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Computer-Aided Design and Applications

Internet of Things and Pervasive Computing in Computer-Aided Interactive English Teaching

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Abstract. In the actual calculation process of English interactive learning, there are some problems such as single teaching and inaccurate evaluation of teaching methods. Based on the Internet of Things technology under mobile edge computing, the prediction algorithm of the Internet of things can be obtained by using the method of determining the regression model of the Internet of things parameters. By introducing perceptual computing, the Internet of Things algorithm can get a mobile comprehensive model under the joint action of the Internet of Things and perceptual technology. The comprehensive model can calculate the change rule of different indexes by extracting the indexes of Computer-aided interactive English teaching. This law of change can reflect the problems existing in the process of interactive English teaching and optimize the problem in Computer-Aided. Finally, the accuracy of the results is illustrated by data comparison. The standard value is the lowest change in the curve of regression model under the action of different calculated values, and the characteristic linear value is the stable linear increasing change. The change of the measured value is shown as linear increase at first and nonlinear change at last. The change of the curve at a lower time is basically consistent with the linear value. Higher time results in the output of the corresponding measured variation with a wide range of variation. In the quantitative weight curve under the Internet of Things theory, the positive weight and the reverse weight have opposite changing trends, while the comprehensive weight has the comprehensive characteristics of the two. The curve is consistent with the change trend of forward weight under the action of small initial value, and with the change trend of reverse weight. Through the positive deviation, the positive deviation is larger when the initial value is low, and the stability of the two deviations is high when the initial value is high. During the calculation of the sample, the English data first increased and then decreased. Indicators such as English platform, digital textbooks, online classes, smart teaching and interactive learning can better reflect the changing characteristics of English data. And with the expansion of indicators, the corresponding interactive learning can reflect the above four indicators. The accuracy of the calculation results is illustrated by comparing the original data with the calculated values. The iot technology under mobile edge computing can be combined with the perceptual computing method.

Keywords: Mobile edge computing; The Internet of things; Perceptual computing; English; Computer-aided
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1 INTRODUCTION

Computer-aided interactive English teaching can be studied using the Internet of Things computing method, and the combination of the Internet of things computing method and perception technology under mobile edge computing can provide accurate computing ideas and research results for accurate computing in many fields. Related research areas and scope mainly include: Industry 4.0 application [1], iot research review [2] and iot opening progress [3], etc.

Munirathinam [4] thinks the theory of the Internet of Things can be combined with perceptual computing. In terms of the application of perception technology in the field of agriculture, the existing calculation results in the field of agriculture were relatively single. The reason for the relatively single result was that the calculation index accuracy was more intersecting, resulting in a more complex model. The research model cannot comprehensively reflect the process in the agricultural field. The Internet of Things technology and the perceptual computing method can optimize the original indicators in the agricultural field, and the actual agricultural computing rules can be reflected through the optimization, and the optimized model can be obtained by introducing the indicators into the original model. In the field of COVID-19 epidemic detection, the detection speed of the original COVID-19 epidemic system was slow and the detection efficiency was low, and the accuracy of the detection results cannot meet the requirements. Singh et al. [5] proposed a new optimization model. The combination of the Internet of Things technology and the sensing method can iterate and optimize the data in the original sensing calculation method, refine and analyze the indicators in the COVID-19 epidemic, and then the COVID-19 indicators can be introduced into the detection technology of the Internet of Things. The speed of COVID-19 detection can be further improved by the optimization of detection technology, and the efficiency of COVID-19 detection can be greatly improved by the optimization model.

When Internet of Things technology was applied to cloud computing system, the accuracy of the original system of Mountain computing system was low, and the iterative calculation of multiple errors was easy to be caused in the process of cloud computing detection, resulting in errors in the final results. Khan and Altayar [6] analyses and studies cloud computing. By analyzing the problems existing in the cloud computing system, the detection technology of the Internet of Things can find the features of the cloud computing analysis and introduce the features into the existing computing models of the Internet of things. The optimization of the computing model of the Internet of things can further reflect the feature changes of cloud computing. Finally, the features of cloud computing were extracted and the advantages of cloud computing were reflected through the experimental results. The existing energy classification was mainly divided into major categories, and the field of sub-category classification was relatively weak. Chen [7] optimizes and divides the perception technology. Based on the detection technology of the Internet of Things, the perceptual computing method was used to divide the energy structure. The energy structure division system can extract energy from major classes, and then refine the characteristics of major classes to reflect the calculation process of small classes. In the calculation process, the energy structure system can not only reflect the actual changes of small classes, but also explain the characteristics of large classes of energy classification.

The above research mainly analyzes the existing agricultural field and energy testing field, and there were relatively few studies on interactive English teaching methods. This paper studies interactive English teaching methods and systems based on Internet of Things and perception technology in Computer-Aided. Relevant studies show that Internet of Things detection technology and perception computing method were relatively suitable for interactive English research. The Internet of Things method under mobile edge computing can determine the parameters of the Internet of things, and optimize the related calculation methods and prediction algorithms. The introduction of perceptual technology to calculate and explore the interactive computing process of English. The research results show that the Internet of things technology combined with the perception method under the mobile edge detection can carry out targeted calculation for the computer-aided interactive English teaching.

2 INTERNET OF THINGS TECHNOLOGY ANALYSIS

Habibzadeh et al. [8] believes that the Internet of Things detection technology under mobile edge computing can calculate the Internet of Things and mobile edge theory, and the corresponding coding flow chart can be obtained by summarizing the analysis and calculation process (Figure 1). The analysis process can be divided into Internet of things judgment and parameter calculation according to different research contents. Firstly, the template input of the iot of mobile edge computing is carried out, and then the iot device of mobile edge detection is turned on. The iot device is divided into two stages by judging whether it is successful: in the first stage, the module of the mobile iot device is initialized and analyzed, and then the success is judged. If the two judgments are not successful, the module of the Internet of things will be incorrectly processed, and then the module of the Internet of things will be programmed again. If successful, it should be imported into the computing module. In the computing module of the second stage, the coding parameters of the Internet of things should be set first, and the next step should be judged by determining whether the value of the coding parameters is reasonable.

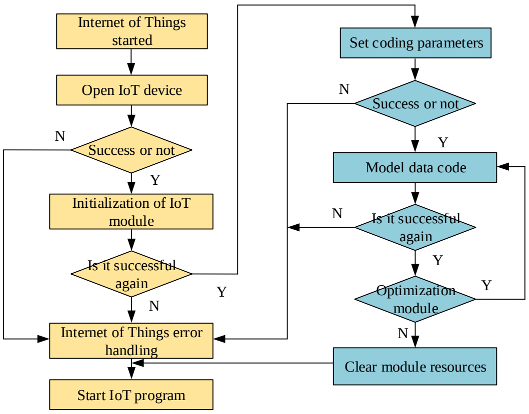

Figure 1: Flow chart of Internet of Things data coding under mobile edge computing.

2.1 Parametric Regression Model for the Internet of Things

The mean of the standard logistic distribution model is zero [9, 10], and its cumulative distribution function is as follows:

$$P(y=1|x)=P[X\leq(T+Ux)]=\frac{1}{1+\exp(-x)} \tag{2.1}$$

Logistic regression model of mobile edge detection technology under the influence of the Internet of Things:

$$p = \frac{1}{1+\exp(-T-Ux)} = \frac{\exp(T+Ux)}{1+\exp(T+Ux)} \tag{2.2}$$

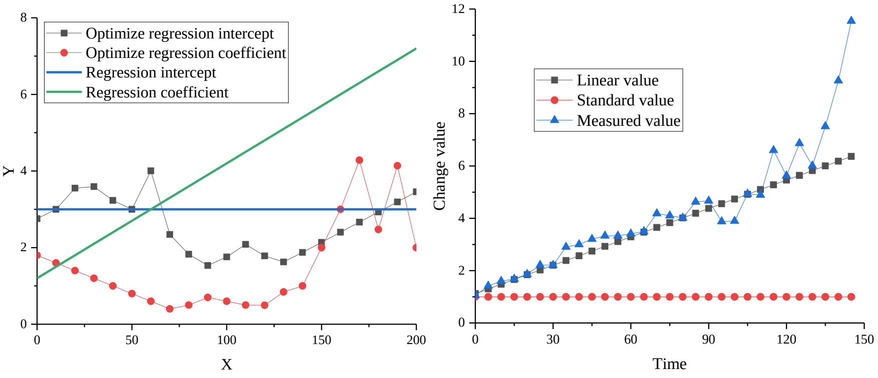

Figure 2: Regression models under Internet of Things technology: (a) Optimization curve, (b) Change curves.

Nasajpour et al. [11] believes that the Internet of Things technology enabled by mobile edge detection technology can be applied to many fields. The iot technology under the action of mobile edge detection technology mainly includes the regression algorithm of model parameters, and the regression model analysis of model parameters can test the model parameters. The test relationship can be divided into regression intercept and regression coefficient according to different research contents. The regression intercept and regression coefficient have a single form before optimization, and the curve parameters have a composite form after optimization. The optimization results of model parameters can reflect the difference of regression intercept and regression coefficient before and after optimization. The corresponding curves of regression model parameters before and after optimization can be obtained by calculation and iteration (Figure 2(a)). As the original regression intercept increases with the independent variable, the corresponding dependent variable shows a stable change. This curve is shown as a straight line in the figure, indicating that the improvement of the variable has no negligible effect on the output result. However, the relationship between regression coefficient and model independent variables is synchronous, both show the same amplitude of increase, and the slope of the regression coefficient curve under the Internet computing theory is constant. Through analysis, both the regression intercept and regression coefficient before optimization have linear characteristics. If there are multiple independent variables in the event, the iot model under mobile edge computing technology can be extended as follows:

$$p = \frac{\exp(T+\sum_{k-1}^{K} U_k x_k)}{1+\exp(T+\sum_{k-1}^{K} U_k x_k)} \tag{2.3}$$

The corresponding logistic regression model will have the following form:

$$\ln(\frac{p}{1-p}) = T + \sum_{k-1}^{K} U_k x_k \tag{2.4}$$

Regression analysis of iot model parameters under the action of mobile edge detection technology shows that the parameters before and after optimization have different change trends, and the corresponding regression model parameters can be obtained by expanding different independent variables [12]. The three indexes in the regression model parameters have different change forms, among which the linear value, standard value and measured value can reflect the change trend of the regression model. The change curves of different calculated values can be obtained by computing the regression model of the Internet of Things (Figure 2(b)). With the increase of time, the corresponding change of the linear value expresses linear improvement. However, the standard value is a horizontal line, indicating that time has no effect on the change value of the coupling model of Internet of Things computing and perceptual computing. The measured value shows a linear increase, then a fluctuation, and finally a nonlinear increase. The whole value has nonlinear characteristics.

2.2 Analysis of Internet of Things Prediction Algorithms

The formula of model convolution layer is as follows:

$$y_n = f(\sum_{i=1}^{M}[(W_n^i \times x_i) + b_n]) \tag{2.5}$$

The recursive process of neural network is as follows:

$$a = f(Wax + Waa + b) \tag{2.6}$$

$$y = g(Wya + by) \tag{2.7}$$

Where: Wax is the forward weight matrix; Waa is the reverse weight matrix; Way is the comprehensive weight matrix; a and b are bias results.

By calculating the error between the forward weight and the reverse weight and the comprehensive weight, the corresponding forward and reverse proportion results can be obtained. The proportion result can reflect the quantitative analysis rule of theoretical weight of the Internet of things under the mobile edge detection technology (Figure 3(a)). The influence of the initial value of the positive weight curve on the perception model of the Internet of Things fluctuates, and its fluctuation is related to the calculation methods of the two models. The range of rapid decline in the two stages is basically the same, indicating that the two stages have the same change law. The reverse weight curve shows a slow increase at first, and then a linear increase. When the initial value reaches a high change, the curve shows a decline, and the overall range of change is smaller than the range of change of the forward weight. The comprehensive weight is first stable, then increases and then decreases rapidly. The comprehensive weight curve can quantitatively describe the changes of forward weight and reverse weight: When the initial value is low, the comprehensive weight curve is consistent with the basic trend of the forward weight curve. At the higher initial value change, the trend of reverse weight change is basically consistent with the comprehensive weight. According to the deviation calculation of forward weight, reverse weight and comprehensive weight, the deviation proportion of forward weight can reflect the change characteristics of data when the initial value is low. And the curve is finally stable when the initial value is higher. The proportion of reverse deviation increases first and then stabilizes. The change trend of the proportion indicates that the higher initial value will lead to the corresponding forward deviation and reverse deviation tend to be stable. Propagation process of prediction algorithm:

(1) Forgetting gate control of prediction algorithm:

$$ft = \sigma(W_f \times [h_{t-1}, x_t] + b_f) \tag{2.8}$$

(2) Save the input gate of the prediction algorithm:

$$\begin{cases} i_t = \sigma(W_i \times [h_{t-1}, x_t] + b_i) \\ c_t = \tanh(W_c \times [h_{t-1}, x_t] + b_c) \end{cases} \tag{2.9}$$

(3) Memory unit update of prediction algorithm:

$$C_t = f_t \otimes c_{t-1} + i_t \otimes c_t \tag{2.10}$$

(4) The output result of prediction algorithm is determined as follows:

$$o_t = \sigma(W_o \times [h_{t-1}, x_t] + b_o) \tag{2.11}$$

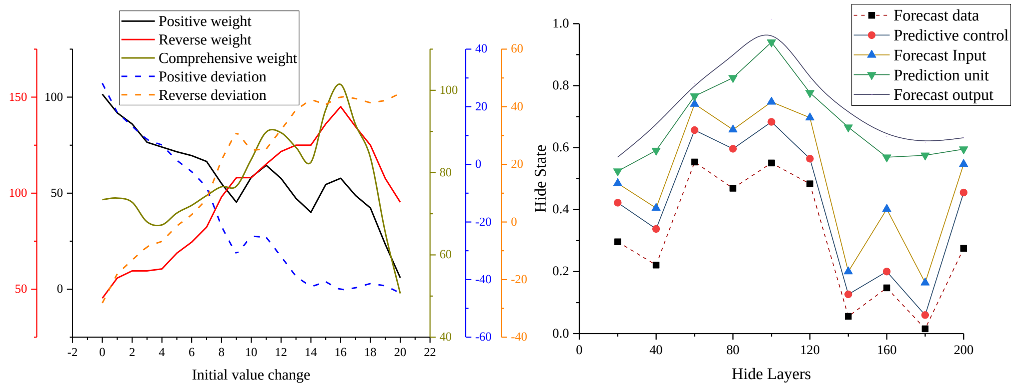

Figure 3: Internet of Things prediction algorithms: (a) Quantitative curve, (b) Prediction algorithm propagation process.

On the basis of the above prediction algorithm, the mobile detection technology of the Internet of Things can analyze the prediction process: the prediction algorithm can be mainly divided into the corresponding forgetting gate control. The forgetting gate control import can save the coupled model and computer aided data corresponding to the iot perception technology, and the coupled model and computer aided data corresponding to the iot perception technology can calculate the data in the input gate, and finally output the prediction results. The technology of the Internet of things can obtain the propagation process and results of the prediction algorithm (Figure 3(b)). With the increase of the hidden layer, the hidden state and the predicted data shows a fluctuating change trend. This fluctuating state is closely related to the computer-assisted learning style in the perception technology of Internet of Things. The overall change fluency is poor, and the curve has obvious abrupt points. Iot sensing technology can predict and control computer-aided data, and corresponding data changes can show the effect of computer-aided English in real time. The overall change trend can describe the predicted data under the Internet of Things technology and perceptual computing models, but the curve has relatively few abrupt points. According to the prediction input step, its overall change trend is basically the same, and the curve will appear the iterative calculation of data. According to the data corresponding to the prediction unit curve, the growth of hidden layer in Internet of Things technology and perceptual computing can reflect the overall change of hidden state, while the change of coupled model data is approximately stable. The variation range and accuracy is the variation trend of the predicted data, but there are still some errors in the data points.

3 PERCEPTUAL COMPUTING AND ANALYSIS

Mathematical expression of perception model:

$$S(x,y) = a\exp(-\frac{x^2+y^2}{\sigma_1^2}) - b\exp(-\frac{x^2+y^2}{\sigma_2^2}) \tag{3.1}$$

Where: a and b represent the sensitivity of the perception center and the surrounding area respectively; σ1 and σ2 represent the area size of the perception center and surrounding area, respectively. The optimization result of the perception region is:

$$E(x,y)=a\exp(-\frac{x^2+y^2}{\sigma_1^2})-b\exp(-\frac{x^2+y^2}{\sigma_2^2})-c\exp(-\frac{x^2+y^2}{\sigma_3^2}) \tag{3.2}$$

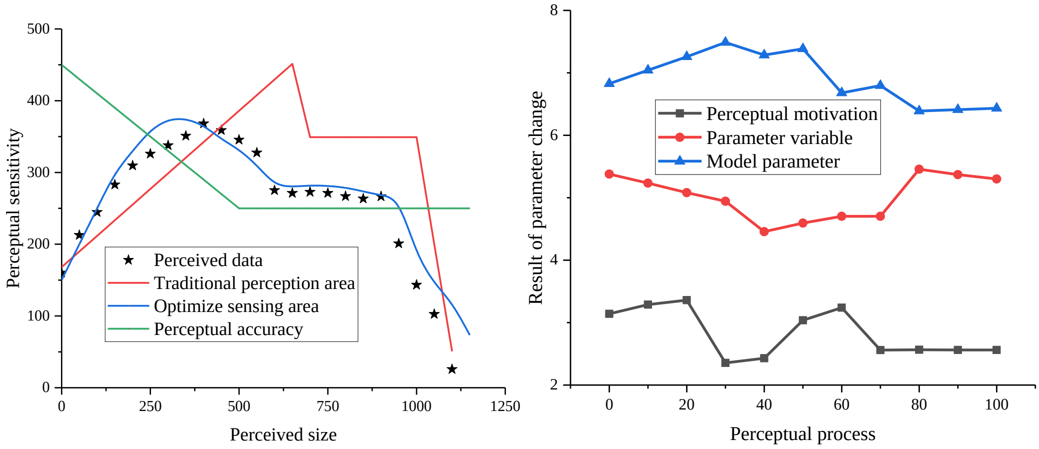

Figure 4: Sensing technology: (a) optimization results, (b) parameter variation map.

The technical analysis method of iot under mobile edge detection can get the regression model of iot parameters, and the specific steps of the prediction algorithm can be reflected through the determination of the regression model. The budget step can analyze the iot analysis model of mobile edge detection technology, and then the relevant theoretical knowledge of perception technology can be obtained through the above analysis. The perceptual technology in this theoretical knowledge can mainly divide the data according to different research contents: sensory regions and perceptual data have a greater impact. The variation range of the original perception area is relatively constant, and the optimized perception area has good flexibility. To compare and illustrate this situation, the optimization results of the perception technology are summarized (Figure. 4(a)). The iot perception technology can improve the results of computer-aided English teaching by optimizing the perception computing method. The technical results of perceptual computing and analysis show that the optimized perceptual region has a good promotion effect on perceptual data, and the corresponding optimization model can be obtained by perceptual analysis and calculation. According to different research contents, the optimization model can be divided into three parts: perceived incentives, parameter variables and model parameters. Computer aided Internet of Things technology and perceptual computing method play a leading role in interactive data changes (Figure 4(b)). Among them, the perceptual mechanism curve is small, and the perceptual mechanism has the worst impact on the perceptual change result. The curve corresponding to the parameter variables is stable at first and then decreases, and the corresponding perceptual data is high. It indicates that parameter variables can reflect the perceptual calculation and analysis results in the perceptual process. The technology of Internet of Things and perceptual computing can be applied to the interactive learning of computer assisted English. The curves corresponding to the model parameters show first increase, then fluctuation, and finally stability. The perceptual calculation of the optimization model is as follows:

$$\begin{cases} cm\frac{dv}{dt}=I-g_1mh(v-v_1)-g_2n^2(v-v_2)-g_3(v-v_3) \\ \frac{dm}{dt}=\frac{(m-m_1)}{t_m};\quad \frac{dh}{dt}=\frac{(h-h_1)}{t_h};\quad \frac{dn}{dt}=\frac{(n-n_1)}{t_n} \end{cases} \tag{3.3}$$

Where: I is perceived incentive; v is the parameter variable; m, h and n are model parameters.

4 AN INTERACTIVE INQUIRY AND PERCEPTUAL COMPUTING IN ENGLISH WITH COMPUTER ASSISTANCE

4.1 A Brief Analysis of English Interactive Teaching

Computer aided interactive English teaching has many problems without considering the Internet of Things technology, which will limit students' learning and improvement of English. Make the learning initiative and enthusiasm of learning to reduce. The problems in English learning are mainly as follows: First, the platform environment is poor, and the English teaching platform is relatively single. The relatively poor platform is mainly reflected in the English teaching environment cannot acquire the environment. In the actual use process, the environment cannot improve students' English learning, and the learning platform cannot keep up with the pace of The Times. The existing English teaching materials are relatively backward, and many of them still have many loopholes. And the overall use of the textbook is still in the use of many years ago, the backwardness of the textbook will lead to a certain lag for students to acquire English knowledge. English teaching class is relatively unitary, classroom research mainly focuses on teacher's explanation, supplemented by students' listening. This kind of English teaching class can make students have this passive learning mentality. Learning methods can not actively acquire English related teaching knowledge, and the poor English interaction reduces learning and teaching. Internet of Things technology and perceptual computing methods can reduce the volatility in computer aided systems. The interactive teaching concept of English is relatively weak, and the teaching concept is still based on education and examination. The main role and function of English as a language is for communication and use, rather than for teaching and examination. The existing teaching concept cannot meet enough to have a great impact on the actual education and teaching methods, the teaching concept is relatively weak, so that students' learning atmosphere and learning requirements are greatly reduced. Lack of actual communication is also a major problem in English learning. English learning is mainly based on textbooks, and teachers' explanation and students' listening are the main communication methods. Usually students' private communication is relatively less, so that learning mainly exists in the classroom.

In view of the above research and discussion, by comprehensively considering the problems existing in Computer-aided interactive English teaching environment, we extracted five main research indicators: platform construction, digital teaching materials, online classroom, intelligent teaching and interactive learning. The platform construction of the five characteristic parameters and indicators can improve the theoretical guidance of English interactive teaching. This research will have a great impact on English learning by combining the Internet of things and perceptual computing methods. This study can further promote English learning. Five corresponding interactive English learning features can be obtained through calculation and aggregation (Figure 5). Through the analysis, the overall trend of the analysis value of the total amount of English is increasing. The change of the proportion of English can divide different indicators into three stages: In the first stage, the platform construction and digital textbooks have a small range of changes, the change indicators of online classes are stable, and the overall corresponding proportion of smart teaching is relatively small. However, the curve tends to increase, the proportion of interactive learning is small, and the change is slow. As a result, the overall analysis value of the total English is below 500. When the proportion of English increases, the corresponding total analysis value of English gradually expands, and the overall change is within 2500. At this stage, the curve change trend is different: Among them, the indicators of platform construction remain stable, the total amount of digital textbooks is slowly increasing, and the stability of online classroom and smart teaching is good. The change of interactive learning satisfies the characteristics of linear increase, and the range of change is the largest, indicating that this index has the greatest impact on the total amount of English at this stage.

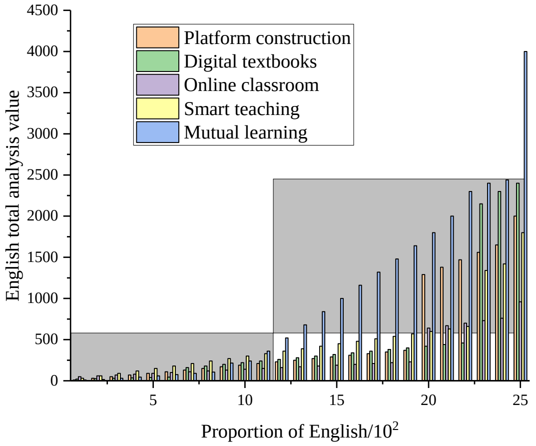

Figure 5: Features of English interactive learning under the influence of the Internet of Things.

4.2 Computer Aided Internet of Things and Perceptual Technology for Interactive English Teaching

Based on the analysis of iot technology under mobile edge detection, the analysis results of iot parameter regression model and prediction algorithm can be obtained. The measurement and analysis of iot can be combined with sensing technology. Perceptual technology can optimize parameters by explaining the difference of perceptual calculation methods and calculation parameters. Based on moving edge detection technology and perceptual computing method, the Internet of Things computing method can plan the computer-aided instruction scheme under the perception theory, and the interactive English teaching of the comprehensive optimization model has different interactive functions in Computer-Aided. In the interactive English teaching method, the first step is to determine the interactive English teaching terminal system in Computer-Aided, which can be divided into three parts: Interactive system function, interactive module function and interactive test function. Among the interactive system functions, the system functions can include Internet of things and perceptual computing methods according to different research contents: The interface module of the system should be determined first, and the interface module of the system can be initialized and analyzed. In the perceptual computing method, the function of the perceptual module is firstly calculated, and the layout of the perceptual function is determined to optimize and discuss the data. In the interactive module function, the module function can be divided into two parts: wireless communication and module positioning. Wireless communication interface and English module positioning can improve the computational efficiency of interactive module. The wireless communication interface first determines the interactive information, and then obtains the information perception and acquisition method through calculation. In English module positioning, the running state of the module will lead to the optimization and analysis of the corresponding system. In the interactive test function, the interactive test function of English can be divided into English communication test and interactive communication test. In English communication test, it is necessary to analyze the serial interface module first, then get the regression model, and calculate the parameters of the regression model.

The corresponding optimization model can be obtained the perceptual computing method under mobile edge detection. This optimization model can analyze the existing problems of English interaction and calculate the relevant indicators. The Internet of Things technology and perceptual computing method provide optimization ideas in the interactive teaching of computer aided English. The calculation process of this model can obtain the data calculation results in the Internet of Things technology factor and perceptual computing factor coupling factor (Figure 6).

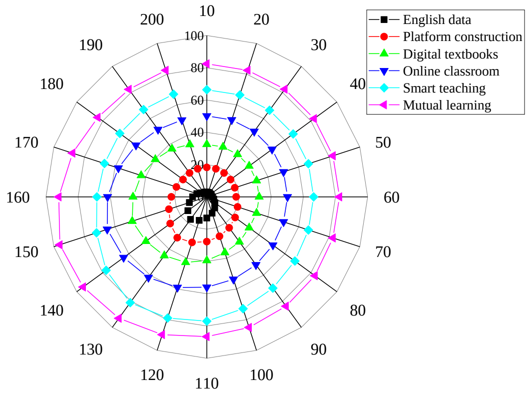

Figure 6: Graph of the impact of indicators on data.

Among them, the calculation performance of English data increases first and then decreases. Through the data of platform construction, we can see that it can well describe the range and form of change of Computer-aided interactive English teaching. The Iot architecture technology and perceptual computing framework of the platform construction can be introduced into the computer aided interactive applied English system as data. However, the performance of digital textbooks is stable at first and then increases. The computer aided interactive English teaching system curve is basically consistent with the trend of data change when the independent variable is low. Through the curve change of online classroom, the change range of English classroom can well contain the change characteristics of English data, the computer aided interactive English teaching system curve is quite different from the English data. Through intelligent teaching, the computer aided interactive English teaching system curve increases first and then decreases linearly. The interactive learning index is the largest, which can contain English data and other four indexes. The interactive learning index can explain the changing trend and law of the four indexes.

5 DISCUSSION

The analysis method of the Internet of Things under the action of mobile edge detection technology can get the regression model of the Internet of things, and the prediction results of the network can be used to study the results of perceptual computing. This research method can get the optimization model of Computer-aided interactive English teaching, which can reflect the change process and iteration law of different indexes through calculation. To study the analysis accuracy of the interactive English teaching model in Computer-Aided, the analysis curve of the data sample can be obtained by comparing the sample data with the calculation results (Figure 7). Among them, the proportion of the sample value and the calculated value is basically the same. On the whole, the curve shows the first decline, then fluctuation and finally stability. By comparing the sample value with the calculated value, the error between the sample and the numeration is small, and the accuracy of the sample calculation result can be reflected by the calculated value. The calculated value under the coupling of Internet of Things technology and perceptual computing and the English sample value in computer-aided interactive teaching are subject to relevant regulations.

6 CONCLUSION

Internet of Things technology and perceptual computing methods have good applications in Computer-aided interactive English teaching. The relevant research conclusions are as follows:

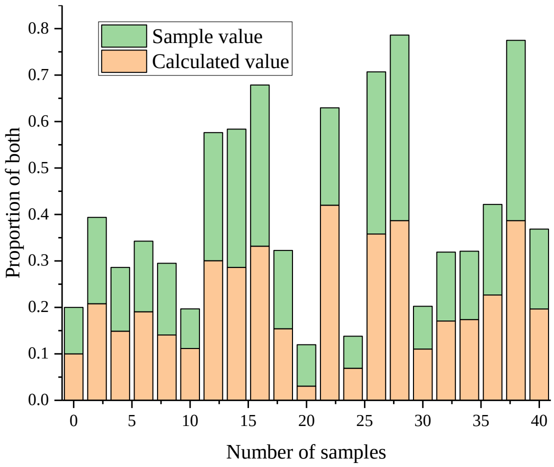

Figure 7: Data sample analysis curve under the Internet of Things and sensing technology.

(1) The original regression intercept and regression coefficient in the regression parameter optimization curve mainly change linearly, and the optimized regression intercept can well reflect the data change characteristics of the original regression intercept. The overall variation range of the regression intercept is higher than that of the original regression intercept, indicating that the optimized data has great variation. However, the optimized regression coefficient is smaller than the original regression coefficient, which indicates that the optimized regression coefficient has better stability.

(2) In the propagation process of the prediction algorithm, the prediction curve is volatile and the error is obvious. Through predictive control and predictive input, the curve gradually tends to be flat, but its stage is still obvious. Through the quantitative calculation of prediction unit and prediction output, the corresponding hidden curve under hidden state can be obtained, which shows that the curve increases first and then decreases, and the curve has good smoothness.

(3) In the process of perceptual technology optimization, the traditional optimization area can only reflect the overall change trend of perceptual data, while the optimization perception area can reflect the data quantitatively. Through the changes of different perceptual excitation and perceptual parameters, the parameter change value corresponding to the model parameter index is stable, which can reflect the calculation process of the optimization model.

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