Research Article

A Study on the Method of Press Freedom Value Assessment Based on Artificial Neural Network

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Received 2 June 2022; Revised 6 July 2022; Accepted 14 July 2022; Published 27 July 2022

Academic Editor: Kuruva Lakshmana

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Freedom of the press embodies an increasingly important role in modern democratic society, and people pay more and more attention to the value of freedom of press. The value of freedom of press has been elaborated from the basic concept, right attributes, and role functions of freedom of press, which are the basis for the existence of the value of freedom of the press and the jurisprudential basis for strengthening its legal construction. Freedom of press is a right extended from the freedom of speech and publication and is the application of freedom of speech and publication in news communication activities. Freedom of press in the modern sense is considered an institutional right, both a fundamental right and a political right. As the role of press freedom in the process of modern democratic society becomes more and more prominent, the conflict between its value and other social values becomes more and more obvious. In such a context, this study introduces BP neural network technology into the assessment of press freedom value, expecting that a set of assessment method models with press freedom value as the core can be constructed. In order to achieve this goal, the core problem is how to use BP neural network technology to automatically evaluate the value of freedom of press. A web crawler is used to crawl news from various online sources and the news are scored and evaluated by the system to present the most valuable news first to the readers. A dataset of 1440 data samples was created to be used in the experiments. The proposed GRU with multifeature fusion method has a higher accuracy and lower error rate as compared to LSTM, linear regression, and random forest-based model.

1. Introduction

Freedom of the press is a right that extends from the freedom of speech and publication and is the application of freedom of speech and publication to news dissemination activities. The mainstream view nowadays is that freedom of the press is an institutional right, both a fundamental right and a political right. Since the beginning of the idea of freedom of the press, people’s discourse on the value of freedom of the press has mostly reflected their understanding of the value of freedom of the press through the elaboration of the basic concept, the attributes of the right, and the role and function of freedom of the press. In fact, freedom of the press is rich in value because it accumulates people’s ideal setting of freedom of the press and confirms it as an essential right for people, thus having a wide range of social functions [1–3]. The basic theories of the value of press freedom include three major schools of thought: the natural rights theory, the marketplace of opinions theory, and the people’s sovereignty theory. Natural rights theory, also known as “natural human rights,” emphasizes that human beings have inherent rights, which are not granted by the state or laws, and are therefore inalienable [4–6]. The Dutch jurist Grotius was the first to propose the idea that “natural rights are the commands of proper reason,” combining natural rights with the natural reason of human beings. The idea of “natural human rights” was established in the form of law in the bourgeois revolution, while freedom of expression and freedom of publication were considered by the Enlightenment thinkers as one of the most important natural rights. Natural rights play an important role in the argument of the value of freedom of the press as follows: since freedom of expression is an inherent right, freedom of the press, which is derived from freedom of expression, is also a natural right of every individual, which is one of the basic conditions to guarantee the realization of human values; the
theory of natural rights also provides the basis for the value of the autonomy of freedom of the press, and the suppression of freedom of the press by any state or government is itself a violation of natural rights. The suppression of press freedom by any state and government is itself a trampling on natural rights, so the value of press freedom is that it can form a social force against autocracy, thus forcing the rulers to change their ways; natural rights are the basis for the derivation of legal rights, so the design of a country’s rights must be based on the content of natural rights; thus, press freedom as a natural right also becomes a measure of the provisions of a country’s rights. The freedom of the press as a natural right becomes the yardstick for measuring the reasonableness and appropriateness of a country’s rights. The marketplace theory of opinion specifically addresses the important function of freedom of the press for the individual, society, and the state. Without the right and opportunity to express one’s opinion, there would be no possibility to express one’s ideas and demands; without an adequate market of opinions, society would be in a situation where “all the people would be in a state of mourning”; without the competition of various opinions in the public forum, the state would inevitably lead to a monolithic and authoritarian situation. In short, the value of freedom of the press can only be obtained through the competition in the marketplace of opinions, and thus, it has become the form through which the value of freedom of the press must be realized [7–10].

In the new media era, no news is hidden, and the more information we want to be blocked, the more people’s desire to discover it is stimulated. Living in the information age, our daily life is filled with all kinds of news. The Internet, computers, and smartphones seem to have become part of our lives, and people can read news anytime and anywhere and seek the information they need in various information networks. In order to meet the needs of the general public, the media environment has also undergone great changes, and some new media have started to create a platform for the collection of information to be freely displayed. To sum up, with the advent of the new media era, the public’s sense of freedom has been awakened by the media, and the freedom of news is gradually being emphasized [11]. Taking the Internet as an example, the Internet has shown its powerful power in the collection and dissemination of information and has made important contributions to the awakening of people’s democratic consciousness and the development of social economy. However, as we all know, freedom is a double-edged sword, and excessive freedom can easily lead to the proliferation of information and distortion, which can confuse the public. In this regard, this paper briefly analyzes how to define the boundaries of freedom in the new media environment and how to exert the power of freedom within a limited scope [12]. The foundation and theory of the existence of the value of freedom of the press is shown in Figure 1.

The algorithm design based on the value of freedom of the press is based on the premise of “public people” who are rational and concerned about public interest and takes the value of freedom of the press, which is the news selection standard of professional journalists, as the theoretical basis of the algorithm design. The theoretical basis of the algorithm design is the news freedom value of professional journalists, which considers both the public nature of news and the interests of the audience. More importantly, this algorithm is designed to judge the quality and value of information and then make a choice based on the understanding of information, returning to the essential issues of news facts and news information. From the perspective of journalism theory research, this study hopes to build a set of algorithmic recommendation model with the value of freedom of the press as the core index by introducing “artificial intelligence” technology into the evaluation of the value of freedom of the press based on the theory of freedom of the press. Therefore, one of the key points of this study is to explore how to use artificial intelligence technology to evaluate the news freedom value of a news article. From the level of theoretical research on press freedom value, this study provides a new interdisciplinary solution to the research on press freedom value assessment.
2. Related Work

2.1. Value Theory of Freedom of the Press. The basic meaning of civilization is the state of progress and enlightenment in the development of human society, as opposed to ignorance and barbarism, which is the result of people’s transformation of nature, society, and their own subjective world. Civilization includes three parts or three forms, one is material civilization, the other is institutional civilization, and the third is spiritual civilization [13–15]. The civilizational value of law is reflected in these three civilizational forms. The civilizational value of freedom of the press is more reflected in the institutional and spiritual civilization. With the development of modern society and the use of modern science and technology, especially the use of electronic media, modern society is gradually developing into a participatory society, where the public can get all kinds of information more widely and freely and participate more widely and freely in social management and power supervision. Modern democracy is also in the process of evolving from representative democracy to participatory democracy. In a certain sense, it can even be said that the system of freedom of the press will replace the electoral system as the core system of democracy. Therefore, the institutional value of the freedom of the press is that it plays an important role in the construction of participatory democracy. The right to information is an inalienable right of citizens. Freedom of the press is an important condition for ensuring that citizens enjoy the right to information. An important element of the right to information is the right to be informed about society, that is, the right of citizens to be informed about social phenomena and matters of interest to them according to the law. The premise of the social phenomena and affairs of interest to citizens is that they must conform to the laws and regulations and to the social morals of normal people in a society and not violate public morals and good customs. Journalism theory has always attached importance to the role of typical and role model guidance. A good typical can cause significant repercussions in the society through the propaganda of the media and attract wide public attention; a good typical can inspire people’s spirits and even purify their hearts and minds and promote a more and more progressive and civilized social atmosphere. Therefore, the right to social information can play an important role in meeting the needs of citizens’ spiritual life while improving their quality and ability and promoting social development. Citizens are committed to forming a moral or aesthetic atmosphere and have the same right as participating in politics. So the spiritual value of the freedom of the press is reflected in the promotion of ideological and moral sublimity. Certainly, the press can play a role in promoting the construction of cultural facilities, the development of education, and the advancement of science and technology through its monitoring and propaganda functions [16, 17].

Democracy is an institution and a value. This system and value are essentially the same. Democracy is not purely a theoretical interpretation, but more importantly a social practice. Democracy is the sum of a certain state system, the rights and freedom of the members of society, and also the democratic style of the state public officials and the general democratic consciousness of the society; democracy is the sum of political democracy, economic democracy, cultural democracy, management democracy, decision-making democracy, and supervision democracy of a certain society; democracy takes legal democracy as the basic content and election democracy, decision-making democracy, management democracy, and supervision democracy as the main pillars. Democracy simply means that the people as a whole enjoy the sovereignty of the country, and the realization of democracy depends on the actual enjoyment of democratic freedoms and rights of each individual as a member of the people as a whole. The extent to which democracy is achieved is measured by the depth and breadth of people’s participation in society [18–21]. Freedom of the press fulfills both requirements of democracy: on the one hand, it guarantees the public’s right to expression and information, and on the other hand, it enables the public to participate extensively in the management and supervision of society. Democratic political thinkers have recognized that freedom of expression is the cornerstone of a democratic system, and freedom of the press is the expression of democratic values in the field of communication. To a certain extent, freedom of the press has contributed to the development of representative democracy to participatory democracy. Participatory democracy advocates maximum broad participation or even universal participation, a way of life closer to real democracy, and in a sense a return to direct democracy. The modern state is a large social organization with a large territory, a large population, and a complex structure. In order to implement a certain degree of direct democracy and cultivate a democratic way of life in such a large state, it is necessary to make use of certain technical means and institutional design, that is, the development of communication technology and the construction of a free press system, and the core and key of participatory democracy is the establishment of a free press system supported by modern communication technology. Therefore, freedom of the press has an important democratic value, and “whatever the definition of democracy is, democracy itself cannot exist without freedom of the press.” Of course, freedom of the press itself does not necessarily bring democracy but only has a potential democratic value, the realization of which depends on the exercise of the right to freedom of the press.

2.2. News Classification and Value Assessment. With the rapid development of the Internet, the network has come into thousands of households, and the media of news dissemination, such as television, newspapers, and radio, have gradually transformed to the new media of the network. The flow chart of news value assessment is shown in Figure 2. The network is pivotal in people’s lives; the wide range of applications, access to news, and information through the Internet is one of the main scenarios of network applications. For news editors, except for a small amount of self-generated news, most of them are manually extracted or reproduced from the Internet by staff members [22]. Since there are tens of thousands of various news media on the Internet such as various portals, newspaper websites,
Therefore, this project will implement an e-integration of text classifying of Internet news information and, through the editorial workers, so this topic will realize an automatic crawl—such a huge amount of data is a huge challenge for news editors and general readers, providing them with a clear and perfect news reading experience and aiding decision-making in editorial work. Firstly, through the analysis of correlation between texts, the system recreates the evolution of news from a global perspective and sorts out the development trend of news from the timeline, and through the filtering and filtering technology, the duplicate news is filtered and marked for management, making the system both streamlined and complete. And through the visualization interface display, the discovery of hot topics becomes clearer and more explicit. Secondly, through the text classification technology, it achieves the purpose of automatic classification of news text, reduces the degree of manual involvement, also provides reference basis for news editors, and improves the efficiency of news text classification. Finally, through the analysis of news free value elements, value-related features are extracted, and a predictive analysis model of value is established to predict the value trend of news and provide auxiliary decisions for news editors to select and publish news [23, 24].

The correlation analysis of news is mainly analyzed in two aspects, similarity of meaning and repetition of content. Similarity analysis refers to transforming news text into structured vector space data which is convenient for calculation and analysis through techniques such as Chinese word separation, deactivation and extraction of text feature words, and then calculating the angle between vectors through cosine theorem. The cosine value between similar news in the sample data through experiments and statistics is analyzed to find out the optimal threshold value to determine whether it is similar news. The news with similar word meanings can be analyzed by comparing with the threshold value [25]. This not only saves readers’ time and avoids reading a large amount of news with similar content but also provides readers with a more comprehensive understanding of news events from multiple dimensions. By comparing the time sequence, the source of the news can be identified, and the original and most original news event can be restored. Because the data is collected from various sites through web crawlers, there may be a large number of duplicate news. In order to effectively filter and flag these duplicate, reprinted, or slightly modified news, we analyze the sample data and find the optimal threshold of duplication index and mark the news with duplication index exceeding the threshold as duplicate news to reduce readers’ reading time and effort and improve their reading experience. In addition, similarity detection and repeatability detection can also be used for news topic discovery. By visualizing similar news with a dotted line graph, where the dots represent the news and the edges represent the similarity index, it is possible to classify groups according to the distribution of the dots, while the correlation index between the repeated news can be adjusted after the repeatability calculation, thus improving the efficiency and correct rate of group discovery.

Implementing news classification function: the classification of news is based on the analysis of news content for different categories of classification. Due to the huge amount of news data crawled every day, it effectively integrates the data and helps readers to quickly locate the news categories they are interested in. Through the analysis of various classification algorithms, as well as the experience and summary of previous authors, SVM support vector machine has good application in the classification with linear indistinguishability. However, since it can only perform binary classification by nature, for multiclassification systems, it is the combination of binary classification, voting election, etc. that is transformed into multiclassification. By studying the traditional multiclassification combination strategy, analyzing its advantages and disadvantages, we propose a suitable multiclassification combination strategy for binary trees, supporting vector machine classification algorithms, based on the principle of prioritizing the most easily segmented categories according to class distance analysis. The classification allows
the system resources to be integrated and effectively managed, as well as enabling readers to quickly locate and target different types of news according to their preferences. Prediction of the future value of news: the value prediction of news is an estimate of the impact that news will have in society over a period of time in the future. By analyzing the elements of news freedom value, we innovatively propose to extract the features related to news freedom value at the current moment based on the Baidu search platform and construct the evaluation index of news freedom value at the current moment by analyzing with the data in between moments, as well as continuously collecting the time series data about news freedom value through a timer, and applying the self-learning BP neural network technology to the next moment of news freedom value is predicted. Figure 2 shows a flowchart of the news value assessment system.

3. Method

3.1. Model Structure. The number of news crawled in this system is up to thousands every day, among which there must exist both valuable news and irrelevant news. In order to let readers see valuable news quickly, each news is scored and evaluated and its value is predicted in this system, and through the sorting process in the background, readers can see the valuable news first. Since news is strongly time-sensitive, its value changes with time, so the free value of news in this system is predicted based on time series. Therefore, this value prediction system mainly contains one modules: time series sample collection module. This system is constructed by extracting the keywords of news titles and contents, applying web crawlers, and parsing the relevant information in Baidu news search platform, the value parameters about news, and automatically collecting data at fixed time intervals. The model structure diagram is shown in Figure 3.

As shown in the figure, the features of news at different moments are collected through the timer constantly updated, and the functional expressions of features and values are determined through regression analysis and other methods. The results are stored in the database, and the results in the database are updated and replaced in real time. Only the data of the most recent period are retained and are replaced when they expire.

3.2. Press Freedom Assessment Indicators. The value of news freedom mainly includes three features. One is the total number of relevant news articles found, which is a general statistic of the search results of the search keywords, assuming that the value is recorded as $A$; the second is the list of relevant news, which is the specific news related to the search keywords, including the title, content, source, publication time, and other information, while the total number of news list indicates the number of news related to the search keywords. The value of the news is related to the same news, similar news, and the total number of related news of other site sources; when the number of related news no longer increases, then the value of the news will decay with the passage of time. The value of the news is described as shown in

$$ \text{Evaluation } (t) = 0.68 \times \text{Evaluation } (t-1) + \Delta Y(t), $$

$$ Y(t) = R_a \ast A + R_b \ast B + \sum_{i=1}^{10} \left( R_{ci} \ast S_i \right). $$

When $t=0$, let $y(t) = 0$. In the equation, $A$ denotes the total number of related news; $R_a$ denotes the weight coefficient of the total number of related news; $B$ denotes the number of sources of related news; $R_b$ denotes the weight coefficient of the number of sources of related news; $S_i$ denotes the number of identical news in related news; $R_{ci}$ denotes the weight of the number of identical news in each related news. $A$, $B$, and $S_i$ can be obtained by web crawlers, and the weight coefficients $R_a$, $R_b$, and $R_{ci}$ can be artificially given the value of news free value after the statistical analysis of the degree of social influence after news release. Then, the collected data samples are calculated by multiple linear regression analysis method. Finally, a total of 1440 time points at 5-minute intervals within 48 hours were collected from mainstream news websites to extract features and apply the values calculated by the value formula as sample data. 80% of the data samples were used for training the neural network, while the remaining 20% were used as test samples for the model.

3.3. News Free Value Prediction. There are various methods for time series prediction. The more widely used ones are
linear prediction class of autoregressive model AR, the
deformed and improved autoregressive sliding average
model ARMA, summated autoregressive sliding average
model ARIMA based on AR, nonlinear class of BP neural
network, and radial basis function RBF neural network. Each
method has its own unique advantages and disadvantages.
However, BP neural network has good self-adaptation and
self-learning and strong anti-interference ability which
makes it incomparable to traditional methods in terms of
prediction accuracy and long-term prediction effect, so BP
neural network is used in this project to predict the value
of free news. Time series analysis is a mathematical model
based on dynamic data analysis to find out the relationship
between the state of the future moment and the current
and previous moments, so that it can more accurately reflect
the dynamic dependence of the data contained in the time
series. In this paper, we use BP neural network to simulate
the interrelationship between the data in the sequence. It is
assumed that there is some relationship between the future
value and its n previous values, described in mathematical
language as

$$X_m = F(X_1, X_2, \cdots, X_n).$$

(3)

The basic idea of neural network for time series prediction
is to fit this mapping relationship through continuous
learning and correction, and the trained model can predict
the future values. The learning methods of neural networks
are mainly divided into two types, “learning” and “no-
learning.” In the no-learning method, the neural network
automatically extracts the pattern of training sample data
and calculates the output according to this pattern. The
learning method of BP neural network used in this project
is self-learning with feedback. By comparing the actual out-
put of the network with the expected output of the sample
data, the weights of the network are continuously adjusted
to make the output as close to the expected output as pos-
ible to achieve the purpose of minimizing the error. There-
fore, the learning process of BP neural network is divided
into two computational steps.

The first step is forward signal propagation. Firstly, the
sample data is input to the neural network, which is calcu-
lated by the middle implicit layer through the excitation
function and then passed to the output layer until the output
result is obtained. The second step is reverse error propaga-
tion. The output result obtained in the first step is compared
with the desired output result given by the sample and then
returned layer by layer according to the original path, and
the connection weights of the network are modified. The
forward propagation in the first step is repeated, and the
results are recalculated and compared until the error meets
the requirements. The value prediction module news value
prediction is based on the news free value sequence of the
first n moments. The news free value of the n + 1-th moment
is calculated after applying the training learning of the BP
neural network model, as shown in Figure 4.

BP neural network is a self-learning machine learning
algorithm with feedback. By learning the mapping relation-
ship from the input sequence to the output value through
the middle implicit layer and by comparing with the desired
output in the sample, the connection weights between each
neuron are continuously corrected until the error between
the actual output and the desired output is within the max-
imum error range set by the system. The training is finished
and the prediction model of news free value is obtained.
With this model, the time series of news freedom value is
input to get the predicted value of news freedom value at
the next moment.

3.4. Recurrent Unit and Attention Mechanism. Bidirectional
gated recurrent unit is a bidirectional structure of GRU,
which can better capture bidirectional semantic dependen-
cies compared to GRU. The hidden state information of its
current time step is jointly determined by the two-time steps
before and after. The equation of the hidden state output is
shown in

$$h_t = \left\{ \overline{h_t}, \overline{\overline{h_t}} \right\},$$

(4)

where $\overline{h_t}$ denotes the forward-propagating hidden state and
$\overline{\overline{h_t}}$ denotes the backward-propagating hidden state. The
paper uses hidden units of number size $h$ to construct the
network. During the forward inference of the network, the
small batch input is known to be $x_t$ and the last time step
hidden state is $h_{t-1}$. The internal substructure GRU of the
Bi-GRU network resets the gate and updates the state of
the gate at time step $t$ by computing $r_t$ and $z_t$,

$$r_t = \sigma(w_r[h_{t-1}, x_t]),$$
$$z_t = \sigma(w_z[h_{t-1}, x_t]),$$

(5)

where $w_r$ and $w_z$ are the weight parameters and $\sigma$ is the acti-
vation function, which takes values between 0 and 1. The
role of the candidate hidden state is to assist in controlling
the calculation of the hidden state at the current time step.
where \( w \) is the weight parameter and \( \text{tanh} \) is the activation function, which takes values in the range of -1 to 1. So far, the output of the hidden state of the forward cell is calculated as shown in

\[
\tilde{h}_t = \sigma \left( w_{i}^{(f)} \tilde{h}_{t-1}, x_t \right).
\]

The hidden state output of the backward cell is calculated as shown in

\[
\tilde{h}_t = \sigma \left( w_{i}^{(b)} [\tilde{h}_{t+1}, x_t] \right),
\]

where \( w_{i}^{(f)} \) and \( w_{i}^{(b)} \) are the weight parameters of the forward and backward directions and \( \tilde{h}_{t-1} \) and \( \tilde{h}_{t+1} \) are the output feature matrices of the previous time step of the hidden state in the forward direction, respectively. Unlike the ordinary attention mechanism, the multiheaded attention mechanism “copies” and “splits” the weight matrix of the self-attended mechanism to form a new weighting computation model to learn semantic information in several different subspaces. The formula is as follows.

\[
\text{Heads}(Q, K, V) = \text{Concat}(h_1, \cdots, h_n) W^o,
\]

\[
\hat{h}_t = \text{Attention} \left( QW_i^Q, KW_i^K, VW_i^V \right),
\]

where \( W_i^Q, W_i^K, \) and \( W_i^V \) denote the linear transformation parameters. The output layer makes probabilistic statistical predictions for the label to which each sample belongs. In classification problems, the output layer is commonly mapped to a SoftMax layer as conditional probabilities. The probability formula for classifying the input samples into category \( j \) is shown in

\[
P(y^{(i)} = j | x^{(i)} ; \theta) = \frac{e^{\theta^T y^{(i)}}}{\sum e^{\theta^T x^{(i)}}};
\]

\[
\hat{y} = P(y^{(i)} = j | x^{(i)} ; \theta).
\]

### 4. Experiments and Results

#### 4.1. Experimental Environment

The dataset used in this paper is the news dataset of the security news portal obtained by web crawler. The experimental environment is Python3 integrated environment Anaconda3. The tools used are mainly the Python scientific computing package Numpy, Pandas, the word splitting tool Stuttering and the visualization toolkit Matplotlib, and Seaborn. For preprocessing the news dataset, we use Pandas to read the news dataset saved as a csv file and filter the news dataset for duplicate values and null values using the deduplication and null-checking statements. We use the Stuttering word splitting tool to split the news headline and news body. The matrix operations involved in this work such as the calculation of cosine similarity are done using the scientific computing package Numpy. The data in this paper are visualized using Matplotlib and Seaborn.

#### 4.2. Experimental Setup

To better evaluate the performance of the framework, comparison experiments are designed in this section. Since the problem in this paper is a regression prediction problem, the mean absolute error (MAE), mean square error (MSE), and root mean square error (RMSE) are used, which are the evaluation indicators for judging the prediction error of regression problems. The coefficient of determination \( (R^2) \) is used for evaluating the discriminative power of the model. Among them, MAE, MSE, and RMSE are important indicators for judging the prediction error of the model. In this paper, we design comparison experiments with LSTM combined with custom feature models, ordinary linear regression-based models, and random forest-based models, which have achieved better results in existing work. The model is built based on Keras with Theano as the backend, and five iterations of the experiment are performed and the average of the five experiments is used as the result. Also, to evaluate the prediction effect of the framework more accurately, the dataset was divided into training set, test set, and validation set in the ratio of 7 : 2 : 1, the experimental results shown in this paper are the test set results. The Keras sequential model is used to build the GRU network, and the dropout layer is added to prevent overfitting. The random deactivation ratio of neurons in the hidden layer is set to 0.5, and the L2 regularity is added to the GRU layer as a penalty term for model complexity. At the same time, ReLU can deactivate some neurons randomly, i.e., "dead neurons," which can alleviate the overfitting and does not have the gradient dispersion problem. The loss function used in this paper is MSE, and stochastic gradient descent (SGD) is used as the optimization method, and the epoch is 6 and the batch size is 8 after using grid search. The training process performance improvement graph and loss convergence are shown in Figures 5 and 6.

#### 4.3. Experimental Results

To verify that the semantic vectors generated by Bert’s pretrained language model are better than Word2Vec’s representations makes the classification accuracy higher. The Word2Vec-GRU and its improved model are compared with the Bert-Bi-GRU model for the first set of classification experiments. The parameters related to this set of experiments are set as follows. The hyperparameters of model training include the following: learning rate \( lr \) is 0.001, the number of hidden units is 128, the batch size is 32, and the dropout rate of network nodes is 0.25. The specific experimental results are shown in Table 1.

From the result record table, by comparing the experimental results of S1 and S2 methods with the introduction of Word2Vec and S3 method with the introduction of Bert, it is found that the accuracy rate, recall rate, and F1 value of S3 method are improved by 5.78%, 5.96%, and 4.37%, respectively, compared with S2 method. It shows that the
vector representation generated by adding Bert can express rich contextual semantic information, which is conducive to the improvement of the subsequent classification accuracy.

The results obtained after five repetitions of the experiments and averaging the results are shown in Table 2 and Figure 7. The proposed GRU with multifeature fusion method performs much better than LSTM with custom feature combinations, ordinary linear regression-based, and random forest-based prediction methods in regression prediction measuring three indicators of prediction error, MSE, RMSE, and MAE. The deep learning-based security news popularity prediction framework proposed in this paper exhibits low prediction error on coarse irregular datasets, while the LSTM plus custom feature prediction method does not achieve good results when dealing with coarse multisource datasets. Meanwhile, the discriminant coefficient $R^2$ of the prediction method proposed in this paper is 0.60349 which is slightly lower than that of the LSTM plus custom feature prediction method, and the $R^2$ is a secondary indicator that the model has better data fitting ability.

Compared with the LSTM, the GRU requires less training time because of its simpler structure and fewer parameters. Table 3 shows the comparison of computational performance using GRU structure and LSTM structure, respectively, and the advantage of GRU structure in terms of computational performance will be more obvious when facing larger datasets.
5. Conclusion

In the past few years, scholars have become increasingly interested in the intersection of social and computer sciences. The use of natural language processing techniques such as text mining has increased in social sciences, and this trend continues to increase. Within the field of journalism and communication, to be able to use the technology of big data text analysis to mine valuable information and knowledge from the massive amount of news texts and to use artificial intelligence technology to achieve effective dissemination of news information and improve the efficiency of users’ access to news information are the issues that scholars are concerned about. Although there is already a very mature judgment framework for the value of freedom of the press in the field of social sciences, the implementation of the specific assessment work not only puts forward very high requirements for the professionalism of the assessor, but also the manual workload is very large. Therefore, this study introduces machine learning and big data text analysis methods into the assessment of press freedom value. We construct a BP neural network model based on traditional press freedom value judgment criteria to achieve automatic assessment of press freedom value. A news dataset is created by crawling news from particular websites which are then evaluated and scored to present the most relevant news to the reader. The proposed model has a higher accuracy and lower error rate than other methods.

Data Availability

The datasets used during the current study are available from the corresponding author on reasonable request.

Conflicts of Interest

The author declares that he has no conflict of interest.

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