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ORIGINAL

RESEARCH ON INNOVATION OF NEW MEDIA SPORTS HEALTH CULTURE COMMUNICATION PLATFORM BASED ON DEEP LEARNING

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ABSTRACT

With the rapid development of science and technology, especially the breakthroughs of deep learning and artificial intelligence technology, new media has become an important channel for the dissemination of sports and health culture. Traditional sports and health culture communication is faced with challenges such as low efficiency of information transmission, insufficient audience participation and insufficient content individuation. Therefore, the innovation of new media platform based on deep learning is particularly important. With the rapid development of Internet technology and network, the network has become an important platform for people to obtain sports health culture information. The number of texts in the network has shown an explosive growth trend, but it is inevitable that there are problems of good and bad. Deep learning is a new research direction in the field of machine learning. In recent years, it has made a breakthrough in speech recognition, computer vision and other applications. Based on in-depth learning, this paper analyzes the changes of sports health culture communication under the new media environment, mainly through further analysis and sorting out the comparative study of sports health culture communication and traditional sports health culture communication, and takes "Nationwide Fitness Programs" as a main research object to promote the development of contemporary sports health culture communication, so as to discuss the value and current situation of sports health culture communication under the new media environment, The ultimate goal is to make a scientific prediction of the future of sports health culture

communication in the new media environment through objective and calm analysis.

KEYWORDS: Deep Learning; Deep Neural Network; New Media; Sports Health Culture; Communication Status.

1. INTRODUCTION

The emergence of massive information makes users face difficulty in choosing when obtaining sports health information. Deep learning technology can analyse users' interests and behaviour patterns to provide personalized content recommendations and enhance the user experience. New media platforms attract user participation through highly interactive forms (such as short videos, live broadcasts, etc.). Deep learning can optimize the user interaction experience and enhance the user's sense of participation and belonging through intelligent feedback mechanisms. Today, with the continuous development and progress of human civilization, the research on the development, cognition and innovation of sports health culture communication has received unprecedented attention (Zhou & Yu, 2021). Human spiritual communication cannot be separated from the progress of sports health culture activities. The development and prosperity of sports health culture activities require the positive adaptation and adjustment of the mode of communication in sports health culture. The progress of communication has a profound impact on the development of sports health culture activities. Media is an indispensable element in human communication activities (Qu et al., 2020). The production and circulation of sports health culture are also inseparable from the media of sports health culture. Only through the media can the sports health culture works written by writers be known and fed back by the audience (Yan, 2020). The existence of sports health culture communication cannot be separated from the media, and the two complement each other. Suppose there is no media in the activities of sports health culture communication. In that case, readers will not be able to participate in the process of sports health culture communication, and cannot contact and understand the content of sports health culture. Therefore, the influence of new media on sports health culture, how to develop and spread sports health culture in the new media era have become urgent issues to be discussed(Lim, 2019). The change of media in the new era will undoubtedly lead to changes in sports health culture theory and practice, which will have a profound impact on the development of sports health culture communication. Therefore, a series of influences of new media on sports health culture urge us to think urgently about the greatest value and ultimate significance of this change for human life and human civilization. As an important dimension of studying sports health culture, today we can't independently study the external and internal aspects of sports health culture communication without the role of media (Du & Luo, 2022). Deep learning is a branch of machine learning. In many cases, machine learning has almost

become an alternative concept of artificial intelligence(Tong et al., 2021). Simply put, machine learning algorithms enable computers to learn potential rules and characteristics from a large number of existing data, which can be used to intelligently identify new samples or predict the possibility of something in the future (Yang, 2022). Since the 1990s, from the perspective of the hierarchical structure of machine learning algorithm model, the development of machine learning has roughly experienced two stages: shallow learning stage and deep learning stage In essence, deep learning is to build a machine learning framework model with multiple hidden layers, and train through large-scale data to obtain a large number of more representative feature information(Chen et al., 2019). So as to classify and predict the samples and improve the accuracy of classification and prediction. This process is to achieve the goal of feature learning by means of deep learning model(Jin & Min, 2021). The difference between the deep learning model and the traditional shallow learning model is that the structure of the deep learning model contains more layers, and the number of layers containing hidden layer nodes is usually above the layer, and sometimes even contains hidden layer nodes more than the layer; It clearly emphasizes the importance of feature learning for the depth model, that is, through layer by layer feature extraction, the features of data samples in the original space are transformed into a new feature space to represent the initial data, which makes the classification or prediction problem easier to achieve(Han et al., 2023). This paper chooses to study the dissemination of sports health culture works in the new media environment based on deep learning. Its main contents and innovations are as follows:

(1) Internet, as an important form of sports health culture creation, sports health culture dissemination and sports health culture reading, provides new channels, new forms and new spaces for individuals and enterprises. Firstly, this paper studies in detail the changes of sports health culture dissemination under the new media environment.

(2) The change of communication mode has brought about the change of communication content at the same time. The content of sports health culture works presented by new media such as movies, television, mobile phones and the Internet often emphasizes the visual effect, and the narrative methods of video media and electronic media themselves are also different from those of paper media. This paper makes a comparative study of the differences and makes an analysis.

(3) In the new media era, the mode of communication has changed, and the value of sports health culture communication has been enhanced. It is not only conducive to building a new social aesthetic consciousness, but also plays a role in promoting the prosperity and development of sports health culture creation. This paper studies the sports health culture and its communication analysis in the new media era based on deep learning. The structure is as

follows: The first chapter is the introduction. This part mainly expounds the great changes in sports health culture communication in the new media era, explains the research background and significance of this paper in detail, and puts forward the research content and innovation of this paper. The second chapter is a summary of the relevant concepts, specifically explaining the concept of "sports health culture communication", summarizing the characteristics and values of sports health culture communication in the new media era, and analysing its advantages and disadvantages. The third chapter is the method part. By further analysing and sorting out the key points of the comparative study between the sports health culture communication in the new media era and the traditional sports health culture communication, and taking "Nationwide Fitness Programs" as a main research object to promote the development of the current sports health culture communication, the value and current situation of the sports health culture communication in the new media environment are discussed. The fourth chapter is the experimental analysis. Through simulation experiments, the traditional communication methods are compared with the communication methods under the new media, and the relevant information is obtained by analysing the data. The fifth chapter, conclusion and outlook, through objective and calm analysis, can have a scientific judgment on the prospects of sports health culture communication in the new media environment. This part mainly reviews the main contents and results of this study, summarizes the research conclusions and points out the direction of further research.

2. Related Work

Sports Health Culture communication is a process in which communicators transmit sports health culture information or sports health culture products to sports health culture consumers by means of certain material media and modes of communication, that is, what people usually call the dissemination and circulation activities of sports health culture society(Rau, 2020). The purpose of sports health culture communication is to transform the creators' sports health culture works into the freedom of information shared by the public. Different media have a direct relationship with the scope and effect of sports health culture communication, and influence the structure and essence of sports health culture system. This paper holds that the significance and value of sports health culture are contained in sports health culture texts, so this paper defines sports health culture communication as the communication of sports health culture texts, which is sports health culture communication in a narrow sense(Karami et al., 2020). "Communication science was introduced into China in the early 1980s. The research on the combination of sports health culture and communication science dates back to the early 1990s. It was not until the mid-1990s that the research began to show results. Until now, the research in this field has been vigorously carried out..." Combining the perspective of communication to study sports health culture

related issues, not only enriches the theoretical reserves of sports health culture itself, but also makes communication itself get a new development(Ren & Zhao, 2023). At present, the research on "media and sports health culture" is very popular. Most researchers agree that media will bring great influence to the field of sports health culture. Most of them think that the changes of the content, mode, creative idea and existing form of sports health culture cannot be separated from the role of media system. The research on the relationship between media and sports health culture is the core in the field of communication and sports health culture research(Gong et al., 2017). This kind of research has produced many remarkable achievements and representative academic papers, which provide a good reference for the research of later generations. Compared with traditional media, new media is a communication form that provides entertainment and information services to users by using network technology, digital technology and mobile technology, relying on the Internet, satellite, wireless communication network and digital TV, mobile phone, computer and other terminals. With the arrival of the new media era, people have higher requirements for the acquisition of sports health culture, and the main path of sports health culture communication has also changed. And the fuller dissemination of sports health culture makes sports health culture value more fully generated and realized in sports health culture creation and reception (Basori et al., 2019). Some sports health culture critics pointed out that "while the traditional sports health culture rules and sports health culture order are structured by modern media, they will also give birth to sports health culture rules and orders suitable for the new media era. After the traditional sports health culture field is subverted, a new sports health culture field will be created(Rathore et al., 2019). Modern media is the subverter and builder of traditional sports health culture"(Wang et al., 2021). With the popularization and development of deep learning network, relevant scholars have simulated the neural system of human processing various natural information, and obtained various neural network models, which have been used in pattern recognition, prediction, classification, regression, optimization, feature extraction, control and personalized recommendation (Zhang et al., 2019). Neural network can simulate the deep understanding of the structure of natural language H by human brain, and extract text features quickly, accurately and concisely. Therefore, based on the deep learning algorithm, this paper studies the text dissemination in the new media era (Niu et al., 2018). In the past historical period, the development of the form of sports health culture communication was not obvious. Until the new media era brought by the media technology revolution, sports health culture communication ushered in a turning reform (Hosny et al., 2019). The addition of new media has changed the previous media pattern. As a new "cooperative partner" of sports health culture communication, it has caused people to rethink the relationship between sports health culture and media(Xu et al., 2023).

3. Methodology

3.1 Sports Health Culture Communication in the New Media Era

The issue of sports health culture communication has attracted more and more scholars' attention and has become a hot topic in journalism and sports health culture research. However, while various media have created a convenient, free, open, and shared communication space for information dissemination, the survival space of traditional sports health culture has been seriously squeezed and continuously reduced. Digital reading has brought a serious impact on traditional sports health culture, and it seems that traditional sports health culture has lost the possibility of continuous progress. But from the sports health culture essence, it is not so. Although new media has had a serious impact on and influenced traditional sports health culture, with the support of new communication means and digital technology, the status and value of sports health culture will not change fundamentally. What will change is its presentation mode and communication mode. From the perspective of sports health culture value and communication, the new media technology has further enriched and expanded the receiving group of sports health culture, provided a more convenient reading mode for the audience, and promoted the development of sports health culture to a certain extent. Of course, we should also face up to the disadvantages brought by the new media technology to the future development and communication of sports health culture, avoid the disadvantages, tap the advantages, and make the communication media a booster for the development of sports health culture. The new media is used to spread, and its spread scope is expanded, making the sports health culture creation groups richer. The architecture diagram of intelligent communication model is shown in Figure 1.

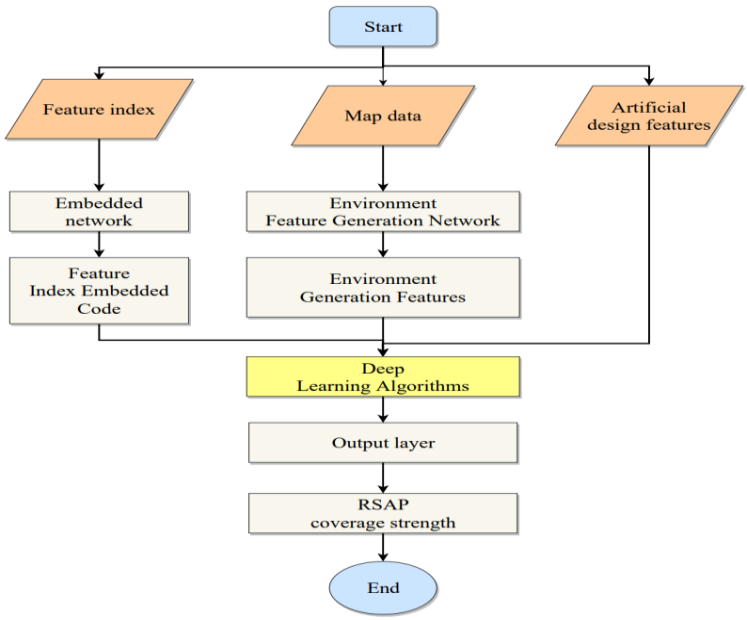

Figure 1: Flow Chart of Intelligent Communication Model Based on Deep Learning

3.2 Deep Learning and Decision Tree Model

The analysis of sports health culture communication naturally needs the help of communication model. The classical propagation model reflects the law of signal attenuation in a certain area. The intelligent propagation model also needs to carry out feature design and fitting on the basis of the classical statistical model, semi empirical model and deterministic model. The basic models of the intelligent propagation model proposed in this paper are deep learning algorithm and decision tree algorithm, so this section gives the basic theory of these algorithms. Deep learning is a branch of machine learning, but deep learning is a multi-layered network. The output of a single-layer system is the input of the next layer system. The input features are combined with the features of the next layer system to form more abstract and higher-order features to fit the distribution of data. Generally, there are input layer, output layer and hidden layer. The propagation analysis process based on deep learning is shown in Figure 2.

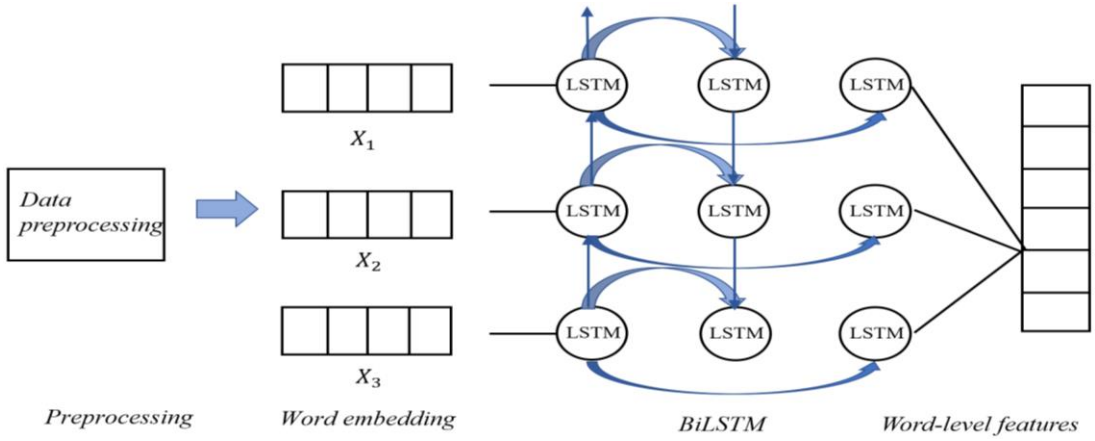

Figure 2: Propagation Analysis Process Based on Deep Learning

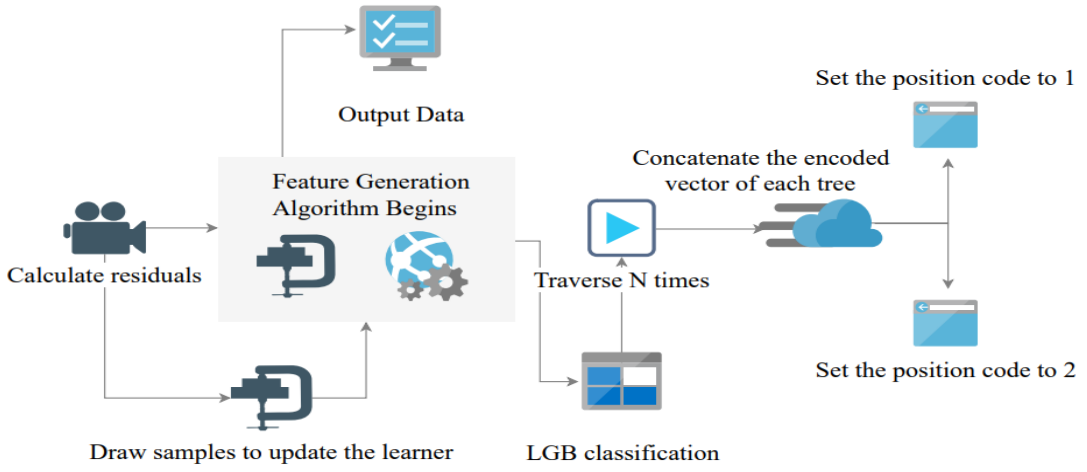

Figure 3: Generating network process diagram based on the characteristics of Light GBM

Decision tree model: A decision tree is a kind of tree used for

classification. Each non-leaf node of the decision tree corresponds to the mark of the sample input feature, and the path between each parent node and its child node is marked by the possibility value of the feature. The classified sample starts from the root of the tree, and through each node, the next child node to enter is selected according to the value corresponding to the characteristics required by the current node of the sample, and the leaf node corresponds to the category of the sample. CART algorithm: Also known as classification regression algorithm. The calculation of Gini coefficient does not include logarithmic calculation, and the amount of computation is relatively small compared with the information gain. If the training data set is D, divided into and according to feature A, the specific calculation formula of Gini coefficient is:

$$Gini(p) = \sum_{k=1}^{K} P_k(1-p) = 1 - \sum_{k=1}^{K} P_k \quad (1)$$

$$Gini(D,A) = \frac{D_1}{D} Gini(D_1) + \frac{D_2}{d} Gini(D_2) \quad (2)$$

After the improvement of cart algorithm, decision tree is not only used in classification problem, but also can make regression decision. The detailed steps of the regression tree generation algorithm are as follows: in the eigenvalues of the training data set, select the split point:

$$min_j = \left[min \sum_{(j,s)} (y_i - c_1) + min \sum_{j,s} (y_i - c_2) \right] \quad (3)$$

Let be the number of leaf nodes of the decision tree, and the final decision tree expression is as follows:

$$f(x) = \sum_{m=1}^{M} c_m I \quad (4)$$

The decision tree algorithm is easy to over fit, so it needs to give a stop condition and prune, such as: controlling the variable purity of each leaf and the depth of the tree in the training process; After pruning, leaf nodes are used to replace the subtree with insufficient confidence. Post pruning in pruning algorithm is often used.

3.3 Basic Structure of Neural Network

The output of the basic structure of the neural network is:

$$y = f(\sum_{i=1}^{n} w_i x + b) \quad (5)$$

Generally, the nonlinear function maps the output signal to a certain range. After linear weighting, it is still weighted without deep learning of nonlinear mapping, which has no deep meaning. B is the bias of the neural network, which carries out affine transformation to increase or decrease the

output value. Let z be the output of the weighted sum of neural networks. The corresponding formulas of several activation functions are as follows: Sigmoid function: the value range of the output is (0,1), and the input parameters are controlled within 0 to 1 of the output, so it is often used as a binary activation function.

$$\beta(x) = \frac{1}{1+e^{-z}} \tag{6}$$

Tanh function: the output value range is between (-1,1) and the average output value is 0, so the data distribution of the output can be controlled. □

$$f(z) = \tanh(z) = \frac{e^{z}-e^{-z}}{e} \tag{7}$$

Relu function: when the relu function is input with x < 0, the gradient is 0, which can resist the gradient disappearance problem. However, the relu function has a neuron problem that has been frozen all the time, so it was optimized and leakyrelu was proposed. When x < 0, the gradient is 0.01.

$$Relu = \max(0, x) \tag{8}$$

Neural network is a multi-layer perceptron network constructed by basic structure. Neural network can fit any nonlinear problem well. The fitting process of the perceptron to the function on the data is called learning. When the data space is R:

$$T = \{(x_i, y_i), (x_2, y_2), \dots, (x_N, y_N)\} \tag{9}$$

The solution to minimize the loss function is:

$$minL(w, b) = -\sum_x y_i(wx + b) \tag{10}$$

L is the loss function, and the parameters W and B are constantly updated in the training process to minimize the loss function.

4. Simulation Experiment

After the training of the cultural communication model based on the new era media is completed, the test samples are input into the network model for testing, and compared with the traditional communication methods. The test sample is 1000 users of sports health culture communication. In the process of testing, the test samples pass through the same network structure, but the bias parameter B vector and weight parameter W matrix in the network are learned by the training part. This chapter selects a group of representative recognition results (including recognition efficiency and recognition accuracy), and the results are shown in Figure 4. Under the same experimental conditions, the

transmission rate of the improved model can reach 87.9% on the test set. Compared with the traditional communication model, the accuracy rate has increased from 58.2% to 87.9%, and the recognition efficiency has increased from 47s to 10s, which can be said to be a leap forward in the situation of repeated network information.

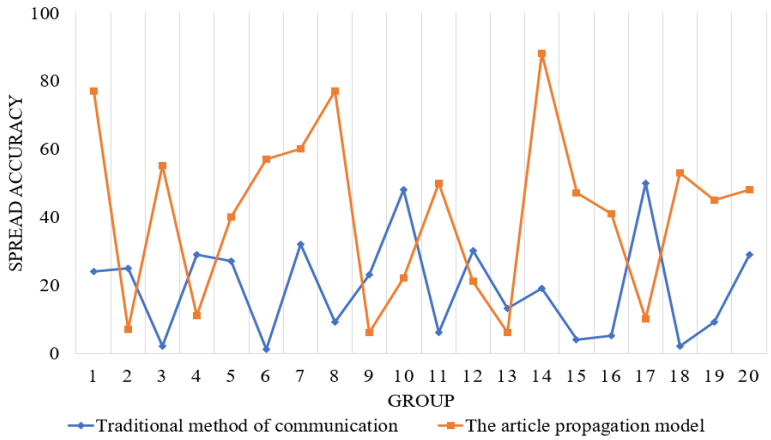

Figure 4: Propagation Rate of Traditional Propagation Model and this Model

At the same time, the algorithms are different, and can be optimized according to the data. Comparing the SGD and adagrad optimization effect curves in Fig. 5, it can be seen that with the increase of the number of iterations (steps), the loss function value (loss) of the adagrad optimization algorithm decreases faster than that of the SGD algorithm, and the optimization effect is better, thus effectively improving the propagation accuracy and efficiency.

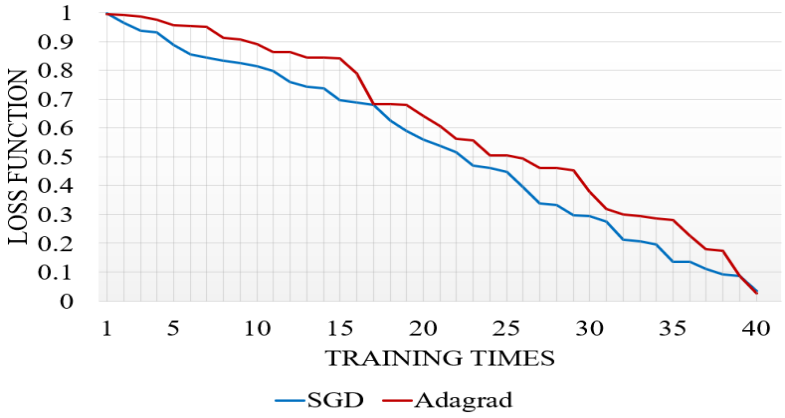

Figure 5: Comparison of Optimization Effects Between SGD and Adagrad

Comparing the error curves of training and testing in Figure 6 and Figure 7, when keep_prob=1 in training, there is over-fitting. When keep_drop=0.75 (i.e., dropping 25%), Dropout played a role. Comparing the training and testing error curves in Figure 6, it can be seen that when keep_prob=1, the adaptability of the model to the training data is better than that of the testing data, and there is over-fitting.

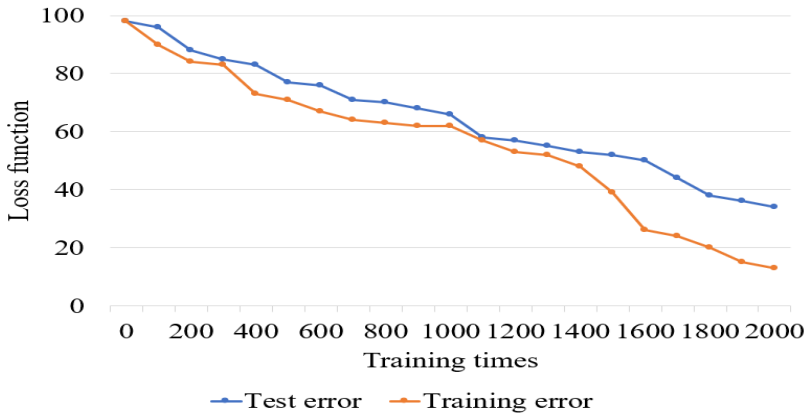

Figure 6: Curve of Training and Testing Error When Keep _ Prob = 1

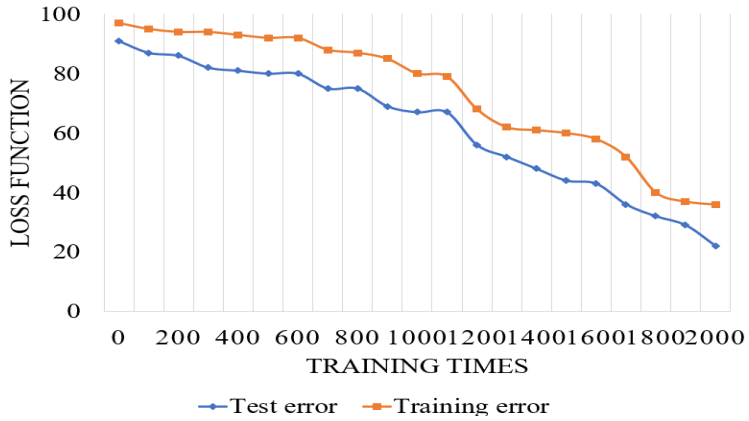

Figure 7: Curve of Training and Testing Error When Keep _ Prob = 0.75

Comparing the training and test error curves in Fig. 7, it can be seen that when keep_ When prob = 0.75 (i.e., drop drops by 25%), the effect is much better, and there is basically no overfitting phenomenon. To verify the accurate propagation performance of the propagation model, MNIST and ImageNet data sets are selected for experiments. Among them, the error rate curves of the improved algorithm (sports health culture communication model based on deep learning) and the original algorithm (traditional multi-layer perceptron algorithm: MLP algorithm) on MNIST and ImageNet data sets are shown in Figure 8.

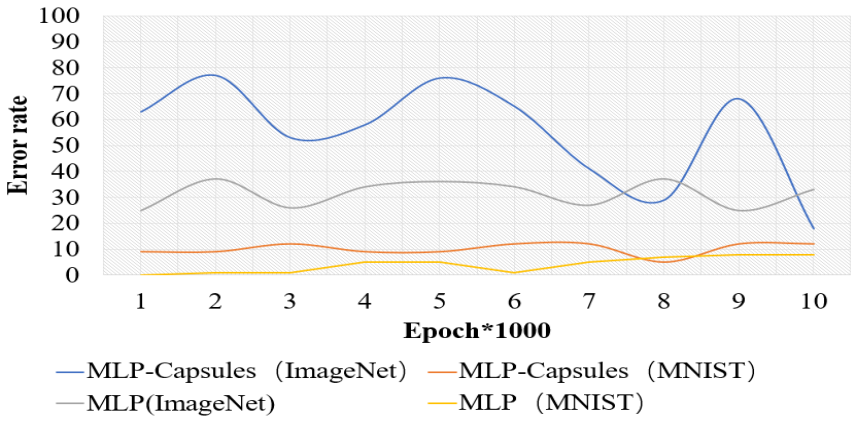

Figure 8: Change Curve of Error Recognition Rate on MNIST and Imagenet

It can be found from the analysis of Fig. 8 that, with the increase of iteration times, on MNIST and Imagenet datasets, the error recognition rate of the traditional algorithm rebounds in the process of decline (i.e., there is overfitting phenomenon), but the error recognition rate of the improved algorithm is constantly decreasing, that is, the improved algorithm has the function of suppressing overfitting and can effectively improve the accuracy of image recognition. It can also be found that for MNIST datasets, the error recognition rate of the original algorithm is 0.33% when reaching the lower error recognition rate (convergence), while the error recognition rate of the improved algorithm is 0.04% when reaching the lower error recognition rate (convergence), and the recognition accuracy is improved by 0.29%. For the Imagenet dataset, the error recognition rate of the original algorithm is 2.3% when it reaches the lower error recognition rate (convergence), while the error recognition rate of the improved algorithm is 0.43% when it reaches the lower error recognition rate (convergence), and the recognition accuracy is increased by 1.87%. It can also be seen from Fig. 8 that as the number of iterations increases, the error recognition rate of the improved algorithm on each data set continues to decline and finally reaches convergence, which indicates that the improved algorithm has strong generalization performance. In this section, the author puts forward the research method of sports health culture communication analysis by using the new era communication model of deep learning framework, introduces the improved MLP model structure such as Dropout, Adagrad and ReLU, and designs the corresponding experiment by using MNIST standard data set, and verifies the effectiveness of the improved algorithm. Experiments show that compared with the traditional propagation method, the improved model can automatically learn effective features and propagate more accurately, and the propagation rate is increased by nearly 8% and the recognition efficiency is increased by 32s；. Compared with SGD algorithm, Adagrad algorithm with adaptive learning rate has better optimization effect, significantly improves the recognition efficiency and saves a lot of processing time. Dropout has a good effect in solving over-fitting; ReLU effectively solves the problem of gradient dispersion, which can effectively improve the accuracy of transmission.

5. Conclusion

The public's attention to health and sports has increased significantly, and online platforms have become an important way to obtain health information and exercise. Innovative communication platforms can meet this emerging demand. The reason why sports health culture works can become classics is that they can transcend the limitation of time and space to spread and inherit the charm, not that the representational books are shelved and stained with dust with the development of society. The development of communication media promotes the reasonable existence of mass media as sports health culture communication media in the new media environment.

Because of this, the traditional ways of sports health culture communication gradually disappear. This is both an opportunity and a challenge for sports health culture communication in the new era. The characteristics of the new media, such as the sense of picture and the sense of seeing and hearing, challenge the traditional sports health culture. The appearance of audio-visual culture dispels people's understanding of the inner meaning of sports health culture communication, and more people pursue the impact of external senses. In the past, when people read sports health culture works, paper writing was the main form; After the emergence of new media, TV, Internet, film and other media present sports health culture to the audience in a vivid and flexible manner. The smooth picture sense, convenient sports health culture search function, and the visual effect of adapting sports health culture works have increasingly highlighted the singleness and rigidity of traditional characters. The contest between the two modes finally reflects that the traditional sports health culture communication mode has been greatly impacted under the new media environment. On the surface, the appearance of new media poses a threat to the creation of traditional sports health culture and a higher challenge to the content carrier of sports health culture communication. In fact, challenges and opportunities coexist. Miller believes that "the new media eliminates the distance between sports health culture and the audience, and this" distance "is the premise of the existence of sports health culture aesthetics. The new media environment is leading sports health culture to extinction by eliminating the distance between sports health culture and audience. " This view is actually exaggerated. Aesthetic feeling is still the essential appeal of sports health culture works. The creative idea of many writers is to stick to the position of sports health culture aesthetics, and sports health culture will not be terminated. Nowadays, the audience is accustomed to using new media to contact sports health culture works or create sports health culture works. These are external forms, and the sports health culture itself will not be shaken. Seeking spiritual comfort and cultural accomplishment is still the ultimate goal of people's contact with sports health culture communication. Although the new media communication model of this paper is relatively perfect, there are still many directions for research, and the next work still needs to be continued. We don't need to worry too much about the new forms of sports health culture communication in the new media environment, and challenges and opportunities coexist. Every change in the form of sports health culture existence, the main body of communication and the scope of circulation is inseparable from the development of the media. sports health culture cannot transcend the independent existence and development of the times. There is no common characteristic to ensure that "media and sports health culture" exist in the same form in all times. In the new media era, where will the sports health culture communication go, how will the fate of sports health culture develop, and how to inherit the essence of sports health culture in the new media environment are the thoughts left to us in this era. In a sense, as the sports

health culture of the times, there has never been an invariable concept of sports health culture communication and an invariable sports health culture characteristic. In the new media era, we should update our original sports health culture concepts, because only an open concept can better develop sports health culture, and only by integrating new media can we maximize the benefits of sports health culture communication to the whole mankind.

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