Research Article

College English Teaching Quality Monitoring and Intelligent Analysis Based on Internet of Things Technology

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With the continuous development of network communication, modern control, information perception, artificial intelligence, and other technologies, the Internet of Things technology has also been more comprehensively developed and grown, and it is playing an increasingly important role in various fields of production and life. Due to the low efficiency and cumbersome procedures of the existing college English teaching quality assessment, this study intends to propose a new method to deal with this problem. Through this research, we get the following: (1) use static weight equalization method, dynamic weight adaptation method, and iterative weight method to filter and analyze the original data received by mobile phones and discard some obviously wrong values in the preprocessing. Analyzing the number requirements of the game model, the supply operation reference model, and the IoT technology upgrade model for the number of demand points, the results show that the IoT technology upgrade model requires the least number of demand points. (2) Optimize the related parameter information of the IoT system model, including candidate numbers, number of students in class, adjustment coefficient, D_i , turnover rate, system cost, and total system consumption. The Internet of Things technology upgrade model performed best. Adjustment coefficient = -102; D_i = -99.6; turnover = -100; system cost = -123.2; SL = -123.5; SP = -99.8. (3) Passed the test of the number of questions and feedback rate, classroom number, classroom test scores, new vocabulary number, system scoring, and comprehensive scoring to judge the model. It is found that the number of questions, feedback rate, class number, and class test scores, number of new vocabularies, system scores, and comprehensive scores of the upgraded and transformed models of the Internet of Things are above the standard values, indicating that the model is highly efficient and intelligent.

1. Introduction

The concept of Internet of Things (IoT) is that when scientists are studying the interaction based on the Internet, they discovered that Internet technology can be perfectly combined with radio signal transmission technology, so the Internet of Things technology is proposed. Its purpose is to realize the interconnection of all things, build an intelligent metropolis, and improve the standard and quality of human life, and then, realize the intelligent recognition and management [1–3]. With the continuous development of network communication, modern control, information perception, artificial intelligence, and other technologies, the Internet of Things technology has also been more comprehensively developed and grown, and it is playing an increasing role in various fields of production and life. COVID-19 has

transcended, radical, conceptual, spiritual, social, and teaching boundaries for global challenges. Great changes have taken place in our lives, and medical diagnosis based on the Internet of Things has also emerged. This detection method greatly improves the efficiency of data integration of testers and shortens the detection time of the new coronavirus. The tide of the fourth industrial revolution has swept the world [4]. The Internet of Things technology covers many fields such as manufacturing, agriculture, health, monitoring, and education [5–7]. In order to increase the sense of experience of the Internet of Things, enhance the sense of participation, and increase comfort, technological innovations, increased sensor distribution, design of more user-friendly interactive interfaces, and adaptation of more applications can be achieved. The solutions to the problems in life through the Internet of Things technology are applied in

FIGURE 1: Teaching quality evaluation system.

TABLE 1: Course arrangement of simulated English teaching.

Week	Units	Functions
1	Unit 1. Where did you go on vacation?	Talk about past events
2	Unit 2. How often do you exercise?	Talk about how often you do things
3 and 4	Unit 3. I am more outgoing than my sister.	Talk about personal traits; Compare people
5 and 6	Unit 4. What is the best movie theater?	Discuss preferences; make comparisons
7 and 8	Unit 5. Do you want to watch a game show?	Talk about preferences make plans
9 and 10	Unit 6. I am going to study computer science.	Talk about future; intentions
11 and 12	Unit 7. Will people have robots?	Make predictions
13 and 14	Unit 8. How do you make a banana milk shake?	Describe a process follow instructions
15 and 16	Unit 9. Can you come to my party?	Make, accept and decline invitations; talk about obligations
17 and 18	Unit 10. If you go to the party, you will have a great time!	Talking about consequences

more and more fields, and the application in each field has its specificity, bringing huge challenges to the deployment of the Internet of Things [8–10]. As the global population continues to age, the health supervision needs of the elderly are increasing. The Internet of Things technology is being used to detect the daily life and dietary health of the elderly. In this way, even if the elderly live alone, there is no need to worry too much. What needs to be solved is the privacy problem involved in the monitoring process. How to better protect privacy is the main problem we are facing now. The use of the Internet of Things technology to enhance the protection of privacy and security and the setting of the whitelist will bring great convenience to the healthy life of human beings. Through the open data set, a smart space that is versatile, open, and inclusive is constructed. In the current trend of intelligent digitization, the Internet of Things needs to use data sensing technology for dimensionality reduction processing of high-dimensional data sets, relying on the powerful network environment and the self-learning function of the deep system. Dynamic image classification is associated with several temporal data disturbances (such as new class arrival and class evolution problems), which can cause serious deterioration of the classification in the deployed classification model and make it invalid. The teaching evaluation system consists of three modules, namely, the decision-making command system, the quality evaluation system, and the information feedback system.

The decision-making command system is composed of school leaders including school leaders and consulting organizations. School-level leaders are responsible for the formulation and modification of some policies, while the consulting organization conducts anonymous questionnaire surveys on some of the needs of students and analyzes the results of the survey. Find out the most concerned issues of the students and agree to solve them. After reporting to school-level leaders, make decisions. The teaching quality evaluation and monitoring system includes strengthening the expansion of the campus monitoring network coverage, the continuous update and improvement of the teaching information system, and the optimization and purification of the network environment for students to surf the Internet. The monitoring of teaching quality also includes the combination of practical teaching and theoretical teaching [11–13]. After comparing practical teaching and theoretical teaching, it is found that each has its own advantages and disadvantages. Practical teaching relies more on experience, while theoretical teaching focuses more on the understanding of knowledge and the derivation of logic. In order to improve the English classroom learning effect of the university, facilitate the management and statistics of teachers, analyze the classroom behavior of college students on the Internet of Things technology, and identify when the students are most focused and when they feel the classroom boring and boring, and then use the deep learning model

TABLE 2: The structure of strengthening multimodal reading teaching.

Teaching phases	Teaching activity	Modalities	Alleviated reading anxiety
Prereading	Warming up	Auditory modality: audio, music, etc.; visual modality: text, video, images, animation, posters, etc.; linguistic modality: spoken language: tone, accent tone, etc.; written language shown on the PPT and text-material. Gestural modality: gestures, movements, expressions, etc.; spatial modality: classroom layout.	Affective factor
	Fast reading		Cultural background
	Careful reading		Text understanding
While reading	Group work (mind map)		Teaching mode
			Cultural background
Postreading	Summary: summarize key points and difficulties; assign homework	Auditory modality: audio, music, etc.; visual modality: text, video, images, tables, animations, posters, etc.; linguistic modality: spoken language: tone, accent tone, etc.; written language shown on the PPT and text-material	Learning method and habit
			Text understanding
			Teaching mode

FIGURE 2: The overall design of the system.

to analyze the captured images. Analyze the source of influence, so as to better improve. College English teaching quality monitoring and intelligent analysis include parameters such as candidate numbers, class numbers, and adjustment coefficients. Adjusting these key parameters can make the functions of the college English teaching quality monitoring

and intelligent analysis system more perfect. In order to obtain and master some of the needs of students, find out the most concerned problems of students and solve them in a unified way. Pass the verification report of four models (VGG16 model, ResNet18 model, ResNet50 model, and AlexNet model). It is concluded that the algorithm recognition ability of the VGG16 model is the strongest, and the accuracy rate for the recognition of students' classroom behavior is as high as 90%. Intelligent image recognition technology based on the Internet of Things technology can improve the efficiency of college English classrooms. This idea is feasible. Due to the low efficiency and cumbersome procedures of the existing college English teaching quality assessment, this study intends to propose a new method to deal with this problem. This research is based on the Internet of Things technology, through online training (OT) and online classifier update (OCU) modules, using a new framework architecture model, and is verified in the quality monitoring and intelligent analysis of college students' English teaching, which effectively proves the adaptation, the advanced nature of the framework algorithm and architecture. Using adaptive algorithms, an adaptive college English teaching quality monitoring and intelligent analysis system supporting the Internet of Things has been developed. Solve the problem of inconsistency between new class arrival and class evolution [14, 15].

TABLE 3: Raw data cleaning and filtering scheme.

Method	1	2	3	4	5	6	7	8	9
Static weight equalization method.	0.150	0.145	0.135	0.105	0.094	0.085	0.097	0.147	0.152
Dynamic weight adaptation	0.073	0.078	0.065	0.072	0.058	0.059	0.074	0.072	0.066
Iterative weight method	0.065	0.059	0.048	0.049	0.052	0.042	0.047	0.053	0.056

FIGURE 3: Original data cleaning and filtering scheme.

TABLE 4: Game model, supply chain operation reference model, and IoT technology upgrade model demand points.

Model	Demand point 301	Demand point 302	Demand point 303	Demand point 304	Demand point 305	Demand point 306	Demand point 307	Demand point 308	Demand point 309	Demand point 310
Game model	8.9	21.9	27	16	21	10	12.4	24	12.5	13.2
Supply chain operation reference model	18.6	10.8	8.6	9.3	22	13.2	5.6	2.2	7.6	5.4
Internet of Things	8.2	9.6	11.6	10.3	10.2	11.2	3.6	2.2	1.03	3.4

FIGURE 4: Game model, supply chain operation reference model, and IoT technology upgrade model demand points.

TABLE 5: Related parameters.

Alternative number	Number of class	Adjustment coefficient	Di	Turnover	System cost	Total system consumption
201	152	1.14	70	1 22	0.92	3.19
202	165	1.13	50	1 22	0.92	3.19
203	154	1.15	70	1 22	0.92	3.19
204	198	1.18	70	1 22	0.92	3.19
205	156	1.19	50	1 22	0.92	3.19

TABLE 6: Value range of spreading factor.

Spreading factor	Spreading factor (chips/symbol)	The signal-to-noise ratio SNR of the signal.
7	128	-7.5 dB
8	256	-10 dB
9	512	-12.5 dB
10	1024	-15 dB
11	2084	-17.5 dB
12	4096	-20 dB

2. Teaching Quality Monitoring and Intelligent Analysis

2.1. Teaching Quality Evaluation System. As shown in Figure 1, the teaching evaluation system consists of three modules, namely, the decision-making command system, the quality evaluation system, and the information feedback system. The decision-making command system is composed of school leaders including school leaders and consulting organizations. School-level leaders are responsible for the formulation and modification of some policies, while the consulting organization conducts anonymous questionnaire surveys on some of the needs of students and analyzes the results of the survey. Find out the most concerned issues of the students and agree to solve them. After reporting to school-level leaders, make decisions. The management execution system also includes the school-level administrative department's implementation and interpretation of higher-level policies and interpretation of the latest guiding ideology of the Academic Affairs Office. Teachers and students play the role of data sources. The information feedback system is composed of the roommate supervision office and the employment office, responsible for the supervision and promotion of the implementation of the project, such as the classroom attendance of college students, and the employment of graduates. The feedback link in the information feedback system mainly accepts feedback from evaluation subjects such as the supervision office and educational administration and society, and the four links of teaching quality monitoring are interrelated and permeate each other [16–19].

2.2. Course Arrangement of Simulated English Teaching. According to a semester of 18 weeks, the English courses are arranged to make the teaching more planned and organized, as shown in Table 1. The weekly course schedule and classroom interaction are listed separately [20].

2.3. Strengthen the Structure of Multimodal Reading Teaching. Selection principle is based on modal system, as well as the current English reading teaching procedures (pre-reading, midreading, and postreading); the English reading teaching steps are divided into three stages. To carry out intensive multimodal reading teaching, follow the steps below to output, as shown in Table 2.

2.4. Overall System Design. The application layer calls and analyzes the college English classroom data through the college English database for the entry and exit management application and finally displays the data of teaching quality monitoring and intelligent management through visualization technology; the network layer is mainly responsible for the communication between the application layer and the collection layer; this technical service can evaluate teaching quality monitoring and intelligent management; the collection layer is mainly responsible for the attribute data information of college English teaching quality in Figure 2.

3. The Application of Internet of Things Technology in College English Teaching Quality Monitoring and Intelligent Analysis

(a) Game model [21]:

$$\frac{1}{x_k} \frac{dx_k}{dt} = [u(k, s) - u(s, s)], \quad k = 1. \quad (1)$$

Adaptability of college English class:

$$\begin{aligned} u_s(C_{\infty}, J) &= y(x_s + \Delta V_s) + (1 - y)(x_s - C_{OS}), \\ u_s &= (C_{OM}, J) = y \times \pi_s + (1 - y)\pi_s. \end{aligned} \quad (2)$$

Average node fitness:

$$\bar{u}_s = xu_s(C_{OO}, J) + (1 - x)u_s(C_{OM}, J). \quad (3)$$

Student cooperation strategy:

$$\begin{aligned} \frac{dx}{dt} &= x[u_s(C_{OO}, J) - \bar{u}_s], \\ \frac{dx}{dt} &= x(1 - x)[\Delta V_s u + C_{OS})y - C_{OS}]. \end{aligned} \quad (4)$$

FIGURE 5: Teaching quality monitoring parameters.

TABLE 7: Sensitivity test of different models.

Test	Game model	Supply chain operation reference model	Internet of Things
Adjustment coefficient	-130.00	-127.00	-102.00
Di	-132.50	-129.50	-99.60
Turnover	-135.00	-132.00	-100.00
System cost	-137.50	-134.50	-123.20
SL	-140.00	-137.00	-123.50
SP	-142.50	-139.50	-99.80

Define game strategy:

$$N = \{n_1, n_2, n_3\},$$

$$P(N) = \{\{n_0\}, \{n_1\}, \{n_2\}, \{n_3\}, \{n_1, n_2\}, \{n_1, n_3\}, \{n_2, n_3\}, \{n_1, n_2, n_3\}, N\}. \quad (5)$$

(b) Supply operation reference model (SCOR) [22]:

Competitive strategies of adaptability in college English classes:

$$v(\{n_0\}) = 0, v(N) = 2\theta. \quad (6)$$

For capturing images of college students:

$$\begin{aligned} v(\{n_1\}) &= v(\{n_2\}) = v(\{n_3\}) = 0, \\ v(\{n_1, n_j\}) &= \theta, (j = 2, 3), \\ v(\{n_2, n_3\}) &= 0, \\ v(\{n_1, n_2, n_3\}) &= 2\theta. \end{aligned} \quad (7)$$

Analyze the classroom behavior of college students on the Internet of Things technology and identify when students are most focused and when they find the class to be

boring and boring.

$$\begin{aligned} m(\{n_1\}) &= v(\{n_1\}) - v(\{n_0\}) = 0, \\ m(\{n_1, n_2\}) &= v(\{n_1, n_2\}) - v(\{n_1\}) = \theta, \\ m(\{n_1, n_3\}) &= v(\{n_1, n_3\}) - v(\{n_1\}) = \theta, \\ m_1(\{n_1, n_2, n_3\}) &= v(\{n_1, n_2, n_3\}) - v(\{n_2, n_3\}) = 2\theta. \end{aligned} \quad (8)$$

Expected contribution margin:

$$\varphi(N, v) = \sum_{\tau \in N} \frac{(|\tau| - 1)!(N - |\tau|)!}{N!} M_i. \quad (9)$$

The differential evolution process of the technological transformation and upgrading of the Internet of Things is

$$\begin{aligned} \frac{dI_H(t)}{dt} &= \beta_m^H N(t) - \alpha_H M_H(t), \\ \frac{dI_D(t)}{dt} &= \beta_m^D N(t) - \alpha_D M_D(t). \end{aligned} \quad (10)$$

Internet of things technology upgrade model [23–27]:

$$\begin{aligned} X_H(t) &= \frac{\gamma_H}{2} M_H(t)^2, \\ X_D(t) &= \frac{\gamma_D}{2} M_D(t)^2. \end{aligned} \quad (11)$$

For the capture of classroom images of college students:

$$\begin{aligned} N(t) &= N_0 + \theta(I_0 - I_H(t)), \\ I_0 &= (\beta_m^D + \beta_m^H) N_0. \end{aligned} \quad (12)$$

The cost of upgrading and reforming the Internet of

FIGURE 6: Sensitivity test of different models.

TABLE 8: The actual measurement of the IoT technology optimization model in the English classroom.

Measurement parameters	1	2	3	4	5	6	8	9	10
Questions	18.1	18.5	19	19.4	20.2	20.8	21.4	21.9	22.5
Feedback rate	85.2	84.8	84	82.5	82.1	81.4	80.9	80.6	80.1
Number of class	22	23	23	24	24	25	26	27	28
Class test results	85.1	84.4	83.6	82.2	814	81.1	80.5	80.2	79.5
Number of new words	39.1	39.5	40.2	40.4	41.2	41.9	42.2	42.5	42.9
System scoring	420	415	411	408	405	403	400	395	392
Comprehensive scoring	925	930	932	950	966	980	992	1005	1010

FIGURE 7: The actual measurement of the IoT technology optimization model in the English classroom.

Things technology is related to efficiency:

$$\begin{aligned} X_H(t) &= P(I_H(t) - \tilde{I}_H), \\ X_D(t) &= P(I_D(t) - \tilde{I}_D). \end{aligned} \quad (13)$$

Optimal efficiency of investment in IoT technology upgrading:

$$\begin{aligned} Y_m(I_D, I_H) &= \varphi_m + \phi_{mD}^* + \phi_{mH}^* I_H, \\ Y_n(I_D, I_H) &= \varphi_n + \phi_{nD}^* + \phi_{nH}^* (I_D + I_H). \end{aligned} \quad (14)$$

Evaluation results of the upgrading and transformation of the Internet of Things technology:

$$f(D(t), H(t)) = \int_0^\infty \left(I_H N_H(t) + I_D N_D(t) - \frac{\gamma_H}{2} H(t)^2 \right) dt. \quad (15)$$

4. Simulation Experiment

4.1. Calculation Example and Analysis. The static weight equalization method, dynamic weight adaptation method, and iterative weight method are used to filter and analyze the original data from the mobile phone, and some values with obvious errors are discarded in the preprocessing, as shown in Table 3 and Figure 3. Analyze the number of demand points required by the game model, the supply chain operation reference model, and the IoT technology upgrade model, as shown in Table 4 and Figure 4.

4.2. Related Parameters. As shown in Table 5, the relevant parameter information of the IoT system model is listed, including candidate numbers, number of students in class, adjustment coefficient, Di, turnover rate, system cost, and total system consumption. The alternative number refers to the number of the English classroom. According to school's arrangement of the courses, find the free classroom for systematic simulation. Table 6 lists the range of spreading factor values.

4.3. Teaching Quality Monitoring Parameters. Use related parameters to evaluate college English teaching quality monitoring and intelligent analysis. College English teaching quality monitoring and intelligent analysis include parameters such as candidate numbers, class numbers, and adjustment coefficients. As shown in Figure 5, as the adjustment coefficient increases, the functions of the college English teaching quality monitoring and intelligent analysis system will become more complete. So as to acquire and master some of students' needs, analyze the results, and find out the most concerned problems of the students for a unified solution.

As shown in Table 7, the sensitivity test of the game model, the supply chain operation reference model, and the IoT technology upgrade model show that the IoT technology upgrade model performs best. Adjustment coefficient = -102; Di = -99.6; turnover = -100; system cost = -123.2; SL = -123.5; SP = -99.8. As shown in Figure 6, it is a visual representation of the results.

4.4. The Actual Measurement of the Optimization Model of the Internet of Things Technology in the English Classroom. For the actual testing of the upgraded and transformed model of the Internet of Things in the English classroom of the university, the model is judged by measuring the number of questions, the feedback rate, the number of students in the classroom, the test results of the class, the number of new words, the system score, and the comprehensive score. It is found that the number of questions, feedback rate, number of classmates, class test scores, number of new vocabulary, system scoring, and comprehensive scoring of the model after the upgrade and transformation of the Internet of Things are above the standard value, indicating that the model is highly efficient and intelligent. As shown in Table 8 and Figure 7.

5. Conclusion

With the continuous development of network communication, modern control, information perception, artificial intelligence, and other technologies, the Internet of Things technology has also been more comprehensively developed and grown, and it is playing an increasing role in various fields of production and life. Due to the low efficiency and cumbersome procedures of the existing college English teaching quality assessment, this study intends to propose a new method to deal with this problem. Through this research, we get the following: (1) use static weight equalization method, dynamic weight adaptation method, and iterative weight method to filter and analyze the original data received by mobile phones and discard some obviously wrong values in the preprocessing. Analyzing the number requirements of the game model, the supply chain operation reference model, and the IoT technology upgrade model for the number of demand points, the results show that the IoT technology upgrade model requires the least number of demand points. (2) Optimize the related parameter information of the IoT system model, including candidate numbers, number of students in class, adjustment coefficient, Di, turnover rate, system cost, and total system consumption. The Internet of Things technology upgrade model performed best. Adjustment coefficient = -102; Di = -99.6; turnover = -100; system cost = -123.2; SL = -123.5; SP = -99.8. (3) Passed the test of the number of questions and feedback rate, classroom number, classroom test scores, new vocabulary number, system scoring, and comprehensive scoring to judge the model. It is found that the number of questions, feedback rate, class number, class test scores, number of new vocabularies, system scores, and comprehensive scores of the upgraded and transformed models of the Internet of Things are above the standard values, indicating that the model is highly efficient and intelligent.

Data Availability

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

Conflicts of Interest

The author declared that there is no conflict of interest regarding this work.

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