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Crafting Emotional Experiences: Data Mining-Driven Reinforcement Learning for Intelligent Cultural and Creative Product Development[1]

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ABSTRACT

Academics and businesses have been paying more and more attention to the emotional requirements of people as science, technology, and society have advanced. The market has also proposed new standards for the quick iteration of intelligent cultural and creative items simultaneously. The emotional design of innovative, artistic and creative things can give these products emotional qualities and provide customers with a lovely and enjoyable experience. Both domestically and internationally, there has been a great deal of research. This research investigates the data mining technology-based reinforcement learning algorithm of intelligent cultural and creative product creation. This essay will first direct the industrial design content in the information age, shortly focusing on convenience and comfort, summarising the findings of the study done by both domestic and international clever cultural and traditional industrial design produce original works, and use these research materials as inspiration make use of examples, research the components of intelligent artistic and imaginative in terms of form, substance, and colour, and analyse the factors that affect the connected elements, and then examine the three as a sophisticated cultural and creative system. Aspects of intelligent, creative, and cross-cultural contact, interactive behaviour, interactive material, and design of interactions. Second, develop and use the emergence of cultural intelligence and creativity depending on design components for appearance, From the perspectives of ergonomics and product aesthetics, analyse and research intelligent cultural and creative practises, design corresponding conceptual sketches, screen model and render to obtain plans, evaluate complementary design scheme, and complete the physical construction of the project. The interaction technique and interaction content in this intelligent cultural and creative solution are designed, and an easy-to-use application product is designed based on the design above aspects, all by the development trend of interaction design in the future. According to experiments, more than 90% of users are satisfied with intelligent cultural and creative items created by algorithms.

INTRODUCTION

The homogeneity of contemporary cultural and creative works has been highly prevalent with the development of civilization and the advancement of science and technology. Performance is no longer the main focus; artistic and creative items' "spirit" performances are becoming increasingly significant. While the "spirit" of cultural and creative products refers to the perceptual factors of emotional characteristics displayed by artistic and innovative products, the "function" of cultural and creative products refers to the rational factors, such as the function and quality of cultural and creative products. On the other hand, the rate of technological advancement is accelerating, user demand is increasing, and business competition is fiercer. As a result, the market life of businesses' cultural and creative products is continuously shortening, as is the cycle of iterations for those products [1-2].

Numerous academics have explored and successfully applied the reinforcement learning algorithm of intelligent cultural and creative product design based on data mining technology. The innovation capability of scientific research institutes is assessed using the four diffusion capacity metrics [3]. Corbi A rethinks the vocabulary people use when conceiving and discussing prototypes, arguing that it is inappropriate to describe prototypes with tools for building prototypes, because there are many ways to use tools, and the vocabulary used to describe prototypes should be more focused on the desired Fundamental issues of designing interactive systems [4].

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METHOD

Application of Data Mining Technology

In Smart Cultural and Creative Product Design Data mining is the process of extracting interesting knowledge from large amounts of data stored in databases, data warehouses or other information repositories. Knowledge discovery is the recognition of validity, innovation, potential, and ultimately the understanding and purpose behind the collection of large amounts of data. It is an advanced level of knowledge extraction using aggregated data from a macro perspective. Using data mining techniques can help designers extract useful or insightful information from a large number of design data sources. We know that the creation of traditional intelligent solutions and production products is often based on the innovation of important information sources. Even if the original information sources cannot be borrowed in part or in whole, some metrics can be given [5-6].

Application of Abstract Concepts in Requirement Discovery

A product does not have to meet the needs of everyone to be called a product. The number of users determines the size of the product. That is to say, as long as someone has a demand, a formula can be created. corresponding product. Human activities, habits, living environment and other different factors determine many needs and color needs, adjust these needs and find products that are technically possible with and without existing in the market. Products of the present invention have been evaluated.

New products are ultimately determined by user needs. The key question is whether they can meet the needs of existing users or discover new users' needs. Human needs include certain things, such as physical and spiritual needs. The first type of demand can be called static demand, which has not changed for thousands of years, and even the demand at the manual level has not changed. The longstanding but unsatisfied demand becomes a new product. The energy market created by knowledge, like the human need for longevity and intelligence, has not changed much in millennia. For such needs, the key is to discover new knowledge and provide product stability systems. Knowledge is usually from a large number of practical minds that cannot be found from existing sources or simply by thinking. In addition, static requirements also include requirements for products from a visual perspective, such as safety, convenience, high quality, and low cost.

The second type of problem can be called dynamic requirements. Some needs, especially important ones, change as the environment changes. For example: when the water bill is 1% per ton, people's demand for water-saving equipment is not fast, and the market for such products will not be very large. When the water bill is high, water saving is very important. The water-saving market will grow significantly, the demand for water-saving products will increase, and the resources (including technology) to support the development of such new products may already be available. To find dynamic requirements, the key issue is being able to understand the changing factors that may lead to new requirements over time. According to the double-definition methodology, first find the specific conversion rate that affects users and the long-term infinity corresponding to the specific conversion rate. Abstract ideas (factors), then infer characteristics that conflict with people's existing needs, and then examine needs. And practical ideas related to existing, unchanging requirements and their related concepts, such as security, flexibility, etc. Dynamic conceptual modelling is the key to realizing requirements and understanding required computer availability. Therefore, summarizing, describing and modelling individual and human needs is not an easy task, it requires long-term, painstaking and active work [7-8].

The Significance of Cultural Creative Products

The inheritance of traditional folk art is particularly important for social development both at present and in the future. As my country is currently invaded by foreign cultures, the single form of traditional culture is not attractive enough for modern people. We use augmented reality technology to display our traditional folk art, so as to derive various cultural and creative products to allow today's people to understand traditional folk art in a new form. Using cultural and creative products as a carrier to bring traditional culture back into people's attention. Use the most popular interactive means to render it, give traditional culture a new form of expression, and better attract people to pay attention to traditional folk art [9].

Algorithm Application

This paper mainly uses association rule algorithm for data mining. Apriori algorithm is one of the association rule algorithms for mining frequent itemsets, and its core is a two-stage recursive algorithm for finding frequent itemsets [10]. The algorithm uses the prior knowledge of frequent itemsets to perform layer-by-layer search in an iterative manner. For the rule A=>B containing itemsets A and B, frequent itemsets that satisfy the minimum support threshold are frequent itemsets and satisfy both the requirements. The minimum confidence threshold is the strong rule. Among

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them, the support degree is calculated by calculating the percentage of A∪B itemsets in the total transaction database D, and the confidence degree is calculated by calculating the ratio of the number of transactions in which A appears at the same time to the number of A transactions shown in [11-12].

support (A => B) = P(AÈB) (1)

confidence(A => B) = P(B A) = P(AB) / P(A) (2)

The process of Apriori algorithm is mainly decomposed into two steps: the first step is to search for frequent itemsets; the second step is to generate association rules through frequent itemsets. The key steps of the algorithm are described as follows:

The first step is to scan the transaction database to generate a candidate set C1, calculate the support degree of each 1 item set 1-Item in C1, remove the 1 item set in C1 that does not meet the minimum support degree, and obtain the frequent 1 item set L1 by searching.

The second step starts from K itemsets (K>=2), and generates K itemsets through (K-1) item sets layer-by-layer search. The candidate K item set Ck is generated by Lk-1 self connection, pruned according to the nature, and then counts the transaction items in the candidate set Ck by scanning the transaction database count(Ck) times, and retains the K itemsets that satisfy the minimum support degree. Obtain frequent K itemsets Lk. Repeat this step until the frequent (K+1) itemsets that satisfy the condition cannot be found.

EXPERIMENT

System Implementation

In order to take into account, the accuracy of classification and the execution efficiency of the algorithm, we adopt a two level classification system. The first level does a rough evaluation, using a decision tree to do a rough evaluation. For the coarse classification results obtained from the rough evaluation, a precise classification is performed again, so two judgment trees need to be constructed. The classification tree for precise classification can be constructed by sub-sample sets contained in each coarse category, or by adding new samples. The difference is that in the first pruning process, the predefined information gain threshold should be appropriately reduced.

When a new design scheme is substituted into the classification rules to obtain the evaluation category, a lookup table is performed to obtain the cost monetary value of the design scheme.

Experimental Design

This paper conducts experiments on the learning algorithm constructed in this paper. The first is to explore the application of the algorithm's data mining in product design, and the second is to respond to the survey on the satisfaction of the cultural and creative products designed by the algorithm.

Problem Exploration

This paper analyses the problems encountered by users in data search, judges the effective application of data mining, and analyses the mean and standard deviation of the problems encountered in data search. The data are shown in Table 1.

TABLE I. QUESTIONS RELATED TO CONDUCTING THE SEARCH

	Don't know the keywords	Search is not required	The search is not valid	Search content is not incomprehensible
mean value	2.87	3.34	3.66	3.05
standard deviation	1.427	1.306	1.101	1.286

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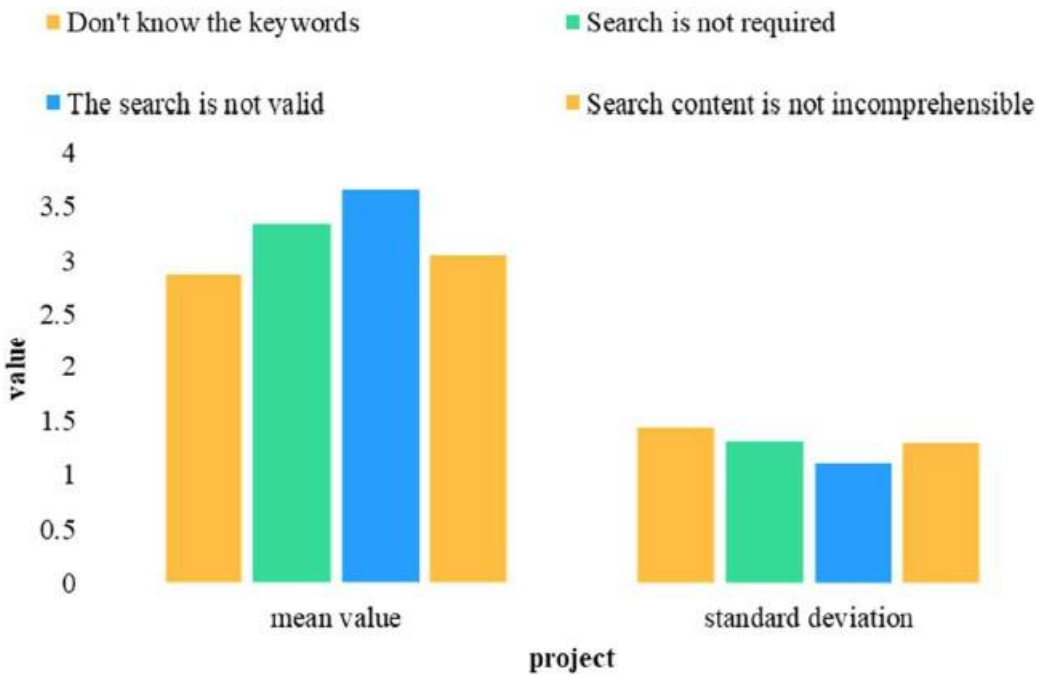

Fig. 1. Current situation of the problems addressed by data mining

As can be seen from Figure 1, in the evaluation of common problems when searching for product-related content on the Internet, the average of three items exceeds 3, and the highest average is "I can search for relevant content, but I can't find it. "Effective information", which means that there are many similar contents in the information about the product on the Internet, but due to different specific usage scenarios, it is difficult for users to select the information that is consistent with their own situation. In addition, not being able to search the desired content and the content being searched are too professional, which are also problems that users often encounter in online searches, while the selection of search keywords does not bring too much trouble to users.

User Satisfaction Survey

This paper conducts a satisfaction survey on the reinforcement learning algorithm of intelligent cultural and creative product design based on data mining technology, and explores the changes in satisfaction of consumers of different genders with past dynasties of cultural and creative products, mainly selecting traditional cultural and creative products and three different generations of intelligent products. The experimental data of cultural and creative products are shown in Table 2.

Table II. Satisfaction of consumers of different gender with multi-generation cultural and creative products

	Traditional cultural and creative products	first generation	second generation	third generation
woman	52	69	83	92
Man	41	51	52	90

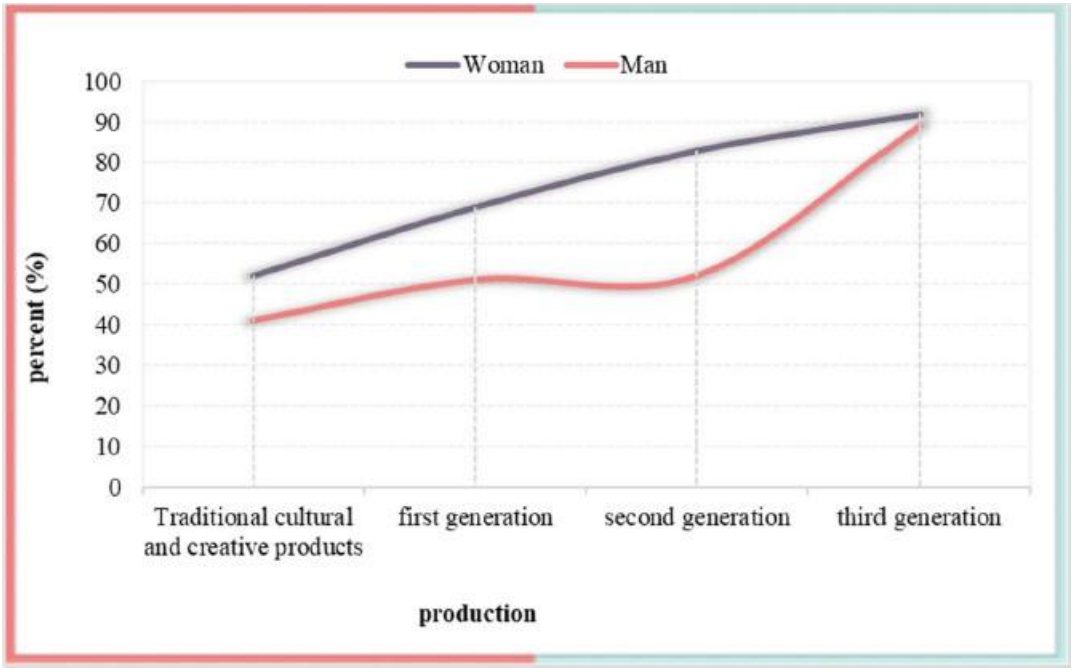

Fig. 2. Changes in consumer satisfaction with cultural and creative products in the past dynasties

As can be seen from Figure 2, traditional cultural and creative products are lacking in design, and the satisfaction of male and female customers is relatively low. With the upgrading of products, user satisfaction gradually improves. When creating the product, the satisfaction of users has reached more than 90%.

CONCLUSIONS

This paper is a multidisciplinary research work that integrates Kansei Engineering, Emotional Design, Industrial Design and Computer Science, etc. It is also a preliminary study on the possibility of combining data mining technology with design. This paper aims to initially explore the emotional design of products through deep learning technology to meet the requirements of enterprises for rapid product iteration and the emotional needs of users. The specific work is divided into two parts: the first part is to establish a product image recognition model based on data mining, which establishes a bridge of communication between designers and users, and proves the feasibility of data mining in product image recognition. Models provide new ideas and methods. The second part is the generation of emotional intelligent product design scheme based on generative confrontation data mining on the basis of the research of the first part, and provides a method for emotional design of intelligent products. Data mining refers to the process of searching information hidden in a large amount of data through algorithms. Data mining searches for rules from a large amount of data by analysing each data.

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