International Journal of Information Technologies and Systems Approach
Volume 16 • Issue 3

New Media Interactive Design Visualization System Based on Artificial Intelligence Technology

Binbin Zhang, Shenyang Institute of Technology, China*

ABSTRACT

The experimental results show that the average cumulative contribution rate of this algorithm was 92.78%, while that of the traditional algorithm was 88.88%. In contrast, the average cumulative contribution rate of this algorithm was improved by 3.9%. In terms of classification accuracy, the average classification accuracy of this algorithm was 94.99%, while the traditional algorithm was 90.98%. In contrast, the average classification accuracy of this algorithm was improved by 4.01%. In terms of dimension reduction time, the average dimension reduction time of this algorithm was 3.46s, while that of the traditional algorithm was 6.43s. In contrast, the average dimension reduction time of this algorithm was shortened by 2.97s. It can be seen from the data that the improved PCA algorithm can effectively improve the classification accuracy and cumulative contribution rate of the visualization system, shorten the dimension reduction time, and improve the system's ability to process data.

KEYWORDS

Artistic Intelligence, New Media Technology, Product Interaction Design, Visualization Technology

1. INTRODUCTION

With the help of science and technology, interactive technology has also been widely used in product design, wherein interactive products have emerged. When users use interactive products, they can interact with them, which brings them many conveniences. With the continuous improvement of human living conditions, people's demand for interactive products is not only at the basic functional level. However, traditional interactive products are designed to fulfill the basic needs of users in terms of product functions, and do not pay attention to the needs of users at the spiritual level. When users interact with the product, they cannot better fulfill their deep needs for the product, which leads to the user's sense of experience of interactive products is greatly reduced. To enhance users' experience in product interaction and meet users' different needs from multiple levels as much as possible, some emerging technologies need to be integrated to improve the performance of product interaction.

The topic of new media has aroused widespread concern in the academic community in recent years, and scholars have conducted studies on it one after another. Kligler-Vilenchik Neta took the

DOI: 10.4018/IJITSA.326053 *Corresponding Author

citizenship model integrating the theoretical knowledge of new media as part of a broader paradigm that replaced the traditional citizenship model. He described the landscape of alternative citizenship model and investigated the role of new media in reshaping citizenship (Kligler, 2017). Wargo Jon M discussed the anti economy of writing new media narratives in the online and offline context, and focused on how young people use these physical and visual texts to strengthen, challenge, and fight against different identities. He thought about how the so-called visual vernacular and the material text of youth life stream could provide alternative concepts for contemporary new media writing and self stories (Wargo, 2017). Cheong Pauline Hope aimed to explore the vitality of new media and religion, and has witnessed the growth of unique sub fields focusing on new media and religion. He pointed out that intermediary communication brought about and constituted the reproduction of spiritual reality and collective, and jointly formulated religious authority. His new mediation based on the old communication practice has become the lifeblood of the continuous development of religious authority and spiritual organization form (Cheong, 2017). Twenge found that from 2010 to 2015, the number of adolescents suffering from depression was on the rise, and the suicide rate was also increasing year by year. In terms of gender, most of them are women. The survey shows that teenagers who spend more time on new media are more likely to have mental health problems. Teenagers have spent more time on new media and less time on other aspects, which may be the main reason for the rise of depression and suicide rates since 2010 (Twenge, 2018). Scolari Carlos A aimed to understand how the new generation uses new media for work, learning and other activities. He conducted research mainly from three aspects: cross media skills, informal learning strategies, young people, new media and new issues in collaborative culture, and discussed the future prospects of cross media literacy as a research and action plan (Scolari, 2018). Cepeda determined that with the passage of time and the obsolescence of digital technology, more and more new media artworks are facing the possibility of disappearing forever. As many new media artworks depend on certain technologies, when these technologies are replaced or no longer available by other technologies, measures should be taken to make the old artworks compatible with the new technologies that replace them (Cepeda, 2019). However, the studies of these scholars on new media are not comprehensive enough, and based on artificial intelligence, the research on media can play a better role.

Research on artificial intelligence is very popular in all walks of life, and there are also relevant research reports in the media. To explore whether AI would provide the same destructive power and utility as other tangible commodity industries in the media industry, Chan-Olmsted Sylvia M made a relevant examination on the utility of AI in the media industry and the role of AI in the context of the value chain. He found that the media faced major challenges in balancing effectiveness and efficiency as well as human and artificial intelligence judgments (Chan and Sylvia, 2019). Ouchchy Leila systematically analyzed the description of AI ethical issues by classified media, expanding previous research to better understand how media coverage of these issues affects public debate on AI. Results show that the media reports on AI ethics have quite realistic and practical concerns, but the reports are still extremely shallow, and various methods need to be taken to deal with social, moral and policy issues of AI technology (Ouchchy, Allen, & Big, 2020). In general, there are not many researches on AI and media. To improve the research of new media interaction, integrating artificial intelligence into the research of new media interactive design visualization systems is necessary.

This paper proposed to apply AI technology and new media technology to product interactive design, and combined visualization technology to build an interactive data mining visualization system. This paper made a visual analysis of the data in the interactive products with the help of this system. By starting a series of operations on the initial data, and then converting the data into graphics, the data can be presented to users in a more intuitive form. The innovation of this paper is to improve the traditional PCA algorithm, so that it can better improve the visualization system's ability in data processing. Through testing and analysing the visualization system, it is found that the improved PCA algorithm can effectively improve the classification accuracy and cumulative contribution rate

of the dataset. It shortens the dimension reduction time of data, which shows that the algorithm can effectively improve the relevant performance of the visualization system.

2. ARTIFICIAL INTELLIGENCE, NEW MEDIA INTERACTIVE ART, AND VISUALIZATION TECHNOLOGY

2.1 Edge Computing

Edge computing refers to all operations between the database and the core approach of cloud computing. Edge computing is actually a computing model that provides a service for data computing, which is different from cloud computing. Cloud computing mainly uses the huge computing resources in the server to centralize data processing, while edge computing processes the generated data information in a decentralized manner.

The layout of edge computing is naturally scattered, wherein it has distributed computing and storage functions. At the same time, edge computing can also flexibly adjust and uniformly manage distributed resources, support intelligent distribution, and have high security performance. For the selection of edge computing products, it is necessary to take into account various integration performance to meet different conditions in the Internet of Things environment.

2.2 Artificial Intelligence and New Media

2.2.1 Overview of AI and New Media

Artificial intelligence organically integrates computer and human brain, which effectively extends human brain intelligence (Heer, 2019). AI covers the dual knowledge system of computer and psychology, which can effectively simulate human thinking to solve practical problems. In the era of big data, AI technology is also increasingly mature and has good applications in all walks of life.

New media is a media form, which integrates a large number of emerging technologies and is the fifth media after the four traditional media. With the help of science and technology, the new media industry has ushered in a peak period of development, and has gradually got rid of the original development strategies and methods of traditional media. New media would become the main way of information transmission in the future. As a leading industry in news communication, new media has integrated a variety of emerging technologies. After technological innovation, it has become more diversified, personalized and detailed. The integration of big data technology can provide customers with customised services in news and articles and use Internet and other technologies to write AI robots.

2.2.2 Application of Artificial Intelligence in New Media Communication

(1) Robot Writing

Robot-writing technology is applied in the news broadcast software. By inputting the structure, central content and data analysis report of articles into the computer, the computer would automatically sort them out and use big data and other technologies to write. The application of robot writing technology not only greatly improves the efficiency of social media, but also greatly reduces the workload of writers. Artificial intelligence integrates big data technology, thus greatly improving the data analysis and processing ability of electronic computers.

(2) New media social platform

Under the wave of artificial intelligence, new media social service platforms have also been built, and numerous social platforms have gradually emerged, such as Tencent QQ, WeChat, Weibo and

other social network platforms, which are loved by the masses. The online media platform pushes accurate content according to the preferences and browsing volume set by users. It is highly targeted and can better fulfil the personalised needs of users, such as popular topics on microblog, WeChat official account, TikTok recommendation and so on. Integrated computer learning searches hot topic content with big data and network and pushes content of interest to users with data processing methods and computer writing technology.

(3) Virtual reality and augmented reality technology

With the advent and rapid development of virtual reality technology, this technology has been gradually used in many fields. This technology connects the virtual world with the real world, bringing people a new visual experience, so it is loved by everyone. With the wide application of virtual reality technology, new media technology has also been developed rapidly. Compared with the application of AI in the new media platform, virtual reality technology highlights the interactive and immersive experience of AI in the application (Sundar, 2020). However, the scene design of virtual reality technology would be limited by glasses, which makes the interaction between the virtual world and the real world unnatural and incoherent. Thus a new application of artificial intelligence came into being, that is, augmented reality, which effectively improved the defects of virtual reality experience. Augmented reality applications are no longer restricted by glasses. Users can feel the real experience brought by multiple senses with naked eyes, as well as improve the immersive and interactive experience.

2.3 Product Interaction Design Under New Media Technology

2.3.1 Innovative Elements of Product Interaction Design

From the perspective of new media, product interaction design is a manifestation of the integration of technology and interaction aesthetics (Dalle, Sutarto, & Hayati, 2017). Therefore, the innovation of product interaction design should focus on these two factors.

(1) Artificial intelligence in product interaction

AI technology can be regarded as a new subject of new media. It has been applied in high-tech products, and it has the characteristics of interaction, intelligence and personalisation. Artificial intelligence can be applied to product interaction design, which has different purposes. It can not only change the interaction between people and products, but also effectively improve the performance of products (Liu, Sivaparthipan, & Achyut, 2022). Intelligent products have a certain sales market, especially with the characteristics of intelligence and personalisation and have become the first choice of users when purchasing goods. The two characteristics of intelligent products are reflected in the users' feelings about the use of products. They are characterised by simple operation, complete functions and convenient information circulation, wherein they are loved by the masses. Artificial intelligence technology can simulate people's consciousness and thinking. Applying this technology to the process of interaction between people and products can make the communication between users and products more intelligent, and the application of products would naturally be widely praised.

(2) Aesthetics in the process of interaction

In product interaction design, users' different needs should be considered from multiple aspects as much as possible to bring users a satisfactory interaction experience (Bach, 2017). To enable users to obtain a satisfactory interactive experience, paying attention to aesthetics in the interaction process whilst meeting the basic functional requirements of users is necessary. In the process of product

interaction, there are mainly two types of aesthetic problems: sensory beauty and technical beauty. During product interaction, users' senses would change differently with the influence of the outside world. If it brings users a good sensory experience, it can be regarded as sensory beauty.

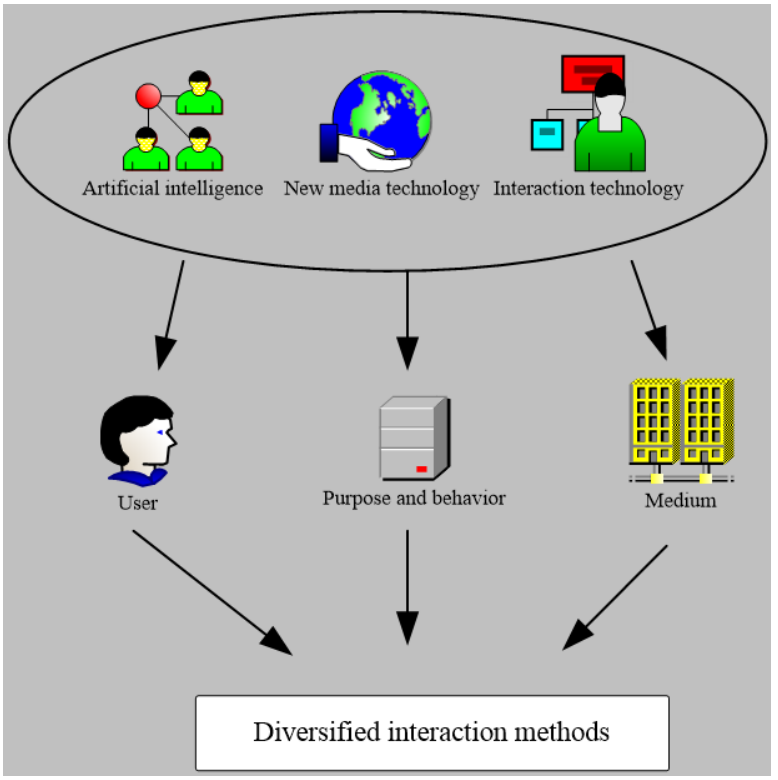
2.3.2 Innovation Points of Artificial Intelligence Technology

The innovation points of AI technology are shown in Figure 1, which comprises three parts: users, purpose and behaviour and media:

(1) Users

As the main body of product interaction, users play a very important role in the process of product interaction. The integration of interactive design in product design should analyze users' different needs for interactive products from multiple levels. When conducting the scheme design, people should take the needs of the public users as the benchmark and target users as the leading demand and conduct in-depth research. In terms of product interaction design integrating new media technology, users have different needs for interaction methods in different age groups. Therefore, designing interactive products which can best fulfil the multiple needs of users of different ages according to the characteristics and actual needs of users of different ages to win the favour of users is necessary.

Figure 1. Key innovation points of AI technology



(2) Purpose and behaviour

The purpose of product design is to provide convenience for users, whilst behaviour is the process of meeting users' needs. A good product interaction process is not only to meet users' needs for product functions, but also to enable users to obtain high satisfaction in the use process. A product can make users feel satisfied physically and psychologically, which is an important factor to test whether the product design is excellent or not. In the function switching of the product, users may want to achieve multiple goals. The purpose and behaviour of users is to determine the matching degree between product function switching and interaction mode.

(3) Media

New media is a medium for users to interact with products. Because AI technology is applied to new media, it has become a new subject of new media. At this stage, the key technology of product interaction is artificial intelligence. The application of this technology promotes the intelligent development of human-computer interaction. The application of this technology promotes the intelligent development of human-computer interaction.

2.4 Interactive Art of New Media

2.4.1 Connotation of New Media Interactive Art

New media interactive art integrates the characteristics of new media technology and shows a new art form. With the strong support of science and technology, communication technology has been developing rapidly, whilst the media is also changing, which makes the new media interactive art more and more diverse. New media interactive art has gradually become the main direction of new media art development.

2.4.2 Scene of New Media Interactive Art Expression

The new media interactive art expression scene is shown in Figure 2. In ordinary scenes, there are usually several basic scenes. Due to the variety of new media interactive art, the composition framework of each basic scene also differs.

2.5 Visualization Technology

2.5.1 Basic Process of Visualisation

Visualisation is a process of image processing for data expansion, which comprises a series of operations on initial data, then converts the data into graphics which can be identified, recognised and interacted with the human eye (Katoh, John, & Kazunori, 2019). The basic flow of visualisation is shown in Figure 3.

(1) Analysis: When users are performing a visual task, they need to analyse the task. The analysis comprises three aspects: task, data and domain. Therefore, clarifying the tasks, objectives, problems and results of data visualisation, and then deciding which algorithm to use for data processing is necessary.
(2) Processing: Before data visualisation, initial data must be preprocessed, including data fusion, cleaning, analysis, conversion and other operations.
(3) Visual mapping: This process is mainly the practice of the analysis and processing process. Through a series of processing operations on the data, the data is mapped.

Figure 2. Composition of new media interactive art expression scene

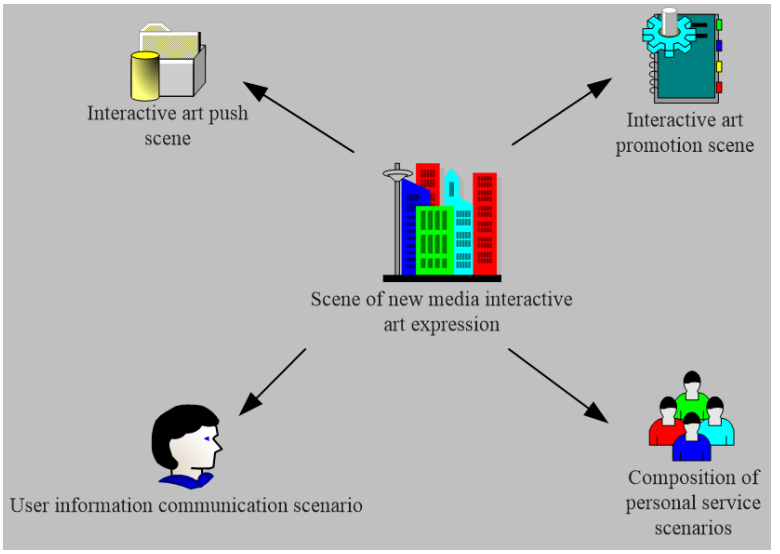
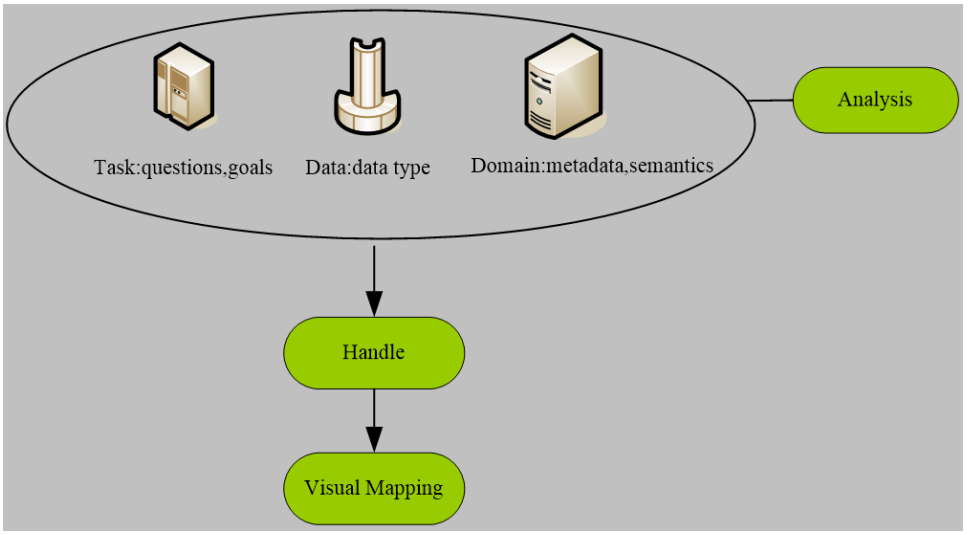


Figure 3. Basic flow of visualization



2.5.2 Content of Interaction Design in Data Visualization

When using the visualization system, users can use interactive technology to change the visual interface in the visualization system, so that users can increase their understanding of data information through changes in various types of images, thus assisting them towards completing tasks or specific goals (Hayes and Amanda, 2017). The commonly used visualisation system is mainly based on the map application of mobile devices, which is a visualisation system of spatial information. Users can see

their real-time location from the map through the global positioning system, and can also query the destination location, plan the optimal route, and navigate through relevant operations.

The basic flow of visual analysis is shown in Figure 4, which shows the interaction process between users and the visualisation system. With user data as the initial point, the user data is input and mapped in the visualization system. Then the visualization system would calculate the user data, convert it into a visual image, and present the results. The relevant information would be fed back to the user, and the user would obtain the results to analyse them, and then start a new round of series operations and so on.

3. INTERACTIVE DATA MINING PROCESS VISUALISATION SYSTEM

3.1 Visualisation of the Data Mining Process

The visualisation of the data mining process aims to take the data parameters and influencing factors in data mining algorithms as the research object and conduct visual analysis on them. In the traditional mode, data visualisation is just a visual analysis of data objects, and there is no effective visualisation of them in the process of data mining, wherein no effective integration exists between the two.

3.2 Visualization System Design

The overall framework of the visualisation system is shown in Figure 5. The system framework comprises the visualization presentation layer, the execution engine service layer, and the data layer.

The execution engine service layer has the function of analyzing and processing data and visualizing the process of data mining. This layer is mainly composed of the following three modules:

Data pre-processing module: the feature of this module is that it uses the principal component analysis algorithm and applies the maximum information coefficient to this algorithm, which can effectively extract features from data. The algorithm shows good effect in processing high-dimensional data and has strong ability to reduce dimensions.

Figure 4. Basic flow of visual analysis

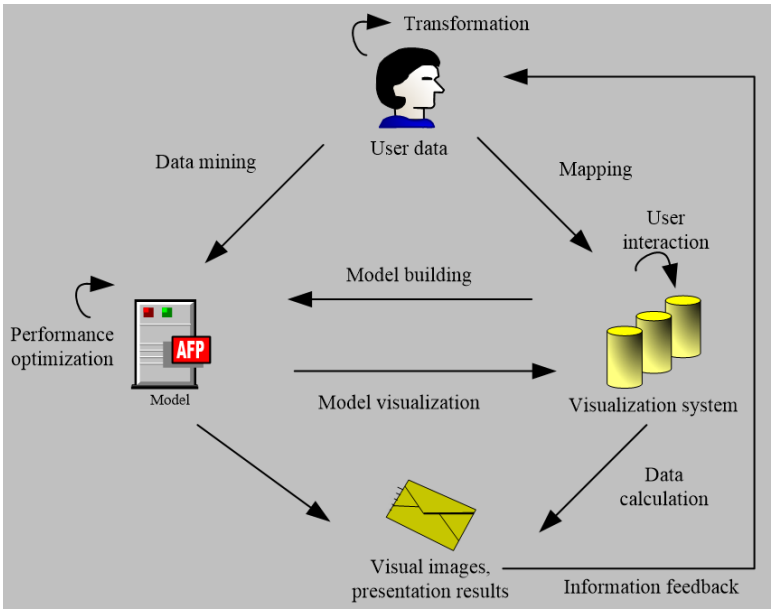
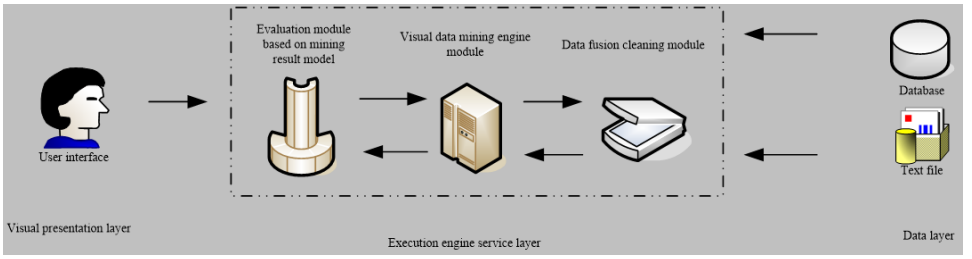


Figure 5. Overall framework of visualization system



Visual data mining engine module: This module is mainly responsible for the construction of the algorithm model, acquisition of algorithm parameters and visual parameters, threshold setting and so on, and allows users to participate in the interactive analysis of data mining.

Data mining result model evaluation module: when mining data, an intermediate result set would be generated. This module is mainly used for visual presentation, in which users can adjust the relevant parameters of the algorithm.

3.3 Improved Principal Component Analysis Algorithm

The traditional principal component analysis algorithm only pays attention to the linear correlation between variables when defining the correlation matrix, and does not pay attention to the type information in the dimension reduction process, resulting in low classification accuracy. This paper proposed an improved principal component analysis algorithm by fusing information coefficients. This algorithm can provide further information about the relationship between features and their types, and the dimensionality reduction effect of data is more obvious when selecting features. Under the same feature dimension, the classification accuracy of the algorithm would be higher.

According to the theory of probability and statistics, the greater the variance of the principal component, the greater the amount of information it covers, indicating the greater the importance of the principal component. The maximum value can be obtained by solving the square difference, which can be regarded as the solution of covariance. The objective conversion function is as follows:

$$\mathrm{Q}^{\mathrm{W}} = \sum \mathrm{E} = \Phi \tag{1}$$

Suppose there are two random variables, m and n, whose marginal probability distribution can be expressed as $\mathrm{t}\left(\mathrm{m}\right), \mathrm{t}\left(\mathrm{n}\right)$ and joint probability distribution as $\mathrm{t}\left(\mathrm{m},\mathrm{n}\right)$, then mutual information is defined as follows:

$$\mathrm{R}\left(\mathrm{M},\mathrm{N}\right) = \sum\sum \mathrm{t}\left(\mathrm{m},\mathrm{n}\right) \log \frac{\mathrm{t}\left(\mathrm{m},\mathrm{n}\right)}{\mathrm{t}\left(\mathrm{m}\right)\mathrm{t}\left(\mathrm{n}\right)} \tag{2}$$

Select a visualisation system dataset T and divide it into a grid. The grid has m columns and n rows. The grid is represented as U. Define the maximum mutual information of the dataset in the grid.

$$\mathrm{R}^{*}\left(\mathrm{T},\mathrm{m},\mathrm{n}\right) = \max \mathrm{R}\left(\mathrm{T}\middle|\mathrm{U}\right) \tag{3}$$

$\mathrm{T}\left|\mathrm{U}\right.$ represents the U grid division of visualization system dataset T. With mutual information, the grid division can be evaluated. By dividing different grids, a maximum characteristic matrix can be obtained, which is recorded as $\mathrm{I}\left(\mathrm{T}\right)_{\mathrm{m,n}}$, and the formula is as follows:

$$\mathrm{I}\left(\mathrm{T}\right)_{\mathrm{m,n}} = \frac{\mathrm{R}^{*}\left(\mathrm{T},\mathrm{m},\mathrm{n}\right)}{\log\min\left\{\mathrm{m},\mathrm{n}\right\}} \tag{4}$$

The maximum information coefficient is defined as

$$\mathrm{MIC}\left(\mathrm{T}\right) = \max_{\mathrm{mn}<\mathrm{O}\left(\mathrm{p}\right)}\left\{\mathrm{I}\left(\mathrm{T}\right)_{\mathrm{m,n}}\right\} \tag{5}$$

p represents the data sample size of the visualization system and $\mathrm{O}\left(\mathrm{p}\right)$ represents the upper limit value of grid division.

The improved PCA algorithm incorporates category information in the calculation process, and the improvement process is as follows:

Firstly, change Formula (1) to:

$$\mathrm{O}^{\mathrm{W}}\gamma_{\mathrm{A}}\mathrm{O} = \Phi \tag{6}$$

γ_{A} represents the sum of the maximum information coefficient matrices among features, O represents the transformation matrix of the improved principal component analysis algorithm, and Φ represents the diagonal matrix of the feature coefficients.

$$\gamma_{\mathrm{A}} = \sum_{\mathrm{d}=1}^{\mathrm{s}}\mathrm{MIC}\left(\mathrm{A}\left|\mathrm{D}\right.\right) \tag{7}$$

s represents the total number of categories of data samples in the visualisation system, whilst $\mathrm{MIC}\left(\mathrm{A}\left|\mathrm{D}\right.\right)$ represents the maximum information coefficient matrix.

The principal components of the improved principal component analysis method are recorded as g, and the following can be obtained:

$$\mathrm{g} = \mathrm{O}^{\mathrm{W}}\mathrm{m} \tag{8}$$

In principal component analysis, the specific number of principal components depends on the ratio of the total eigenvalue matched by the principal components to the total eigenvalue of the whole, whilst their ratio is the cumulative contribution rate. Define the total cumulative contribution rate of the first h principal components, then:

$$\vartheta_{\mathrm{h}} = \frac{\sum_{\mathrm{i}=1}^{\mathrm{h}}\mathrm{l}_{\mathrm{i}}}{\sum_{\mathrm{i}=1}^{\mathrm{j}}\mathrm{l}_{\mathrm{i}}} \tag{9}$$

i represents the quantity and l represents the eigenvalue of the maximum information coefficient matrix.

3.4 Test and Interactive Data Mining Process Visualization System

To verify the effectiveness of the improved principal component analysis method for the performance optimization of the visualization system, this paper selected some data from the system database as samples to generate four sets of data sets. The improved principal component analysis method in this paper was used to test and analyse these datasets, and the traditional algorithm is also used for comparative experiments.

3.4.1 Cumulative Contribution Rate Test

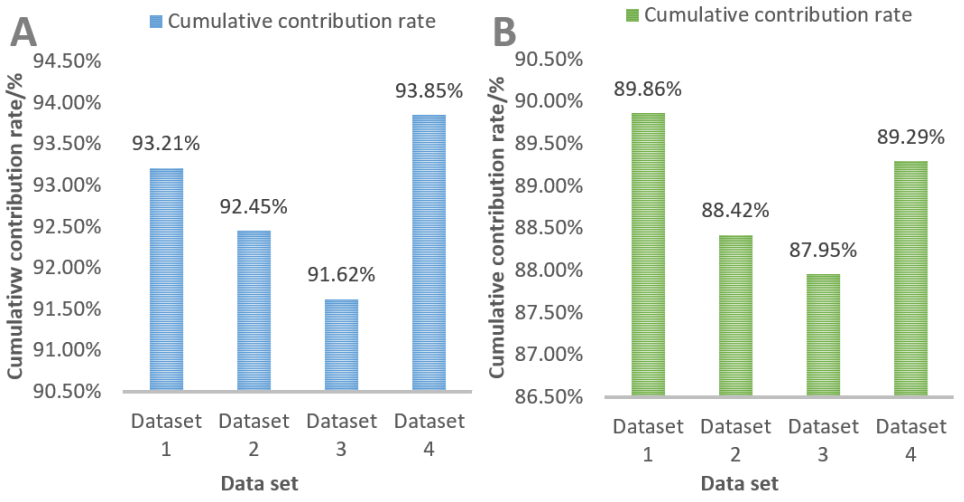
To compare the dimensionality reduction ability of different algorithms on system data, this paper tested the dataset from the aspect of cumulative contribution rate, and the test results were shown in Figure 6.

Figure 6A shows the cumulative contribution rate of the dataset under this algorithm

Figure 6B shows the cumulative contribution rate of the dataset under the traditional algorithm

Figure 6 shows that the two algorithms have certain differences in the cumulative contribution rate test results of each group of data sets in the system. In Figure 6A, the cumulative contribution rate of each group of data sets is relatively high, basically maintaining approximately 92%. Amongst the four data sets, the cumulative contribution rate of data set 3 was the lowest, 91.62%. The cumulative contribution rate of dataset 4 test is the highest, reaching 93.85%, which can calculate that the average cumulative contribution rate of each dataset is 92.78%. In Figure 6B, the cumulative contribution rate of each group of data sets is slightly lower, basically below 90%. The cumulative contribution rate of dataset 3 is the lowest, 87.95%, and that of data set 1 is the highest, 89.86%. The average cumulative contribution rate of each data set was 88.88%. It can be seen from the data that under the algorithm in this paper, the cumulative contribution rate of each group of data sets is higher. The higher the cumulative contribution rate, the better the dimensionality reduction ability of this algorithm is, and it can play a good role in optimising the system performance. Therefore, the algorithm in this paper has certain advantages in terms of cumulative contribution rate.

Figure 6. Cumulative contribution rate test under different algorithms



3.4.2 Classification Accuracy Test

To compare the differences between the two algorithms further, people also tested and analysed the classification accuracy. The specific results are shown in Figure 7.

Figure 7A shows the classification accuracy of the dataset under this algorithm

Figure 7B shows the classification accuracy of the dataset under the traditional algorithm

Figure 7 shows that the classification accuracy tests of the two algorithms for each group of datasets differ. In Figure 7A, the classification accuracy of each data set is relatively high, exceeding 93% overall.. The classification accuracy of dataset 1 is the lowest, 94.25%, and that of dataset 4 is the highest, 95.67%. It can be calculated that the average classification accuracy of each dataset is 94.99%. In Figure 7B, the classification accuracy of each data set is relatively low, basically below 92%. The classification accuracy of dataset 2 is the lowest, with 90.37%, and that of dataset 4 is the highest, with 91.76%. The average classification accuracy of each dataset is 90.98%. By contrast, the classification accuracy of the algorithm in this paper is higher, which shows that the algorithm has higher classification accuracy and better classification effect, so the algorithm in this paper has more advantages.

3.4.3 Dimension Reduction Time Test

To compare the advantages and disadvantages of the two algorithms more comprehensively, people also tested and analysed each group of datasets from the aspect of dimension reduction time, and the test results are shown in Figure 8.

Figure 8A shows the dimension reduction time of the dataset under the algorithm in this paper

Figure 8B shows the dimension reduction time of the dataset under the traditional algorithm

Figure 8 shows that different algorithms have obvious differences in testing the dimensionality reduction time of datasets. In Figure 8A, the dimensionality reduction time of each group of data sets is controlled below 4s. It can be seen that the dimensionality reduction time of this algorithm is relatively short, whilst the fluctuation amplitude between each group of data sets is relatively small. The stability of the algorithm is good. The dimension reduction time of dataset 4 is the shortest, 3.17s, and that of dataset 2 is the longest, with 3.96s. It can be calculated that the average dimension reduction time of each dataset is 3.46s. In Figure 8B, the dimensionality reduction time of each data set is relatively long, exceeding 5s. Among them, the dimensionality reduction time of dataset 3 is

Figure 7. Classification accuracy test under different algorithms

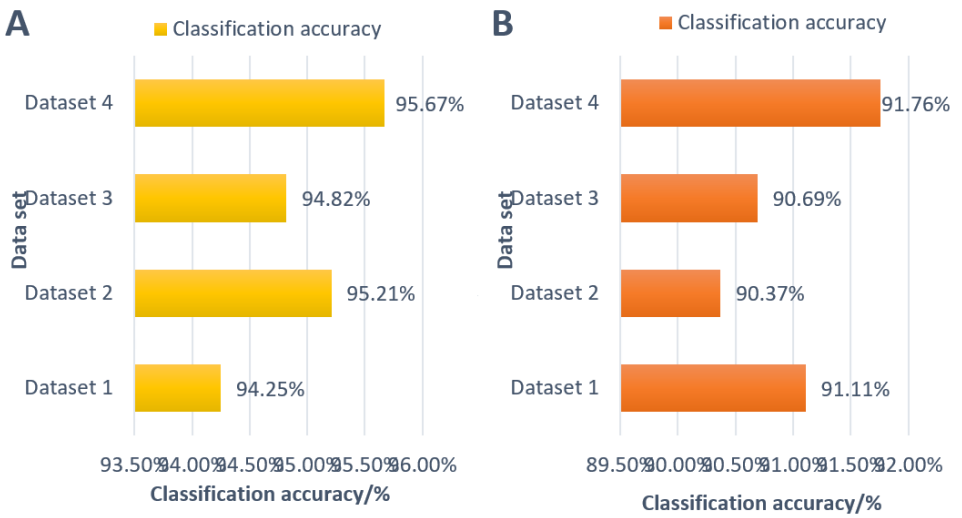
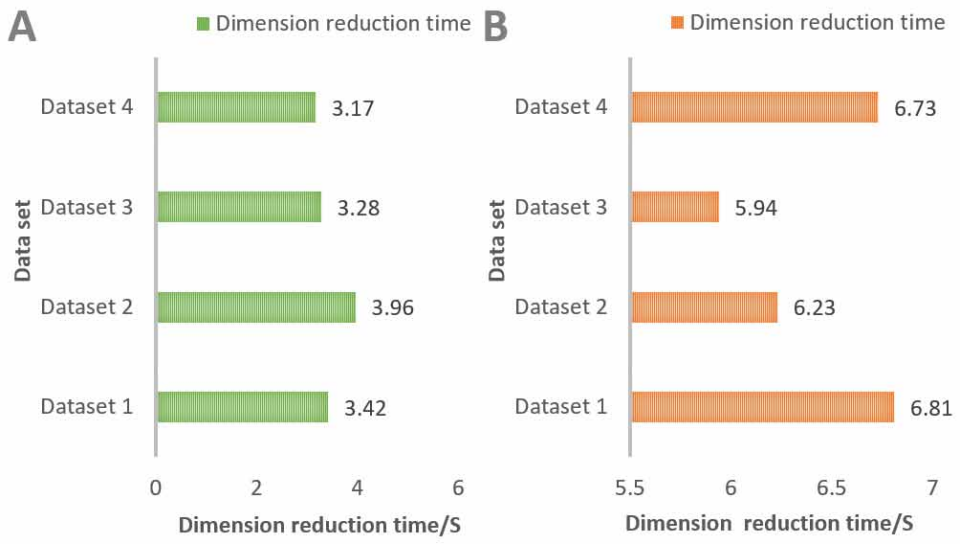


Figure 8. Dimension reduction time test of different algorithms



the shortest, with 5.94s. The dimension reduction time of dataset 1 is the longest, with 6.81s, while the average dimension reduction time of each dataset is 6.43s.

4. CONCLUSION

With the birth and development of new media technology, it has been gradually applied in all walks of life. Nowadays, the economy is in the stage of sustainable prosperity and development, whilst the living conditions of human beings are also continuously improving. With the improvement of the quality of life, the people's demands for interactive products tend to be diversified, no longer simply meeting the basic functional needs. To fulfil people's various needs for interactive products and design satisfactory interactive products, this paper applied artificial intelligence and multimedia technology to product interaction design. In this paper, an interactive data mining process visualization system was built based on the visualization analysis technology, and the related test research was conducted with the improved principal component analysis algorithm. The experiment shows that the algorithm can effectively improve the cumulative contribution rate and classification accuracy of the visualization system and shorten the dimension reduction time of the system. In future studies, the improved PCA algorithm needs to adapt to the relevant requirements of the visualization system constantly and improve the performance of the algorithm, which can provide more effective help for the visual analysis of product interaction design.

REFERENCES

Bach, B., Sicat, R., Beyer, J., Cordeil, M., & Pfister, H. (2017). The hologram in my hand: How effective is interactive exploration of 3D visualizations in immersive tangible augmented reality? *IEEE Transactions on Visualization and Computer Graphics*, *24*(1), 457–467. doi:10.1109/TVCG.2017.2745941 PMID:28866590

Cepeda, R. G. (2019). Rescuing new media art from technological obsolescence. *DAT Journal*, *4*(3), 37–46. doi:10.29147/dat.v4i3.145

Chan, O., Sylvia, M. (2019). A review of artificial intelligence adoptions in the media industry. *International Journal on Media Management*, *21*, 193-215.

Cheong, P. H. (2017). The vitality of new media and religion: Communicative perspectives, practices, and changing authority in spiritual organization. *New Media & Society*, *19*(1), 25–33. doi:10.1177/1461444816649913

Dalle, J., Sutarto, H., & Hayati, N. B. (2017). The development of interactive multimedia learning pyramid and prism for junior high school using macromedia authorware. *The Turkish Online Journal of Educational Technology*, *16*(3), 714–721.

Hayes, A. F., & Amanda, K. M. (2017). A tutorial on testing, visualizing, and probing an interaction involving a multicategorical variable in linear regression analysis. *Communication Methods and Measures*, *11*(1), 1–30. doi:10.1080/19312458.2016.1271116

Heer, J. (2019). Agency plus automation: Designing artificial intelligence into interactive systems. *Proceedings of the National Academy of Sciences of the United States of America*, *116*(6), 1844–1850. doi:10.1073/pnas.1807184115 PMID:30718389

Katoh, K., John, R., & Kazunori, D. Y. (2019). MAFFT online service: Multiple sequence alignment, interactive sequence choice and visualization. *Briefings in Bioinformatics*, *20*(4), 1160–1166. doi:10.1093/bib/bbx108 PMID:28968734

Kligler, V. N. (2017). Alternative citizenship models: Contextualizing new media and the new "good citizen". *New Media & Society*, *19*(11), 1887–1903. doi:10.1177/1461444817713742

Liu, Y. B., Sivaparthipan, C. B., & Achyut, S. (2022). Human–computer interaction based visual feedback system for augmentative and alternative communication. *International Journal of Speech Technology*, *25*(2), 305–314. doi:10.1007/s10772-021-09901-4

Ouchchy, L., Allen, C., & Big, D. (2020). AI in the headlines: The portrayal of the ethical issues of artificial intelligence in the media. *AI & Society*, *35*(4), 927–936. doi:10.1007/s00146-020-00965-5

Scolari, C. A., Masanet, M.-J., Guerrero-Pico, M., & Establés, M.-J. (2018). Transmedia literacy in the new media ecology: Teens' transmedia skills and informal learning strategies. [EPI]. *El Profesional de la Información*, *27*(4), 801–812. doi:10.3145/epi.2018.jul.09

Sundar, S. S. (2020). Rise of machine agency: A framework for studying the psychology of human–AI interaction (HAII). *Journal of Computer-Mediated Communication*, *25*(1), 74–88. doi:10.1093/jcmc/zmz026

Twenge, J. M., Joiner, T. E., Rogers, M. L., & Martin, G. N. (2018). Increases in depressive symptoms, suicide-related outcomes, and suicide rates among US adolescents after 2010 and links to increased new media screen time. *Clinical Psychological Science*, *6*(1), 3–17. doi:10.1177/2167702617723376

Wargo, J. M. (2017). Every selfie tells a story…: LGBTQ youth lifestreams and new media narratives as connective identity texts. *New Media & Society*, *19*(4), 560–578. doi:10.1177/1461444815612447

Binbin Zhang was born in Tieling, Liaoning. P.R. China, in 1990. He received his master's degree in design from LuXun Academy of Fine Arts in China. Now he is working in the network and new media major of the Academy of Arts and Media of Shenyang Institute of Technology. His research fields include digital media interaction design and UI design.