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Retraction

Retracted: Research on Teaching Management Methods and Approaches of Chinese-Foreign Cooperation in Running Schools in Colleges and Universities under the Background of Big Data

Wireless Communications and Mobile Computing

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

(1) Discrepancies in scope
(2) Discrepancies in the description of the research reported
(3) Discrepancies between the availability of data and the research described
(4) Inappropriate citations
(5) Incoherent, meaningless and/or irrelevant content included in the article
(6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

In addition, our investigation has also shown that one or more of the following human-subject reporting requirements has not been met in this article: ethical approval by an Institutional Review Board (IRB) committee or equivalent, patient/participant consent to participate, and/or agreement to publish patient/participant details (where relevant).

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

[1] Q. Feng, "Research on Teaching Management Methods and Approaches of Chinese-Foreign Cooperation in Running Schools in Colleges and Universities under the Background of Big Data," *Wireless Communications and Mobile Computing*, vol. 2022, Article ID 8577550, 10 pages, 2022.

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Research Article

Research on Teaching Management Methods and Approaches of Chinese-Foreign Cooperation in Running Schools in Colleges and Universities under the Background of Big Data

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Several Chinese universities are setting up systems to anticipate students' academic performance and to offer them academic early notifications to boost their students' performance effectively. Chinese-Foreign Cooperation in Running Schools (CFCRS) is one of China's fastest-growing sectors of education. The academic achievement of CFCRS students is lower than that of students in noncooperatively organized programs. A realistic and timely academic prediction is critical to identifying students at risk of academic failure and providing them with the support they demand. A unique CNN-BiLSTM-AM approach will be used in this study to forecast the academic achievement of CFCRS learners more accurately and efficiently. Convolutional neural networks (CNN), bidirectional long-short-term memory (Bi-LSTM), and attention mechanism (AM) form the basis of this technique. The characteristics of the input information are extracted using a CNN. For good forecasting accuracy, AM is employed to obtain the contribution of characteristic levels on student results in various teaching methods. Initially, the Chinese students' datasets are gathered from the big data for this investigation and are partitioned into 4 different groups. Four teaching methods are provided in groups. The proposed approach is used to forecast the performance of the students. Finally, the performance of the proposed approach is examined and compared with certain existing approaches to obtain the proposed approach with maximum correctness. The findings of this research are indicated in chart formations by employing the Origin tool.

1. Introduction

As globalization progresses, practitioners must grasp cutting-edge technologies and barrier-free communication language abilities. The Chinese-Foreign Cooperation in Running Schools was created to meet the need for internationalized people and training. With the use of foreign high-quality educational materials and educational philosophies, students' foreign language skills will be strengthened, and they will better adhere to bilingual education, preparing them to become great internationalized talents. Bilingual education is inextricably linked to Chinese Foreign Cooperation in Running Schools [1]. An effective academic early warning predicts students' potential academic issues and cautions a student against academic failure, allowing students and educators to take preventative measures to avoid the repercussions of academic failure later on. University administrators and professors use a prediction model to carry out classroom interventions and provide academic help to students who are doing poorly in academics. The prediction system helps schools enhance the quality of their instruction. Academic early warning is commonly employed in several Chinese institutions, according to the report. An accurate academic performance forecast is the most crucial element of a successful early warning system, yet it is the most difficult to achieve. Mining the association between students' academic achievement is an important method of predicting students' academic success. According to certain reports, kids who are experiencing academic failure have some characteristics [2]. Figure 1 depicts the Chinese education industry trends.

Learning the phases of development may help stakeholders, policymakers, operators, and researchers administer

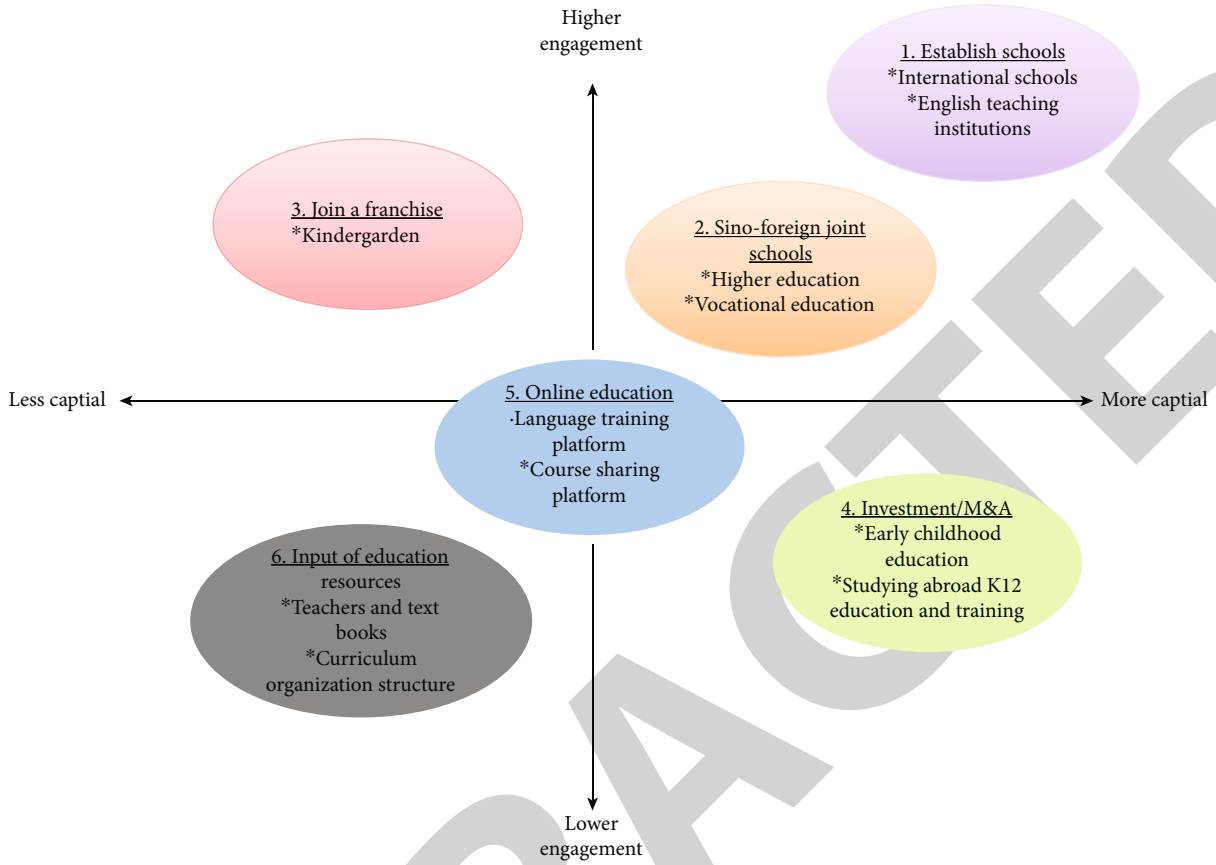

Figure 1: Chinese education industry trends.

schools. The internationalization of higher education is a recent worldwide trend in an era of economic globalization; various nations prioritize higher education openness and competitiveness [3]. The internationalization of Chinese higher education has gone through a unique process: it has been pushed as a fundamental driver of the state's education reform and innovation. Among them, the objective is to provide educational materials and break out the original outcomes through studying advanced experience. The Ministry of Education has released comments on speeding up and extending education openness in the new era, such as eliminating institutional barriers, promoting school management reform, and developing collaboration channels for high-quality educational materials. To a certain degree, satisfying people's different educational demands, China's worldwide collaboration and thorough introduction of high-quality educational materials have tremendous significance [4]. Chinese-foreign school collaboration has become a staple of Chinese education. With the expansion of the openness to the outside world and the strengthening of education reform, Sino-foreign collaboration in operating schools is rapidly growing. There are several articles on school cooperation in the China National Knowledge Infrastructure (CNKI) database; this one describes the current state and future trends in school cooperation. It is important to extract articles linked to useful information for scholars to examine the current condition and growth trend of Chinese-foreign collaboration in operating schools [5].

Section 2 contains the literature review and problem statement. Section 3 describes the methods and materials used in our investigation. Section 4 contains the result and discussion, while Section 5 contains the paper's conclusion.

2. Literature Review

Several research trials have recently been done to address concerns about CFCRS students' academic progress. A number of articles on school cooperation can be found in the China National Knowledge Infrastructure (CNKI) database. These studies describe the current state of school cooperation as well as future trends. In [6], the goal is to help CFCRS grow in Yunnan. This paper will not only recognize the current state of CFCRS in Yunnan but also address the issues and provide solutions. In [7], several countermeasures are proposed in this study to encourage the growth of Sino-foreign cooperative education in the Yunnan Province. In [8], Chinese foreign cooperatives in school management can benefit from a variety of factors, including economic development, internationalization, educational resources, and government support. However, all provinces' education spending and the resulting demand for international educational resources are found to be deterrents to the growth of Chinese-foreign cooperatives in school management. In [9], the authors suggested that the elements from other nations' systems are incorporated into China's review process, but it also has its unique features. Increasing the

enthusiasm of colleges and universities as evaluation subjects is one way that China can improve education quality in the future, but it is also one way that it can strengthen evaluation laws, improve evaluation feedback channels, and allow evaluation to play a genuine role in this process. In [10], many of the disorders have multiple odontogenic keratocysts. A 12-year-old female youngster had several odonotogenic keratocysts. The studies found no other anomalies indicative of a condition. In [11], personalized medicine employs fine-grained data to identify specific deviations from normal. These developing data-driven health care methods were conceptually and ethically investigated using "Digital Twins" within engineering. Physical artifacts were coupled using digital techniques which continuously represent their state. Moral differences can be observed based on data structures and interpretations imposed on them. Digital Twins' ethical and sociological ramifications are examined. The healthcare system has become increasingly data-driven. This technique could be a social equalizer by providing efficient equalizing enhancing strategies. In [12], allergic rhinitis would be a long-standing worldwide epidemic. Taiwanese doctors commonly treat it with either traditional Chinese or Chinese–Western drugs. Outpatient traditional Chinese medicine therapy of respiratory illnesses was dominated by allergic rhinitis. They compare traditional Chinese medicine with western medical therapies in treating allergic rhinitis throughout Taiwan. In [13], the usage of high-dose-rate (HDR) brachytherapy avoids radioactivity, allows for outpatient therapy, and reduces diagnosis timeframes. A single-stepping source could also enhance dosage dispersion by adjusting latency at every dwell location. The shorter processing intervals need not permit any error checking, and inaccuracies could injure individuals; hence, HDR brachytherapy therapies should be performed properly. In [14], this study presented a treatment as well as the technology of domestic sewage to improve the rural surroundings. In [15], soil samples from chosen vegetable farms throughout Zamfara State, Nigeria, have been tested for physicochemical and organochlorine pesticides. Testing procedure and data were analyzed using QuEChERS with GC-MS. In [16], the authors suggested that in the real-world case study, they used machine learning algorithms to predict graduation rates. At the District University Francisco Jose de Caldas in Colombia, they analyzed data from five undergraduate engineering programmers. The confusion matrix and receiver-operating characteristic curve are used to compare support vector machines and artificial neural networks. Algorithms and architectures are shown in this article. In [17], Internet use and academic performance have been linked in this research, and machine learning is used to predict the academic achievement of students based on their use statistics. In [18], the primary goal of this research is to demonstrate that it is possible to train and model a tiny dataset and create a viable prediction system. Visualization and clustering methods may also be used to discover significant signs in a limited sample, which would be used to build a prediction system. In [19], the goal was to identify the factors that influence students' decisions on what to study in college. To assist students in making an informed decision about where they want to go to college, algorithms will be created to anticipate their attitudes, behaviors, and performance in these areas. Predicting student performance ahead of time makes it easier to take proactive measures to raise achievement levels. Numerous efforts to forecast student performance have been developed; nevertheless, their accuracy has not been acceptable enough to meet a quality education standard. In [20], the authors suggested that the risk and marginal students may be predicted using a reduced training vector-based support vector machine (RTV-SVM). SVM classifiers are trained for data classification using RTV-SVM, which aims to remove duplicate training vectors. RTV-SVM requires a convex hull for the training vectors for every category and distinct categorization trouble to arrive at a correct formulation. Training time and support vectors are also reduced by removing duplicate vectors. Universities face the challenge of training data scientists and engineers in various technological and managerial skills since big data analytics has become imperative for business success in the digital economy. Besides traditional lectures, active learning formats ensure a practice-oriented education that allows students to apply novel big data technologies. In the rapidly changing and digital economy, big data analytics can help colleges and universities create value and succeed in an increasingly competitive market. Academic education has begun to align with the trend toward big data at universities. There is still a need for innovative methods of teaching big data despite the development of information systems curricula and big data-related adaptations.

2.1. Research Gap and Problem Statement. Many issues have arisen concerning the design of curriculums and the performance of Chinese-foreign joint educational institutions as a result of the lack of a clear and reasonable understanding of the status quo. For example, some Chinese-foreign educational programmers' professional or experimental courses failed to run or were of poor quality, preventing students from completing their professional exercises because of a lack of professional faculties, laboratory experiments, and professional books. Similarly, teachers of certain specialties whose primary goal is to train practitioners lacked a relatively stable training base. There are several low-quality disciplines and specialties in combined Chinese-foreign educational programs and institutes. There are some higher educational institutions that, to increase enrollment and scale, failed to conduct thorough due diligence on the quality of their foreign partners or partners and paid little attention to the content and performance of their cooperation courses or programs, resulting in an overly repetitious curriculum that lacked distinguishing features.

3. Proposed Methodology

A new CNN-BiLSTM-AM technique will be employed in this research to better precisely and effectively anticipate the academic progress of CFCRS students. In this method, CNNs, bidirectional long-short-term memory (Bi-LSTM), and attention mechanisms (AM) are used. A CNN is used to identify the features of the data that is being fed into the

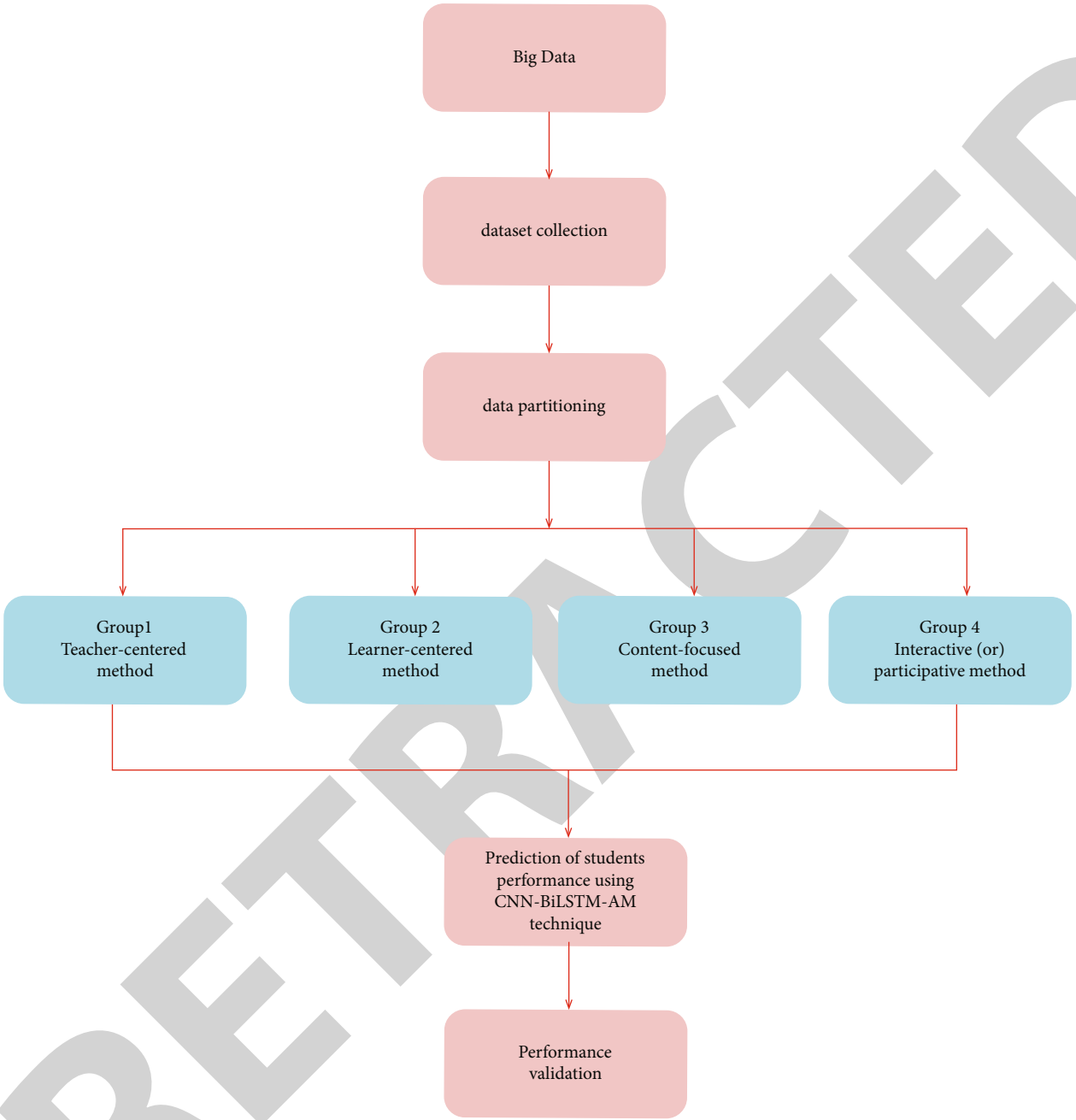

Figure 2: Proposed methodology.

system. Bi-LSTM predicts academic success based on the feature data that has been gathered. AM is used to determine the contribution of characteristic levels to student performance in different teaching techniques for excellent predicting accuracy. In the beginning, the datasets of Chinese students are acquired from big data and divided into four distinct groups for this inquiry. Groups of students are given access to four instructional modalities. Figure 2 depicts the proposed methodology.

3.1. Dataset Collection. Approximately 55,500 Tsinghua University students provided the data for this study. A large-scale national survey of college students in China was used to gather our data, which was gleaned from the Chinese College Student Survey (CCSS). The CCSS is, to our knowledge, China's first nationwide survey to ask about college study abroad [21]. The dataset's description is shown in Table 1.

3.2. Data Partitioning. The data are split into 4 groups, group 1 with 13870 students is taught with teacher-centered methods, group 2 with 13873 students is taught with learner-centered methods, group 3 with 13876 students is taught with content-focused methods, and finally, the group 4 with 13878 students is taught with interactive (or) participative method.

Table 1: Data description.

	China	
	No. of students	% of students in studied abroad
Total	55	529 6.1
Gender		
Male	28,592	6.6
Female	26,937	5.7
Major		
Arts and humanities	6,263	7.8
Enrollment size		
Small	9,904	5.9
Medium	28,937	6.6
Large	16,688	5.3
Parental education		
College	15,878	4.6
Graduate school	1,878	8.3

3.2.1. Group 1 Learning with Teacher-Centered Methods. In this group, 13870 students participated. Students' attention is solely focused on the teacher when instruction is centered on the teacher. The students just pay attention to what you have to say. Collaboration is discouraged during class activities, and students often work alone. A well-organized classroom is the result of education that is centered on the teacher. Teachers who work in settings where the needs of the students come first concentrate on developing personal connections with their charges by engaging them in intellectual investigations of relevant subject matter. There is a lot of emphasis on material rather than on how students learn. Methods like this one show that if someone does not know how to deal with children's potential, it is hard to trust in their abilities to do anything. Both methods emphasize the importance of involving students in the process of improving their academic performance. The teacher is in charge of student learning while using a teacher-centered method. The teacher utilizes her understanding of the subject matter to assist students to connect the dots. Secondary to this effort is learning about the learner's preferences and learning style.

(1) Advantages of Teacher-Centered Methods.

(a) The teacher's curriculum makes it easier for students to reach their objectives

(b) Children's interests, needs, and level of comprehension make subject matter psychologically sound

(c) The information is organized logically

3.2.2. Group 2 Learning with Learner-Centered Methods. In this group, 13873 students participated. The teacher's role is diminished in favor of the students' in learner-centered classrooms. Some examples of these strategies include active learning, in which students work together to solve issues, respond to questions, and develop their questions during class, explain, argue, or brainstorm.

(1) Advantages of Learner-Centered Methods.

(a) Teach pupils to think for themselves

(b) Teach children key skills they need to master

(c) Teach pupils to reflect on how and what they are learning

(d) Allow pupils to choose the material they want to study

(e) Encourage contact amongst students

3.2.3. Group 3 Learning with Content-Focused Methods. In this group, 13879 students participated. The term "content-based learning" refers to a method of teaching languages that places the emphasis not on the language itself, but rather on the content that is being taught. In content-focused methods, teachers who want to meet today's high expectations for their students must have a firm grasp of the subject matter and the flexibility to help students build usable mental maps, connect ideas, and correct misunderstandings. Teachers must be able to identify the connections between different areas and how they apply in the real world.

(1) Advantages of Content-Focused Methods.

(a) It may be a fun and inspiring way to learn a new language

(b) As a result of being able to put their newly acquired language skills to practical use, pupils gain more autonomy and self-assurance

3.2.4. Group 4 Learning with Interactive or Participative Methods. In this group, 13878 students participated. Teacher-student contact and student-student interaction, usage of audio-visuals, and hands-on demonstrations are all ways in which interactive teaching may be used to engage students in learning. Students are continually urged to take part in the discussions and activities. It is the best way of learning.

(1) Advantages of Interactive or Participative Methods.

(a) Feedback in real-time

(b) Close the knowledge-to-action gap

(c) Engaging students in a variety of ways

(d) Mistakes without taking a chance

(e) Learning simulators are effective

3.3. Prediction of Students' Performance Using Convolutional Neural Network with Bidirectional Long-Short-Term Memory and Attention Mechanism (CNN-BiLSTM-AM). CNN is used in feature production because it concentrates on the most obvious aspects of the visual range. Students' education analysis frequently makes use of BiLSTM, which has the feature of increasing with time. An important feature of AM is that it incorporates time-series data's previous

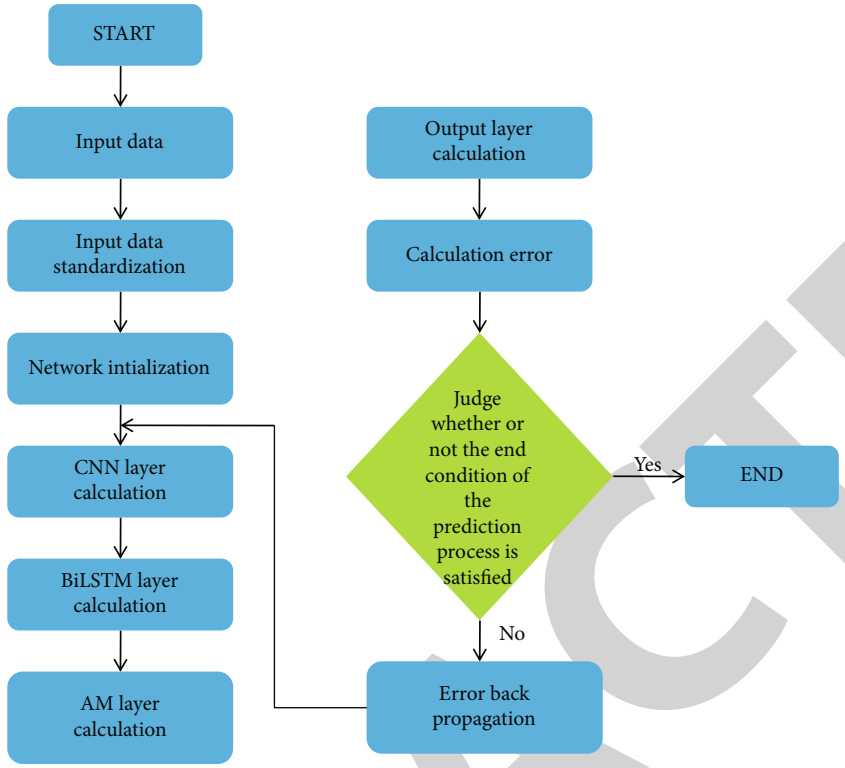

Figure 3: CNN-BiLSTM-AM's training procedure.

features into the output findings. After BiLSTM, it would be more common to employ it to modify the prediction performance.

CNN, BiLSTM, and AM features are used to build a student's performance system called CNN-BiLSTM-AM as depicted in Figure 3.

3.3.1. CNN-BiLSTM-AM Training Procedure. Figure 3 depicts the CNN-BiLSTM-AM training procedure.

Step 1. The data necessary for CNN-BiLSTM-AM training is entered.

Step 2. Z-score standardization is used to equalize the incoming data because of a big disparity throughout the data. This will allow the model to be trained more effectively.

Step 3. The weights and biases of all layers of the CNN-BiLSTM-AM are set to zero at this point.

Step 4. Convolution and pooling layers are used to transmit the incoming data through the CNN layer, where the features of the input information are extracted, and also, the result value is determined.

Step 5. The result of the CNN layer is then determined via the hidden layer of such BiLSTM layer, and also, the final solution is calculated.

Step 6. A value is derived by running the BiLSTM layer's final output through an AM layer computation.

Step 7. To arrive at the model's output, we must first compute the AM layer's result.

Step 8. The resultant value generated by the output layer gets matched to the student's performance of this set of data, and the related error is determined.

Step 9. Anticipate if or not the forecasting process's goal has been achieved: after a given number of iterations have been completed, the weight has dropped below a particular barrier, and the forecast error rate has dropped below some threshold, a positive conclusion is declared. The training will be finished when at least one of the prerequisites for the conclusion is satisfied. Training will go on as usual if this is not the case.

Step 10. It proceeds back to Step 4 to keep training the infrastructure, but this time, it does it in a reverse manner, causing the error to be spread backward.

3.3.2. CNN-BiLSTM-AM Prediction Procedure. Figure 4 depicts the CNN-BiLSTM-AM prediction procedure.

Step 1. To make a prediction, the necessary data is entered.

Step 2. There has been a normalization of all of the input data.

Step 3. The trained CNN-BiLSTM-AM is used to anticipate the target value based on the normalized data.

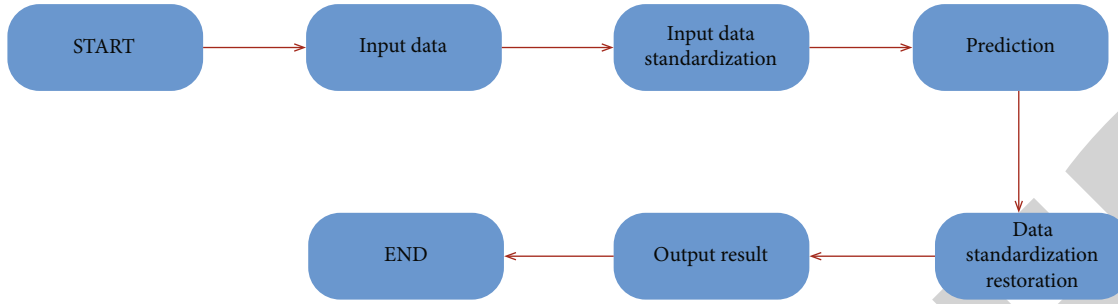

Figure 4: CNN-BiLSTM-AM's prediction procedure.

Step 4. To restore data scalability, the CNN-BiLSTM-AM generates the normalized output. The actual data of the normalized value is returned.

Step 5. The regenerated findings are transmitted to finish the prediction procedure.

4. Result and Discussion

In this paper, we predict Bi-LSTM for academic attainment based on the extracted feature data. AM is used to determine the influence of characteristic levels on student performance in different teaching techniques for excellent predicting accuracy. The parameters include accuracy, learning loss, satisfaction, performance level, sensitivity, and prediction level. The existing methods like *K*-means clustering algorithm (K-MCA), graph convolutional network (GCN), machine learning algorithm (MLA), and deep learning model (DLM) are used.

4.1. Accuracy. Accuracy is defined as "the degree to which the outcome of a measurement adheres to the proper value or a standard." Accuracy and precision are both required for the best grade measurement. A collection of measurements need not be exact to be precise, because a set of measurements may be grouped by value.

$$\text{Accuracy} = \text{TP} + \text{TN}\,\text{TP} + \text{TN} + \text{FP} + \text{FN}. \quad (1)$$

As shown in Figure 5, the suggested and current approaches are comparable in terms of accuracy. The suggested approaches (CNN-BiLSTM-AM) have better accuracy than the current methods.

4.2. Learning Loss. A student's absence from college causes them to lose their acquired information and abilities, which is what is often understood by the term "learning loss." In other words, if students do not keep up with their studies, they will lose what they have learned.

Figure 6 shows how students lose knowledge. The four categories are used to break down learning loss. Students in groups 2 and 3 were taught using teacher-centered techniques, while students in groups 3 and 4 were taught using learner-centered methods, and finally, students in group 4 were taught using an interactive or participatory manner.

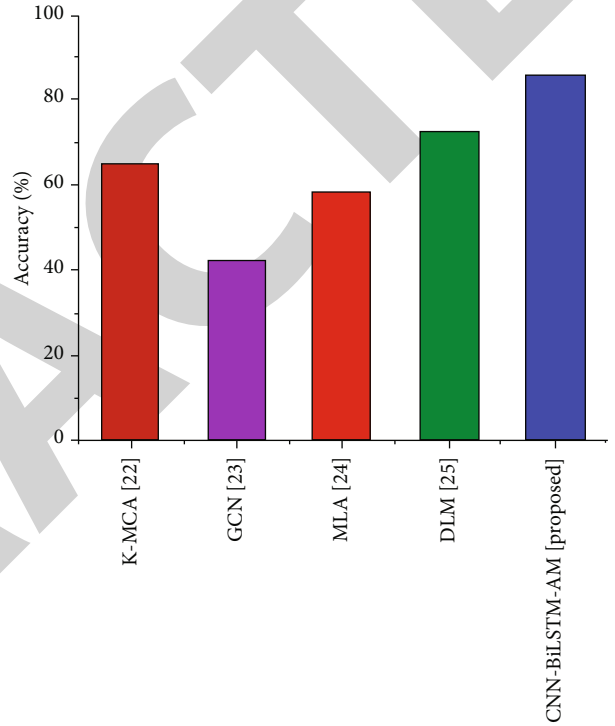

Figure 5: Comparison of accuracy in proposed and existing methods.

Finally, the group with the teacher-centered strategy had a larger learning loss.

4.3. Satisfaction. Satisfaction is the degree wherein an individual act offers them pleasure and contentment. Professional behavior is driven by enjoyment and also beliefs and ability.

Figure 7 shows how satisfied students are with their education. A teacher-centered approach is used by group 1, a learner-centered approach is employed by group 2, a content-focused approach is utilized by group 3, and an interactive or participatory approach is utilized by group 4. As a result, students in group 4 are more satisfied with their educational experience.

4.4. Performance Level. Students' grade-level abilities and ideas are measured by their performance levels. Quantile measures and performance levels together may be used to

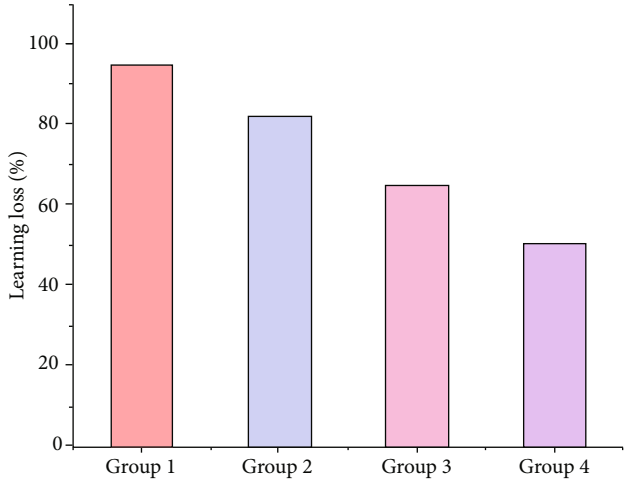

Figure 6: Learning loss of students.

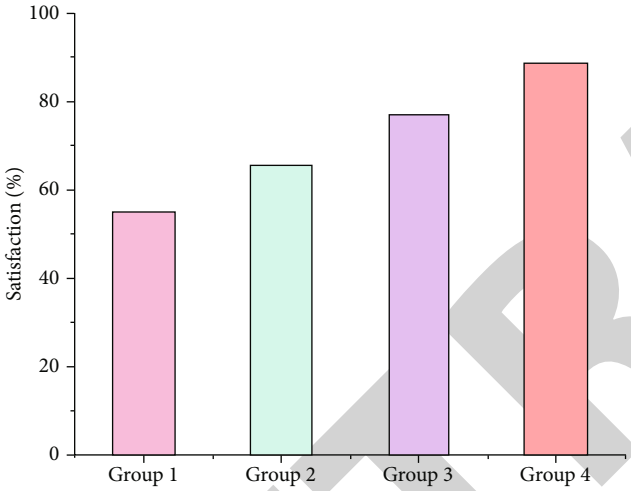

Figure 7: Satisfaction level of students.

categorize students and identify suitable teaching for each one.

Figure 8 indicates the comparison of performance levels in proposed and existing methods. When compared to the proposed method, the existing methods has a lower performance level for students.

4.5. Sensitivity. A test's sensitivity relates to its capacity to identify students. A more sensitive test implies that fewer instances of illness go unnoticed since there are fewer false-negative findings. A test's specificity refers to its capacity to identify as negative a person who does not have a condition.

A comparison of suggested and current approaches' sensitivity is shown in Figure 9. Existing approaches are less sensitive than the proposed method.

4.6. Prediction Error. Students' predictions have the added advantage of decreasing official warning signals and preventing students from being expelled due to their inefficiency. With the help of predictions, students may choose courses and study schedules that are suited for their skills.

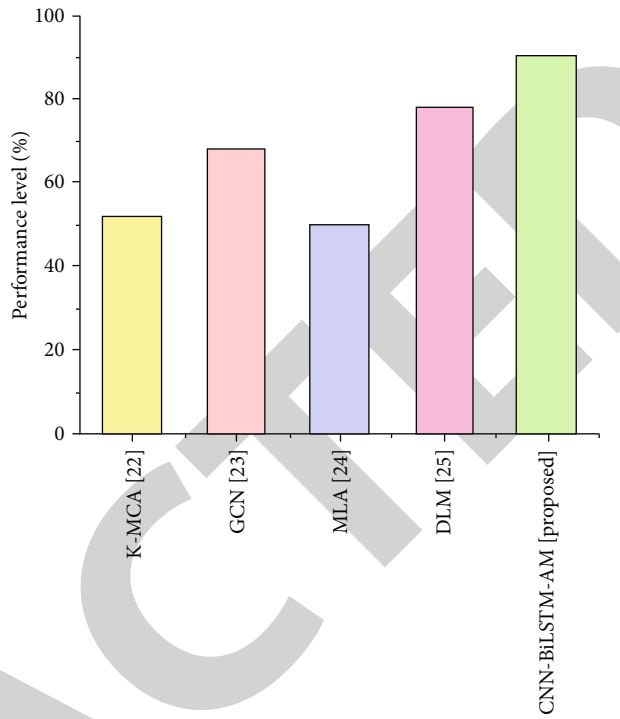

Figure 8: Comparison of performance levels in proposed and existing methods.

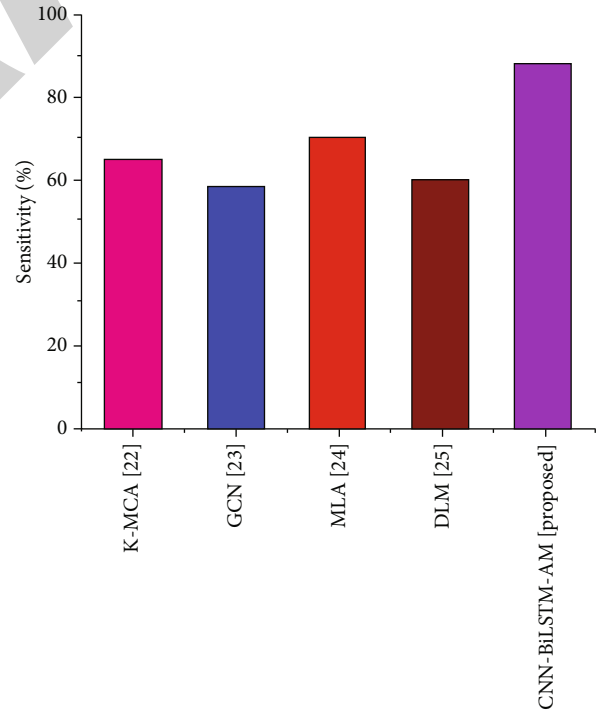

Figure 9: Comparison of sensitivity in proposed and existing methods.

Figure 10 shows the students' ability to forecast. Current approaches have a greater degree of prediction than the suggested methods.

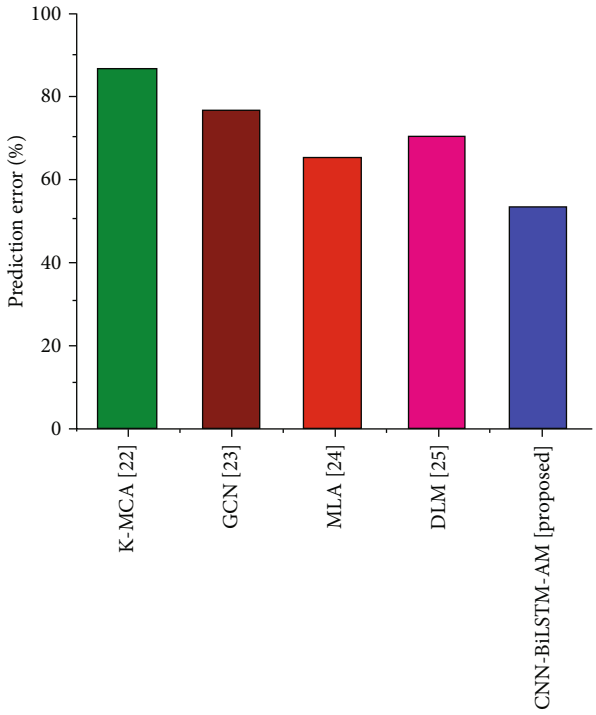

Figure 10: Comparison of prediction error in proposed and existing methods.

5. Discussion

K-means clustering algorithm (existing) unsupervised learning approach, uses the *k*-means algorithm, a kind of indirect clustering method based on a low similarity measure between the samples, rather than a hierarchical clustering method. Data mining has made extensive use of this algorithm. It is impossible to use the *K*-means method to group random *k* initial objects and then choose an item that represents the cluster center. With each of the other objects, the clustering distance between the centers of mass of each of them is calculated and allocated to the item that is most comparable [22]. In graph convolutional network (existing), it is critical to have accurate and timely academic predictions to identify students who are academically at-risk and to provide them with effective interventions. Research on graph convolutional networks (GCN) will be used in this study to develop an improved model for predicting the academic inefficiency of CFCRS students [23]. In machine learning algorithm (existing), it would also address the problems and limits of implementing machine learning in this field. The ML methods are inefficient to predict students learning. It is necessary to train each narrow application. Require a lot of organized training data. Training data must be marked to ensure supervision [24]. An AI-enabled framework for SARS detection has been proposed by Jiang and Hongwei [25]. A block-matching filter as well as histogram equalization (HE) are used to preprocess the input CT images. This technique utilizes Compact Entropy Rate Superpixels (CERS). A histogram of gradient (HOG) is used to extract the characteristics of segmented output. An approach based on Random Sigmoidal Artificial Neural Networks (RS-ANN) can effectively diagnose the presence of a disease. Deep learning models (existing) makes it easier for the machine to teach itself new features; it also makes it more difficult for humans to grasp and interpret the model since it requires less human effort on their part. Indeed, deep learning's greatest issue is model interpretability [26]. The students' performance is predicted using the suggested method (CNN-BiLSTM-AM). Lastly, the suggested approach's performance is evaluated and compared to other current ways to arrive at the most accurate method.

6. Conclusion

The formation of Sino-foreign cooperative institutions was a huge advancement in China's internationalization of higher education. It is difficult to assess and guarantee the syllabus level and academic prestige of the international nations in the majority of the joint Chinese-foreign schools that are now in operation. Moreover, the overall quality of Chinese-foreign cooperatively administered institutions' students' performance is not very great because most of the major universities are still waiting and seeing. The early warning system relies on accurately predicting students' future performance. This paper is an attempt in that direction. To correctly and effectively predict the academic progress of college students, this research will apply a new CNN-BiLSTM-AM technique. An attention mechanism (AM) is used in conjunction with a convolutional neural network and a bidirectional long-short-term memory (Bi-LSTM). Students' success in the next semester is predicted using a CNN, which is based on their prior final exam results. This model appears to be practicable and more efficient than earlier models. The parameters including accuracy, learning loss, satisfaction, performance level, sensitivity, and prediction level are becoming a better outcome for our proposed methods. The Chinese students' datasets are gathered from the big data for this investigation and were partitioned into 4 different groups. Group 4 taught with interactive (or) participative methods has better results for students' learning. Student assistance and experience might be improved in the future by using learning analytics apps that identify students who are likely to postpone their studies or fail to complete them on time, as well as those who will drop out or graduate with a narrow pass.

Data Availability

The data used to support the findings of this study are available from the corresponding author upon request.

Conflicts of Interest

The author declares that there are no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgments

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