Hindawi
Mathematical Problems in Engineering
Volume 2023, Article ID 9763061, 1 page
https://doi.org/10.1155/2023/9763061

Retraction

Retracted: Application of IoT-Oriented Online Education Platform in English Teaching

Mathematical Problems in Engineering

Received 1 August 2023; Accepted 1 August 2023; Published 2 August 2023

This article has been retracted by Hindawi following an investigation undertaken by the publisher [1].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.

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] D. Chen, "Application of IoT-Oriented Online Education Platform in English Teaching," *Mathematical Problems in Engineering*, vol. 2022, Article ID 9606706, 9 pages, 2022.

Hindawi
Mathematical Problems in Engineering
Volume 2022, Article ID 9606706, 9 pages
https://doi.org/10.1155/2022/9606706

Research Article

Application of IoT-Oriented Online Education Platform in English Teaching

Deyong Chen

School of Foreign Languages, Anhui Science and Technology University, Chuzhou 233100, Anhui Province, China

Correspondence should be addressed to Deyong Chen; chendy@ahstu.edu.cn

Received 16 May 2022; Revised 5 June 2022; Accepted 9 June 2022; Published 24 June 2022

Academic Editor: Naeem Jan

The integration of science, technology, engineering, and mathematics and education has accelerated due to the rapid growth of national information technology. Thanks to advancements in the internet of things technology, students can learn in a new way using mobile devices and online education platforms. Despite the fact that the internet of things is a science and technology, it can be used in education and teaching. This is especially true in English classes, where the internet of things can help pupils break free from the restrictions of traditional teaching. When teachers and students can instantly access information using internet of things technology, the English teaching process becomes more efficient. Learners can use mobile terminals for online learning and self-control learning steps, arrange learning time, and strengthen learning content based on their own shortcomings. The main contents of this work are as follows: (1) This study designs an internet of things-oriented online education platform for English language teaching, in order to provide a good learning environment and improve their comprehensive English strength. (2) This study offers a new BP network to assess the impact of an IoT-oriented online education platform on English language instruction. In order to improve the ability to search for the optimal solution, the grey wolf optimization (GWO) algorithm was first modified; then, the reverse learning (RL) mechanism was added to the grey wolf algorithm to develop the RLGWO algorithm. Using RLGWO to optimize BP and construct RLGWO-BP, the model is used to evaluate the improvement effect of the internet of things-oriented online education platform on English language teaching. The systematic experiment verifies the validity and reliability of this work.

1. Introduction

English basic education has implemented a series of innovative reforms. But so far, classroom teaching is still the main teaching mode, but there are many problems to be solved in classroom education. First of all, the role of teachers is very important, and it is difficult to reflect the main role of students. The teacher is the external cause, and the teacher's teaching activities can only be carried out through the internal cause of the students [1, 2]. In classroom teaching, the number of students is large, and teachers cannot take into account the differences between each student and individual students, so that the learning level of students in a class develops at multiple levels. Over time, it is easy to form a phenomenon in which teachers play the leading role and students revolve around the teacher's axis. The role of the student is no longer the main one but a foil to the teacher's teaching. This teacher-centered teaching mode hinders the improvement and development of English ability [3, 4]. Then, the teaching materials fall behind, and the substance of the lessons cannot be updated in a timely manner. The information superhighway has suddenly opened up a whole new world, with all types of knowledge pouring in, not only rich in content but also updated often. In English textbooks, some contemporary literary works closely related to the times, network literary works and time-sensitive scientific and technological works should be added in time. In a textbook-based classroom teaching mode, it is impossible to update teaching materials. Second, teaching activities are limited by time, place, environment, and other factors, and are not flexible [5, 6]. Classroom teaching is often restricted by factors. Whether the environment around

the classroom is quiet or noisy, you can only teach in a fixed place, and there is no choice. This kind of teaching activity, which is only for a single choice, has no flexibility and is not conducive to improving quality. Finally, individual differences are easy to be ignored. With the deepening of teaching content, the phenomenon of polarization is more serious. There is a lot of variation in the way people learn a new language. Despite the fact that classroom teachers cannot teach based on each student's actual situation, each student's learning shows a variety of situations. As a result, it is important to keep a close eye on the teaching progress and guarantee that most students have a basic understanding of what they are learning. In this way, learning difficulties, doubts, key points, or wrong problems are caused by individual differences. In classroom teaching, there is no guarantee that all questions will be repeatedly answered or corrected. With the deepening of the learning content, students' English ability will develop in two directions [7, 8].

The connection between the real physical space and the digital information space is realized in the framework of the internet of things [9, 10]. The participants can influence the dynamic information in real time thanks to the intelligence and informatization of the teaching summary design, and finally realize the fusion of the virtual and physical teaching environments. In addition, the internet of things is perceptive, and teachers and students can perceive changes in the physical environment through sensing equipment and maximize the use of teaching resources. For example, teachers can use smart tags to identify learning objects and understand the learning situation of each student in a timely manner, so as to adjust teaching methods and content in a targeted manner, thereby mobilizing enthusiasm and improving the quality and efficiency of English teaching [11, 12]. Therefore, the internet of things-oriented network education platform plays a very important role in English teaching. First of all, the main role of students can be reflected. As a teacher-led knowledge imparting style, most conventional English instruction heavily relies on the student's active engagement in order to get the same results with less work. Students are at the center of network teaching, which is based on subject learning or self-directed learning via communication between humans and machines and collaboration between teachers and students. As a result, online education can help students expand their learning and inventing abilities by allowing them to fully utilize their own initiative and enthusiasm [13]. Then, the learning materials are rich, novel, and varied. There are many English websites on the internet, or there are English web pages, and the English materials provided are rich in content and novel in knowledge.

Students can not only enhance their interest but also their English language proficiency in a simulated pure setting, by being exposed to a vast number of original language materials rich in the times. Second, the actions of teaching are not confined. Students in online education can create their own learning environment on their own time. There are no time restrictions in class, and students can schedule their own learning time and topics. The learning activities are flexible, and the learning content is diverse, not only without the restrictions of the campus walls but also no longer limited by time and region. The problem of supplementary lessons has also been resolved in a timely manner. Finally, students can get help in a variety of ways [14]. Problems encountered by students in their studies can be released through the BBS of the network, and they can get help in all directions. Students can widen their horizons in thinking and problem-solving by using brainstorming and multiparty dialogues to broaden their horizons in thinking and problem-solving. This can assist pupils to increase their capacity to understand and use language while also improving their thorough observation and judgment abilities [15].

The following is the paragraph that arranges the study as follows: the related work is provided in Section 2. Section 3 examines the methodologies used in the suggested work. Section 4 discusses the experiments and their outcomes. Finally, in Section 5, the research task is performed.

2. Related Work

As a result of this analysis, the literature [16] made a detailed discussion on the challenges that English teachers encounter when teaching online and how to overcome them. Literature [17] used questionnaires and in-depth interviews with foreign language professors at four different schools and universities to gather data and information. In the light of the current state of educational technology's use in foreign language instruction in colleges and universities, the appropriate ideas and suggestions have been put out in this study. Teaching a foreign language to students should be based on constructionist principles, according to literature [18], which advocates incorporating new information network technologies into classroom instruction. Literature [19] started from the construction of the central meaning of the constructivist learning concept through a teaching reform practice for foreign trade English majors in universities. It analyzes the computer-aided project teaching mode from five aspects: learning enthusiasm, goal guidance, task authenticity, continuous reflection, and interaction and cooperation. Literature [20] proposed a networked autonomous learning teaching model, emphasizing individualized teaching and autonomous learning, giving full play to the learning potential of learners, and changing the traditional teaching mode of teachers telling students to listen. Literature [21] found that autonomous learning performance and learner self-efficacy in the network environment are positively correlated, and on this basis, it expounds the implications of the analysis results for current college English teaching. Literature [22] believes that how to realize the optimal integration of computer network technology and English classroom teaching in high school has become the goal pursued by the majority of English teachers. Reference [23] examines the theoretical foundations and viability of self-directed learning on the internet, and the tactics and benefits of self-directed learning in high school English using network resources. Reference [24] took the utilization of network resources as an opportunity, proceeded from the background and significance of the research, and discussed

the impact and role of using network resources on English teaching in junior high schools. Literature [25] obtained first-hand information through sampling questionnaires and interviews, organized and analyzed the survey materials, and analyzed the situation and effect of using computer-assisted English teaching.

Literature [26] presents its own views and opinions on how to select and find resources on the internet that can be used to serve foreign language teaching and how to develop and utilize these resources by introducing relevant information and practices. Literature [27] starts from the historical background and essential characteristics of e-mail development, and discusses the advantages and theoretical basis of its application in English teaching. Literature [28] proposed that the activities in the field of computer-assisted language teaching mainly focus on resource development, teaching innovation, and research. Literature [29] discusses the advantages of network education and the problems of network resource construction in high school English education informatization on the basis of combining theory with practice. Reference [30] starts with a case study and discusses how to apply network resources to the operational skills of English classroom teaching. Starting from the development of educational information technology and language laboratory, it tries to re-examine the language laboratory with systems theory, modern linguistics, and modern educational information technology theory, and discusses the development trend of the language laboratory. Reference [31] explores the degree of realization of online interactive learning in the course, students' experience of online interaction, and the change and development of their beliefs. As a listening resource for high school English lessons, reference [32] attempted to present the Voice of America via the English listening website. Examinations, questionnaires, and interviews were used to gather information about what students thought about network-assisted English listening instruction and traditional English instruction. The results were used to develop the theory behind network-assisted English listening instruction.

3. Method

This work first builds an IoT-oriented online education English learning platform and then uses neural networks to evaluate the improvement of this platform on English teaching.

3.1. IoT-Oriented Online Education Platform. The English education system is usually used as a learning aid and must ensure the user's experience effect. At the same time, it is necessary to ensure that its functions are realized as much as possible, in order to simplify the overall design requirements. Based on the research on the existing system structure, it can be concluded that there are three types of users in the system based on the English education system. That is, system administrators, teacher users, and student users. Relating to a variety of functions, you end up with multiple separate modules by combining functions with overlapping criteria. The framework is demonstrated in Figure 1.

The login registration module is utilized to complete the student account registration process and the login identity authentication function. The teaching information module allows students to examine information about their classes. Students can use the test module to take online tests. The message module provides a doorway for pupils to receive teaching messages. User information management is used by administrators to retrieve and modify user information. Course management is used by administrators to search and modify online courses. Discussion management is used by administrators to delete and query messages in the discussion area. Announcement management is used by administrators to publish website announcements and to modify and delete announcements.

Student management is highly targeted, mainly based on students' learning content. English education needs to comprehensively consider students' listening, speaking, reading, and writing abilities. Registration and login, viewing, and modification of personal information should be implemented. At the same time as core content, students can view courseware, video tutorials, test questions, and complete online quizzes. Students can also view website announcements, postonline responses to messages, etc. These functions mainly ensure that students can log in to the learning terminal to conduct effective learning and achieve the purpose of autonomous learning through the system.

Teachers and administrators can make decisions about background functions, and both have the ability to add, delete, and enter data. Teachers can control courseware, teaching videos, and examination questions in addition to having the permission of students. The management center is used by teachers for basic information management such as user management, courseware management, homework addition, and online answering management. The management message board has functions such as forum management and replying to messages.

3.2. BP Network. The BP is a model based on error feedback regulation. The basic idea of its core algorithm is gradient descent, and the network uses the output value error backpropagation to train a feedforward network with multiple hidden layers in the middle. The mean square error between the data output value and the expected value in the network is minimized using the gradient search method. Backpropagation of the error and forward propagation of the input data make up most of the BP algorithm's two primary stages of operation.

The error output process is carried out according to the forward propagation process from input to output, and then, the feedback calculation from output to input is performed through weight adjustment and threshold adjustment. In the process of forward propagation, the input data are output through the hidden layer nodes. The output feature information is obtained by nonlinear transformation of the function in the hidden layer. If the actual output feature value does not match the expected value, the error reverse adjustment process is entered. The

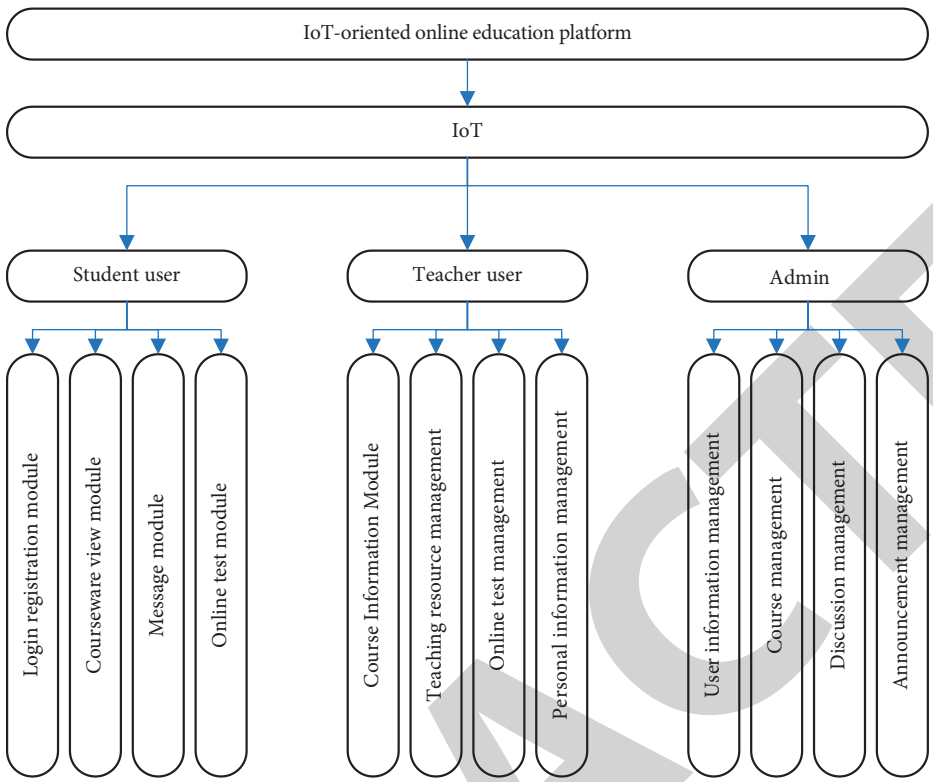

Figure 1: IoT-oriented online education platform.

reverse adjustment of the error is to build a feedback mechanism in the hidden layer and transfer the output error value to the input layer through the hidden layer in reverse. In this process, the error value will be allocated to each neuron node in the hidden layer, and the error value obtained in each hidden layer will be used as the basis for adjusting the weight of each neuron node. The connection strength of the output layer and each hidden layer node and the overall threshold have been continuously adjusted and optimized. The error of the model will decrease along the gradient. In the continuous training process, the minimum error and the model weight corresponding to the minimum error image are obtained, and the training can be stopped.

Figure 2 shows a simple neural network architecture framework. The input layer is responsible for the input and reading of data. Another role of the input layer is to filter the input data to ensure that most of the data are necessary factors for the model. If the input data contain too much redundant data, it will affect the training of the network. To minimize overfitting owing to too many influencing elements in the input data, it is required to check from the input component. The hidden layer is responsible for feature extraction of data, and the number of hidden layers can be adjusted at will according to the amount of data. The output layer is fully connected to the data extracted by the features of the hidden layer and then output to obtain the data form expected by the research.

The neural network model involves several main functions.

$$\text{Sigmoid}(x) = \frac{1}{(1 + \exp(-x))}. \tag{1}$$

The output function of the output layer is as follows:

$$O_i = \sum_{j=1}^{N} x_j w_{ij} - b_j. \tag{2}$$

The error value calculation function is as follows:

$$E_i = O_i - T_i. \tag{3}$$

The weight and bias update functions are as follows:

$$w_{\text{new}} = w - \Delta w, \tag{4}$$

$$b_{\text{new}} = b - \Delta b. \tag{5}$$

The BP network also has some shortcomings, and it is easy to fall into local data minimization, which leads to the death of neurons and the overfitting of the model. The weight in the BP network is continuously adjusted according to the positive direction, similar to the local search algorithm, which makes the weight value easy to converge to the minimum value, that is, it falls into the local maximum value problem. Therefore, this work uses the improved RLGWO algorithm to optimize the BP network.

3.3. GWO Algorithm. The GWO is a stochastic global optimization approach based on the grey wolf's leadership

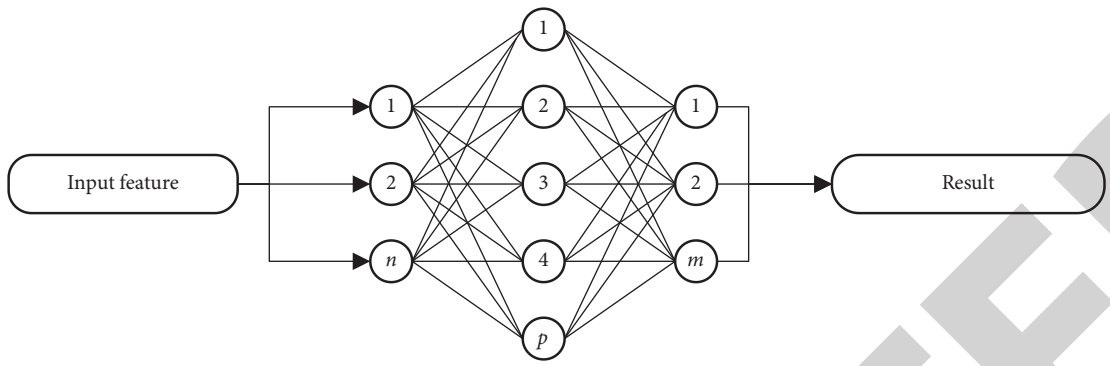

Figure 2: The BP network.

structure and hunting strategy. For example, the grey wolf method does not consider gradient information and has a simple structure with few parameters and a powerful global search capacity.

Grey wolves hunt in packs in the wild, and their social status dictates how effective they are at catching their prey. The alpha wolf is the highest leader of the wolf pack, consisting of a male grey wolf and a female grey wolf. The pack's behaviors, like as hunting, are directed by the alpha wolves. Alpha wolves, on the other hand, do not make all of the decisions for the pack, and they do occasionally listen to other wolves. These wolves are not necessarily the most powerful in the pack, but they must be grey wolves with greater prestige in the pack and familiar with their ability to survive. They have strict hierarchies that make these grey wolf populations apex predators. The grey wolf on the second floor is called the beta wolf. Grey wolves at this level will help alpha wolves make some decisions. These wolves are generally filled with experienced and strong wolves and can take the place of alpha wolves at any time. Beta wolves obey the command of alpha wolves, while assisting alpha wolves in commanding other low-level wolves. Delta wolves are in beta wolves, and they follow the command of alpha wolves and beta wolves. Omega wolves are the lowest level of grey wolves; they are the wolves' commoners, and they follow the orders of other grey wolves in the management class. They are the last to eat and hunt in a coordinated manner under the supervision of the management wolves. Omega wolves are the main body and structure of the entire wolf pack to prey on their prey, and they have powerful abilities under the command of the management wolf pack.

In the GWO algorithm, the search process starts by creating a random pack of grey wolves. The possible location of the prey is mainly estimated based on the wolf's location, and each candidate solution updates its distance from the prey. The vector A is introduced as a convergence factor. When it is greater than 1, the candidate solution tends to deviate from the prey, hoping to find a more suitable prey. When it is less than 1, the candidate solution tends to approach the prey for the next stage of chasing and encircling the prey. The description of a grey wolf approaching and surrounding its prey reads the following:

$$X(t+1) = X_p(t) - AD, \tag{6}$$

$$D = \left|CX_p(t) - X(t)\right|, \tag{7}$$

$$A = 2ar_1 - a, \tag{8}$$

$$C = 2r_2. \tag{9}$$

During the predation process of grey wolves, alpha wolves are often led by wolves to approach and surround the location of their prey. In an abstract search space, the prey's exact location is unknown, but the wolves are well versed in where it might be. This means that the top three answers found thus far are saved, and other search agents are asked to update their positions in accordance with the best search's position.

3.4. BP Network with RLGWO. A reverse learning mechanism is added to GWO, which can improve the global search ability of the algorithm. The idea of reverse learning is to generate reverse individuals in the area where the current individual is located, to participate in the comparison and competition with the current individual, and to select more outstanding individuals to enter the next generation.

$$X^p = B_L + B_U - T + r(T - X), \tag{10}$$

where X^p is the reverse position in the search space, B_L and B_U are lower and upper bounds, and T is the position of the best grey wolf. The flow of the RLGWO algorithm is illustrated in Figure 3.

The BP network model's weights and thresholds were optimized with the RLGWO to improve prediction accuracy. Continuous updates to weights and thresholds are made with each grey wolf algorithm iteration until optimal values are obtained. Following are the steps of the RLGWO-BP: identifying the BP network's topology, the number of hidden nodes, and the output node's excitation function is the first steps in creating the neural network. Initializing the grey wolf method and population, and the maximum number of repetitions and individual grey wolf dimensional parameters, is the next steps. Calculating the grey wolf's individual

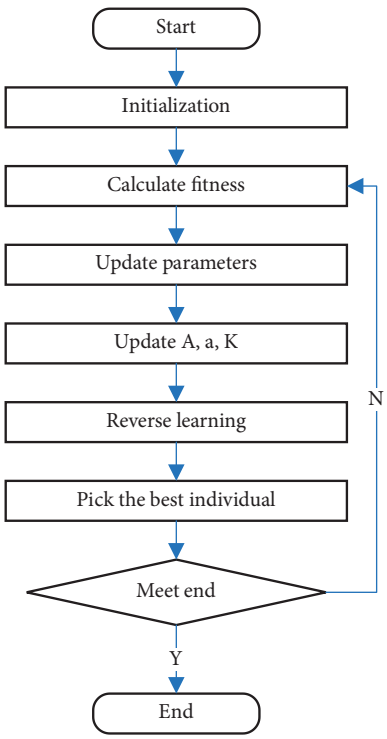

Figure 3: The pipeline of RLGWO.

fitness value and determining the three best solutions to that value are the third phase in the process. The fourth phase involves updating other grey wolf individuals using the best three grey wolves. The fifth stage is to build a reverse population using the reverse learning mechanism and then choose the best individual for the next generation population. In the sixth step, if the algorithm reaches the set error value or the maximum number of iterations, the loop is terminated. Otherwise, steps 3 to 5 are repeated. In the seventh step, the final return result is the position of the grey wolf, which is the weight and threshold of the optimal BP network. Also, the fitness value of the grey wolf is returned. Finally, the established RLGWO-BP model for the effect of IoT-oriented online education platform in English language teaching is used.

4. Experiment

4.1. Dataset. This work uses a self-made dataset to evaluate the impact of IoT-oriented online education on English language teaching. Each sample contains a 13-dimensional feature as shown in Table 1 and a five-category quality level. The evaluation metrics used in the experiment are precision and F1-score.

4.2. Experimental Evaluation. First, the RLGWO-BP algorithm designed in this work is compared with other machine learning methods, and the experimental results are demonstrated in Figure 4.

Compared with the other methods, the method proposed in this work can achieve the best performance, thus

Table 1: The data index of the dataset.

Index	Meaning
a_1	Education resource
a_2	Course design
a_3	Learning monitoring
a_4	Learning support
a_5	Subject knowledge
a_6	Teaching skill
a_7	Teaching objective
a_8	Teaching content
a_9	Teaching method
a_{10}	Course management
a_{11}	Student ability
a_{12}	Student knowledge
a_{13}	Teacher ability

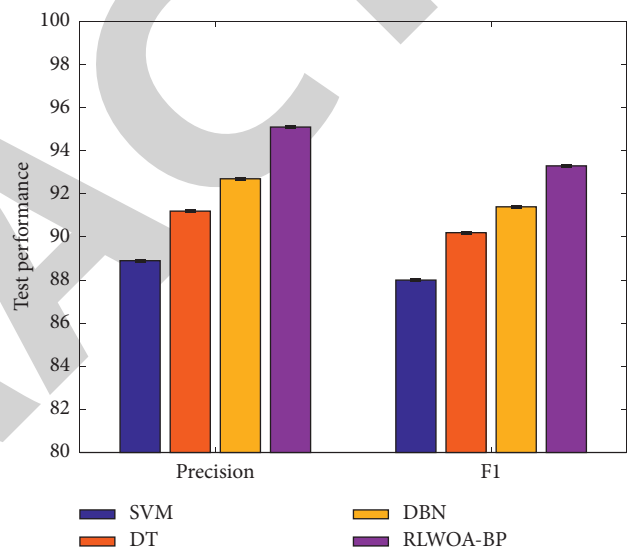

Figure 4: Comparison of RLGWO-BP with other methods.

demonstrating the effectiveness of the method. In addition, in order to verify that the RLGWO can effectively optimize the BP network, it is compared with the traditional BP method, and the experimental results are demonstrated in Figure 5.

Compared with the traditional BP method, after using the RLGWO for optimization, the precision improvement of 1.6% and the F1-score improvement of 1.6% can be obtained, respectively. To further verify the optimization effectiveness of the RL strategy for GWO, the evaluation performance of the RLGWO-BP and GWO-BP is compared, and the experimental results are demonstrated in Figure 6.

Compared with the GWO-BP method, after using RL for WOA optimization, the precision improvement of 1.3% and the F1-score improvement of 1.1% can be obtained, respectively.

The number of hidden layers in a BP network is varied. A comparative experiment is carried out in this work to validate the influence of different layers on performance, and the experimental results are shown in Table 2.

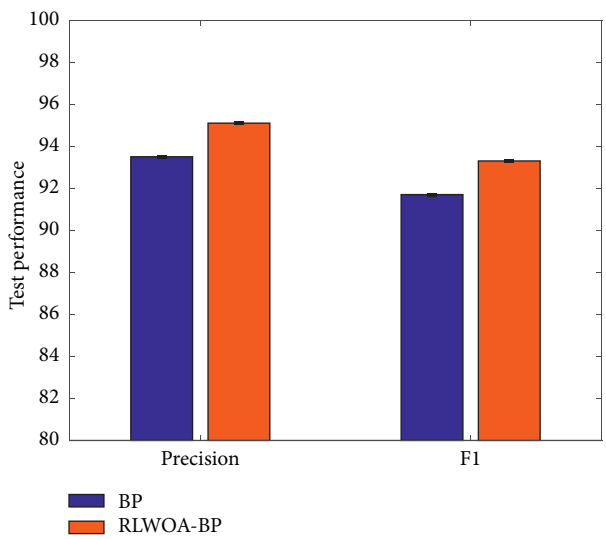

Figure 5: Comparison of RLGWO-BP with BP.

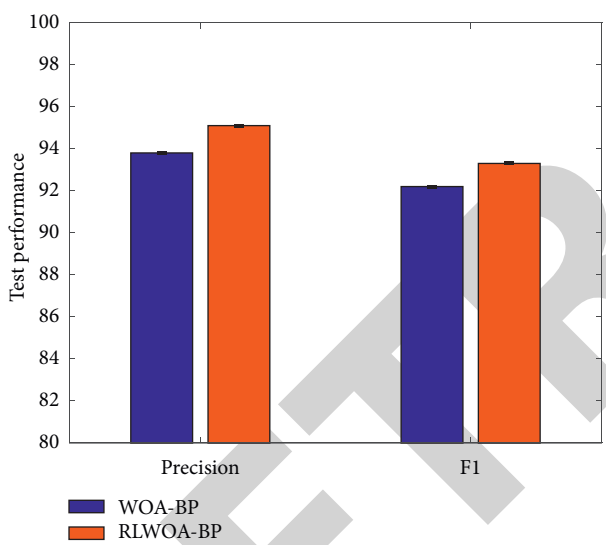

Figure 6: Comparison of RLGWO-BP with GWO-BP.

Table 2: Effect of different hidden layers on performance.

Layer	1	2	3	4
Precision	94.70	95.10	94.80	93.90
F1-score	92.80	93.30	93.10	91.60

The best performance can be obtained when the number of hidden layers is 2. Afterward, as the number of layers increases, the network performance will decrease.

Finally, this work tests the performance of the IoT-oriented online education platform, mainly the system delay test. The experimental results are demonstrated in Figure 7.

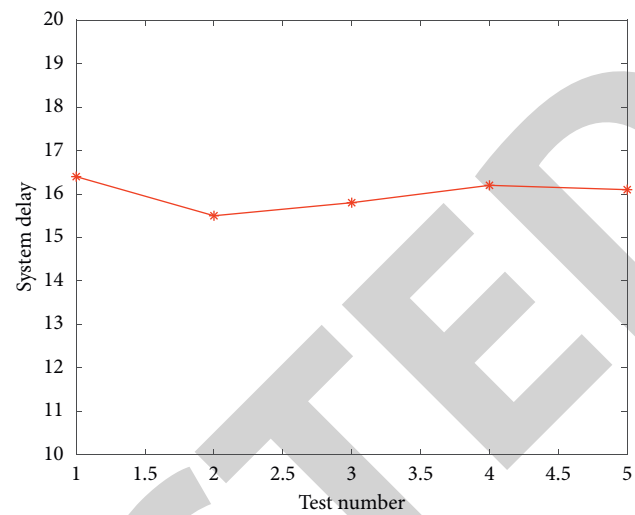

Figure 7: System delay test.

The delay of the platform system is generally stable and at a low delay level, which proves the effectiveness of the system.

5. Conclusions

With the development of IoT technology, education tends to be more technological and informatized. The online education platform for English teaching is realized, and the future developmental prospect is broad. There is no doubt that the intelligent development of education is a change from the traditional English mode. Therefore, when designing the English education system, this study deeply understands the relationship between the IoT and the intelligent system, and then designs a fully functional internet of things-oriented English network education platform. The system not only provides students with individualized teaching services such as online learning, online testing, downloading, online replying, and other services, but it also provides them with online learning, online testing, downloading, and other services. It also provides a variety of communication channels, aiming at online English education, promoting the development of students' advanced cognitive ability, and strengthening the mutual learning. In addition, this study proposes an improved BP network to evaluate the improvement effect of IoT-oriented online education platform on English language teaching. First, the GWO is improved, and the reverse learning mechanism is added to the grey wolf algorithm to enhance the ability to search for the optimal solution. The RLGWO-BP model is constructed and used to evaluate the improvement effect of the IoT-oriented online education platform on English language teaching.

Data Availability

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

Conflicts of Interest

The author declares no conflicts of interest.

References

[1] A. Abd Syakur, Sugirin, and Widiarni, "The effectiveness of English learning media through Google classroom in higher education," *Britain International of Linguistics Arts and Education (BIoLAE) Journal*, vol. 2, no. 1, pp. 475–483, 2020.

[2] Z. Turan and B. Akdag-Cimen, "Flipped classroom in English language teaching: a systematic review," *Computer Assisted Language Learning*, vol. 33, no. 5-6, pp. 590–606, 2020.

[3] S. Nassim and W. Labidi, "Integrating intercultural education among arab speakers in English classroom," *Creative Education*, vol. 13, no. 02, pp. 450–465, 2022.

[4] K. Chandra, A. S. Marcano, S. Mumtaz, R. V. Prasad, and H. L. Christiansen, "Unveiling capacity gains in ultradense networks: using mm-wave NOMA," *IEEE Vehicular Technology Magazine*, vol. 13, no. 2, pp. 75–83, 2018.

[5] K. Tahir, "Transformational teaching: Pakistani students' perspectives in the English classroom," *International Journal of Teaching and Learning in Higher Education*, vol. 30, no. 1, pp. 61–69, 2018.

[6] A. A. Aziz and S. Kashinathan, "ESL learners' challenges in speaking English in Malaysian classroom," *Development*, vol. 10, no. 2, pp. 983–991, 2021.

[7] S. Issa, "Comics in the English classroom: a guide to teaching comics across English studies," *Journal of Graphic Novels and Comics*, vol. 9, no. 4, pp. 310–328, 2018.

[8] P. Si, "A study of the differences between EFL and ESL for English classroom teaching in China," *IRA International Journal of Education and Multidisciplinary Studies*, vol. 15, no. 1, p. 32, 2019.

[9] Z. Sun, M. Anbarasan, and D. Praveen Kumar, "Design of online intelligent English teaching platform based on artificial intelligence techniques," *Computational Intelligence*, vol. 37, no. 3, pp. 1166–1180, 2021.

[10] A. B. Rinekso and A. B. Muslim, "Synchronous online discussion: teaching English in higher education amidst the covid-19 pandemic," *Journal of English Educators Society*, vol. 5, no. 2, pp. 155–162, 2020.

[11] T. N. Fitria, "Teaching English through online learning system during covid-19 pandemic," *Pedagogy: Critical Approaches to Teaching Literature, Language, Composition, and Culture: Journal of English Language Teaching*, vol. 8, no. 2, p. 138, 2020.

[12] Q. Huang, "Comparing teacher's roles of F2f learning and online learning in a blended English course," *Computer Assisted Language Learning*, vol. 32, no. 3, pp. 190–209, 2019.

[13] A. Tratnik, M. Urh, and E. Jereb, "Student satisfaction with an online and a face-to-face Business English course in a higher education context," *Innovations in Education & Teaching International*, vol. 56, no. 1, pp. 36–45, 2019.

[14] S. Shrestha, S. Haque, S. Dawadi, and R. A. Giri, "Preparations for and practices of online education during the Covid-19 pandemic: a study of Bangladesh and Nepal," *Education and Information Technologies*, vol. 27, no. 1, pp. 243–265, 2022.

[15] C. H. Ng, "Communicative Language Teaching (CLT) through synchronous online teaching in English language preservice teacher education," *International Journal of TESOL Studies*, vol. 2, no. 2, pp. 62–73, 2020.

[16] M. K. Kabilan, N. Ahmad, and M. J. Z. Abidin, "Facebook: an online environment for learning of English in institutions of higher education?" *Internet and Higher Education*, vol. 13, no. 4, pp. 179–187, 2010.

[17] M. Baturay and E. Yukselturk, "The role of online education preferences on student's achievement," *The Turkish Online Journal of Distance Education*, vol. 16, no. 3, pp. 3–12, 2015.

[18] J. F. Moloney and B. Oakley, "Scaling online education: increasing access to higher education," *Journal of Asynchronous Learning Networks*, vol. 14, no. 1, pp. 55–70, 2010.

[19] D. Xu and S. S. Jaggars, "The effectiveness of distance education across Virginia's community colleges: evidence from introductory college-level math and English courses," *Educational Evaluation and Policy Analysis*, vol. 33, no. 3, pp. 360–377, 2011.

[20] B. Cejda, "Online education in community colleges," *New Directions for Community Colleges*, vol. 2010, no. 150, pp. 7–16, 2010.

[21] S. Suh, S. W. Kim, and N. J. Kim, "Effectiveness of MMORPG-based instruction in elementary English education in Korea," *Journal of Computer Assisted Learning*, vol. 26, no. 5, pp. 370–378, 2010.

[22] P. Duan, Y. Jia, L. Liang, J. Rodriguez, K. M. S. Huq, and G. Li, "Space-reserved cooperative caching in 5G heterogeneous networks for industrial IoT," *in IEEE Transactions on Industrial Informatics*, vol. 14, no. 6, pp. 2715–2724, 2018.

[23] J. K. Heirati and L. A. Alashti, "Attitudes toward using the Internet for language learning: a case of Iranian English teachers and learners," *International Journal of Research Studies in Educational Technology*, vol. 4, no. 1, 2015.

[24] R. Kern, "Technology as pharmakon: the promise and perils of the internet for foreign language education," *The Modern Language Journal*, vol. 98, no. 1, pp. 340–357, 2014.

[25] J. Gómez, J. F. Huete, O. Hoyos, L. Perez, and D. Grigori, "Interaction system based on internet of things as support for education," *Procedia Computer Science*, vol. 21, pp. 132–139, 2013.

[26] K. E. Pearce and R. E. Rice, "The language divide—the persistence of English proficiency as a gateway to the Internet: the cases of Armenia, Azerbaijan, and Georgia," *International Journal of Communication*, vol. 8, p. 26, 2014.

[27] S. Ramani, "The internet and education in the developing world-hopes and reality," *Smart Learning Environments*, vol. 2, no. 1, pp. 1–16, 2015.

[28] S. Mumtaz, H. Lundqvist, and K. M. S. Huq, "Smart Direct-LTE communication: An energy saving perspective," *Ad Hoc Networks*, vol. 13, pp. 296–311, 2014.

[29] S. Celik, "Internet-assisted technologies for English language teaching in Turkish universities," *Computer Assisted Language Learning*, vol. 26, no. 5, pp. 468–483, 2013.

[30] L. Zamorshchikova, O. Egorova, and M. Popova, "Internet technology-based projects in learning and teaching English as a foreign language at yakutsk state university," *International*

Review of Research in Open and Distance Learning, vol. 12, no. 4, p. 72, 2011.

[31] A. Laplante-Lévesque, K. J. Brännström, G. Andersson, and T. Lunner, "Quality and readability of English-language internet information for adults with hearing impairment and their significant others," *International Journal of Audiology*, vol. 51, no. 8, pp. 618–626, 2012.

[32] H. Hadiyanto, A. Mukminin, and M. Makmur, "Teaching in a digital era: English lecturers' readiness toward the internet use in teaching and learning at selected higher education institutions in Indonesia," *Asia-Pacific Collaborative Education Journal*, vol. 9, no. 2, pp. 113–124, 2013, https://repository.unja.ac.id/179/.