements of deep integration of enterprise data and business and proposes an application method of art product process adaptive design based on manufacturing big data mining, which is used to solve the problem of insufficient utilization of manufacturing data in enterprises. These artistic ceramic product designs, which contain the crystallization of human wisdom, have important reference and reference significance for our modern product design, especially the characteristics of ceramic materials, artistic ceramic elements, and their unique product semantics, providing new ideas for modern product design.

1. INTRODUCTION

Emerging information technologies such as big data and cloud computing have sprung up rapidly and combined with modern industrial technology, resulting in many new production and manufacturing modes, such as intelligent manufacturing, digital twins, etc. Data driven has become an effective way and important means to solve complex problems. With the widespread application of CNC machine tools, sensors, data collectors, and other equipment components, manufacturing enterprises have accumulated a large amount of manufacturing data in the production process. These manufacturing data show typical big data characteristics, and the association rules and manufacturing knowledge behind the data have yet to be discovered. Data mining is needed to effectively guide the iteration and optimization design of product process, thus improving the adaptability of product process design to the manufacturing environment.

From the unearthed cultural relics, we can see thousands of years of pottery and porcelain, from simple living utensils to decorative porcelain, all of which reflect people's wisdom. In modern design life, ceramic elements and materials are applied in the design of household utensils, household appliances, modern digital products, modern bathroom products, and modern daily products. In summary, in modern product design, ceramics endow products with new and richer connotations due to their perfect physical properties in terms of structure, shape, color, and surface decoration. Today, with the ideology of environmental protection, nature, sustainability, and original ecology, ceramic materials will be widely used in modern society due to their unique properties.

Art and design majors have the characteristics of large amount of professional data and complex query and analysis, which makes big data become very important in art and design majors. The arrival of the big data era not only promotes the development of education, but also increases the demand of the society for students majoring in art and design. Moreover, art and design majors are characterized by strong Intersectionality and difficulty in finding. The application of big data in art and design majors can effectively improve the design ability and information processing ability of art majors. In the actual application process, students can use big data as an effective tool to continuously improve their learning ability, to gradually meet the needs of social development.

Conduct quality testing on the produced products and generate product testing data. The process of mining manufacturing data is to explore the relationship and laws between product quality and process parameters by analyzing and processing manufacturing data. Newly discovered knowledge can be standardized and structured stored using knowledge base technology, assisting in design optimization decision-making, improving product design, and achieving "backward design" of product processes. At present, the product process design method based on experiment and simulation is relatively mature in the application of manufacturing enterprises, but the "backward design" driven by manufacturing big data is insufficient. It is urgent to solve the problems of poor adaptation of product design to the manufacturing system environment, lagging product iteration and version update, etc.

2. THE PROPOSED METHODOLOGY

2.1 Matching degree of artistic product design elements and feature matching

From the unearthed cultural relics, we can see thousands of years of pottery and porcelain, from simple living utensils to decorative porcelain, all of which reflect people's wisdom. In modern design life, ceramic elements and materials are applied in the design of household utensils, household appliances, modern digital products, modern bathroom products, and modern daily products. In summary, in modern product design, ceramics endow products with new and richer connotations due to their perfect physical properties in terms of structure, shape, color, and surface decoration. Today, with the ideology of environmental protection, nature, sustainability, and original ecology, ceramic materials will be widely used in modern society due to their unique properties.

The characteristics of big data mainly include: (1) huge amount of data; (2) The types of data are diverse and involve a wide range of aspects, which are related to many aspects of society and have strong data processing capabilities; (3) The data needs to be effectively classified and organized. If the

data is too large, the effectiveness of the information is not strong enough, and it needs to be processed in a timely manner to obtain effective data information. (4) The application of big data requires high timeliness, and too old data and information cannot meet the needs of users. In advanced manufacturing systems, with the increase of sensor types, the amount of information generated is increasing, and the form of data expression is more complex, such as time sequence data generated when mechanical sensors and speed sensors are working, image data generated when visual sensors capture images, and data generated during the operation of product data management system (PDM).

The remarkable characteristics of manufacturing big data are diversity, complexity, and uncertainty. The unified expression of manufacturing big data is the key and difficult point to solve the problem of data fusion. Ceramic materials are deeply loved by the surface industry because of their advantages such as good gloss, high hardness, no rust and discoloration, and stable chemical performance. Ceramic watches give people a pure white feeling. Their case and strap have good rust resistance, high heat resistance, high hardness, no fading not easy to wear and tear, with minimal damage to the skin. For designers, studying the application of ceramics in product design can not only help them better understand materials, but also broaden their thinking and transform and deconstruct materials and design. In short, the addition of ceramic elements in modern product design allows modern product design to continuously radiate the atmosphere of the times and new vitality, and better serve life.

Students majoring in art and design can learn in a large open online classroom through big data technology in the actual learning process. Moreover, students can also independently arrange the time and place of learning. This learning mode not only effectively enhances the learning interest of art and design students, but also promotes the continuous improvement of their learning quality. Cultivate the improvement of students' self-learning ability in art and design majors.

2.2 Adaptive Evaluation Algorithm for Matching Degree of Elements in Art Product Design

For example, with the support of actual big data, students can timely and dynamically appreciate the works of others, see the works of peers or masters, improve their art appreciation ability, broaden their thinking, and broaden their horizons. Big data for art and design majors can improve the learning and communication between students and other colleges and enhance students' communication and learning ability. In the data-driven product process adaptive design pattern, the volume and quality of data play a crucial role. Data quality includes the accuracy, completeness, consistency, and validity of data. Among them, accuracy refers to the degree to which the data conforms to the physical world, completeness refers to the proportion of valid values in the data, consistency refers to the degree to which the data meets specified constraints, and validity represents the value density of the data.

In traditional decorative patterns, plant decorative patterns are often used by people and often endowed with auspicious meanings. Among them, peonies are known as representatives of nobility and elegance, and lotus flowers are also regarded as symbols of integrity. In the product design of "Modern Baofeng Liquor Ware Design - Clear Fragrance Type", the advantages of ceramics and the changes in glaze color after firing are utilized to decorate the wine utensils with deformed

lotus decorative patterns. The Baofeng Liquor Clear Fragrance Type wine utensils are explained from the aspects of shape, glaze color, and pattern. With the support of big data, it can realize the exchange and communication between higher vocational colleges and higher vocational colleges, and between higher vocational colleges and undergraduate colleges, effectively avoid the differences between different colleges, promote the promotion of advanced art design education concepts among schools, improve the quality of education, and help colleges to establish high-quality and high-quality professional teaching. In the environment of big data, colleges and departments can better guide and explore art and design talents.

The application of big data technology in colleges and departments can also effectively provide a better platform for communication and learning for teachers and students. The various data collected during the manufacturing process usually have certain correlations, such as the voltage and current during the welding process, the rotational speed and cutting speed of the machine tool spindle, etc. This correlation can cause dimensional redundancy and increase unnecessary calculations, making data dimensionality reduction particularly important. Data dimensionality reduction refers to preserving appropriate feature data from high-dimensional data spaces and eliminating redundant data to reduce data dimensions. The reduced dimension data can not only retain the original information, but also avoid the Curse of dimensionality. Ceramic products have now become a necessity in our daily life. With the improvement of its manufacturing technology and the integration of Elements of art, ceramic product design has risen to the level of art and become a work of art.

With the improvement of people's material and cultural living standards, modern consumption is no longer just satisfied with the demand for price and use, but more to meet people's spiritual and cultural life. With the support of big data, we can better protect the legitimate rights and interests of authors and works, avoid plagiarism as much as possible, and help protect intellectual property rights. At this stage, the relevant legal protection of art and design in China is not perfect, and still needs further protection. The application of big data can enable relevant departments to fully understand the authors, works and other relevant content, and ensure the legitimate rights and interests of designers.

3. CONCLUSION

It can also improve the self-learning ability of students majoring in art and design, promote their ability to collect and identify information, and enable them to continuously meet the needs of the job market, achieving the sustained and healthy development of students majoring in art and design. Manufacturing big data contains rich knowledge and models, which can guide product design decisions and support the realization of product process adaptive design in different manufacturing environments. It is suggested to further promote the combination of big data and emerging technologies such as the fifth generation mobile communication technology, increase investment in research and development of big data platform and algorithm design platform, and stimulate greater integration of manufacturing Big data and product process design. It helps to expand design ideas and explore design methods that are more suitable for the integration of modern product design and ceramic elements, thus laying the foundation for us to design products that are more suitable for modern life.

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