Auxiliary Teaching Software for English Reading Based on Machine Learning

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Abstract: With the development of modern computer-aided design theory, English-assisted teaching software has entered a new era. Auxiliary teaching software is playing an increasingly important role in every corner of modern education, and is even irreplaceable in some aspects. This paper designs an auxiliary teaching software for English reading based on machine learning . The hardware part includes a wireless dedicated fingerprint handheld terminal and an interactive handwriting board, which are the basis of the entire teaching-aiding software. After a survey on the satisfaction of application the software, it has been found that teachers and students are very satisfied with the auxiliary teaching software, and the application of the auxiliary teaching software also cultivates students' interest in English reading, and improves the students' vocabulary and reading level.

Keywords: Machine Learning, English Reading, Auxiliary Teaching Software

1. Introduction

As a teaching method combined with traditional teaching methods, auxiliary teaching software is conducive to creating English learning space for students both in class and after class. Therefore, in order to improve the teaching quality and improve the students' vocabulary and reading level, this paper hopes to develop auxiliary teaching software with clear modules and powerful scales, which will provide a progressive ladder for the rise of English teaching level.

Many scholars have researched on the design of assisted teaching software for English reading based on machine learning. For example, some developed countries have developed rapidly in the field of teaching assistance systems, and their computer technology level is very high, and the social development is more open and rapid, so the teaching assistance systems also have a good development environment. The teaching assistant system is widely applied to colleges and universities, and even the primary and high school stages. From the beginning of education to the moment of graduation, students can enjoy the easy learning of the network support system [1]. The English teaching-assistant system designed by scholars, using a neural network model, allows students to conduct self-testing in English, and feedback the results to teachers through system records so that the teacher can learn students' learning dynamics and learning efficiency [2]. At present, taking the author's University as an example, the evaluation method of English reading course is single, especially the setting of process evaluation mode is lack. Therefore, in order to improve the teaching quality and improve the process evaluation system of English reading, this paper hopes to develop a clear and powerful English auxiliary teaching software, which will provide a step for the improvement of English reading teaching level.

This paper first expounds the concept of machine learning, and proposes two machine learning models, artificial neural network and BP neural network, and then introduces software development tools and English teaching situation design. Based on this, the functional modules of auxiliary teaching software for English reading are designed, and finally put the designed software into practical application, by investigating the analyst students' satisfaction with the software and evaluating the software teaching effect.

2. Machine Learning and Design of English Auxiliary Teaching Software

2.1 Machine Learning

Machine learning is often considered a branch of artificial intelligence, and it is also an interdisciplinary subject that includes probability, statistics, and computational complexity. It can design an algorithm that can learn automatically according to the target data sorting or regression function, and solve the unknown data according to the designed algorithm [3]. Machine learning algorithms can be divided into two categories. One is to use algorithms to analyze or predict unknown data; possible data mapping information, such as event prediction. The other is to learn from a large amount of data and find other data, such as event classification, through algorithms that belong to a specific relationship. The key to the role of machine learning is to find an efficient and convenient learning algorithm that can be used both in theory and practice [4].

(1) Artificial Neural Network

Artificial neural network (ANN), also referred to as neural network, neural network model, also known as artificial neural network, is essentially a function defined by a mathematical model, namely f: X→Y [5]. Define $\{x_1, x_2, ..., x_n\}$ as the input of the neuron, its essence is a vector of dimension n, $\{w_1, w_2, ..., w_n\}$ is the weight between layers, the attribute value of a neuron is also a vector, the size is also n, usually called the weight vector, θ is The correction parameter of the neuron structure, usually called the bias, f is a linear or nonlinear mapping, called the activation function. When designing an ordinary neural network, in order to better describe abstract events, the activation function will use nonlinear mapping, t is the output of the neuron, and its mathematical expression can be expressed as:

$$t = f(t\sum_{i=1}^{n} w_i \times x_i + \theta)$$

（1）

(2) BPNN model

A BP neural network (BPNN) is essentially a guided neural network that uses the BP algorithm as an error checker [6]. BP neural network consists of interconnected neurons. It does not accept external information during training and has a nonlinear relationship. Excellent characterization capabilities; use without knowledge of specific input and output connections. This is a very good machine learning model [7-8]. In the BP neural network model, x_i represents the input layer node, y_i represents the hidden layer node, z_i represents the output layer node, w_{ij} represents the weight from the input layer to the hidden layer, and r_{ij} represents the weight from the hidden layer to the output layer. e represents the output expectation, so the calculation method of the output global error E is:

$$E = \frac{1}{2}\sum_i (z_i - e)^2 = \frac{1}{2}\sum_i \left(f\left(\sum_j r_{ij} y_j + \theta\right) - e\right)^2$$

(2)

2.2 Development Tools and Design of English Teaching Situation

The practical method of English education auxiliary software design is to make ready-made software. There are many sites on the Internet that offer free software, but developing software can still be a daunting task for a non-computer engineer. In other words, developers must have at least the C or Java programming languages to be able to design software [9]. By constantly looking for other programming methods, I found that there are actually many ready-made applications on the Internet for people who program software, such as Appmakr website, COMO website and so on. These websites will provide a variety of templates, designers can choose the template they need to

replace and add the content they need. However, the functions provided by the website are limited. If you need more beautiful templates and complex functions, you must pay extra [10].

Context is an important factor in English teaching. Creating a learning situation refers to creating a teaching environment that helps students understand the subject. This is a very broad concept. In the English-assisted teaching software based on machine learning, students are provided with rich learning resources, such as modeling dialogue environments in English, role-playing, and reflection on learning content [11]. The creation of learning situations includes the creation of intuitive situations, associative situations, language situations and auxiliary situations [12].

3. Design of Auxiliary Teaching Software for English Reading

3.1 Hardware Design

The auxiliary teaching software is composed of single chip microcomputer, battery and expansion equipment, which constitutes the basis of the whole terminal system. The quality of hardware devices directly affects the performance of the entire auxiliary software. The STM32 processor based on the Cortex-M3 core is the main unit for creating the system hardware, which coordinates the work of other modules. The optical fingerprint sensor is used as the fingerprint identification system of the system. The collected fingerprint image is transmitted to STM32 through UART for processing, and the received function information is stored in the FLASH chip. These hardwares realize the functions of software fingerprint collection, wireless communication and interactive writing on the blackboard.
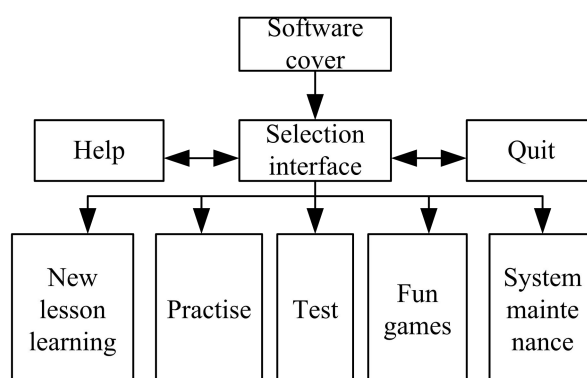
3.2 Design of Functional Modules

Figure 1. Functional Module Design

As is shown in Figure 1, in the design of each module of the software function, it includes the design of functions such as cover, help, new lesson learning, practice, quiz, fun games, and system maintenance.

The cover is inserted into the main body in the form of animation, the content of the cover is displayed in the form of animation, and has a voice prompt function. It is easy to get the students' attention. The opening and ending are Flash animations (swf format) downloaded and used by ShockwaveFlash timer manager and VB timer. SWFLASH to VB management allows users to play Flash animations in VB, and Flash animations are used as welcome screens when creating software.

The help module instructs the operation method and process for the user, and provides the usage instructions of some functions. The main content is based on VB image box management and label label management development, download the corresponding function picture in the picture box management, use the label control to describe the text, and then adjust the switch button.

In the new course learning module, you can freely enter the text you want to learn by clicking the mouse. The text to be learned can be freely entered by clicking the mouse. This section includes word lookups, chapter and paragraph retrieval, and direct translation of parts of the content. The repetition of chapters and paragraphs includes a sentence and reading of the article. At the same

time, there is a "Help" button, click to prompt the use method in text mode. "Exit" button, you can exit the software directly from here.

Class exercises and template exercises are primarily designed for practice sections. The class has exercises related to the new lesson content. For example, create practice scenarios that allow students to reapply learning content. Each exercise of the practice module is done together. A variety of standard question types are available through new classroom learning modules, human-computer interaction and repeated practice. Below each content, there are exercises that meet the requirements of the new content category. In the formative exercises, the three exercises are phonetics, grammar, and vocabulary exercises. The main purpose of the practice module is to consolidate the new knowledge and content that students have learned in the new course unit by doing an appropriate amount of practice questions. The exercises are rich in content and cover all the knowledge points of the textbook.

There are mainly summartive tests in the test module, including unit tests and mid-term and final tests. The fun game module has a built-in mini game. The game is downloaded from the Internet, mainly through the system mode shell connection. In VB, the shell function can facilitate access to the EXE file.

The system maintenance module is mainly for the function setting and maintenance of the English assisted teaching software based on machine learning, such as the design of volume, color and database interface.

4. Software's Application

4.1 Evaluation of Satisfaction

This experiment tests the students' and teachers' satisfaction with the auxiliary teaching software, and the results are shown in Table 1. 83% and 91% of students and teachers are satisfied with the software, 10% and 6% hold a general attitude, and 7% and 3% hold a dissatisfied attitude. It shows that the vast majority of teachers and students agree to use this software for English teaching.

Table 1. Results of Satisfaction Survey

	Satisfy	Quite satisfied	Generally	Relatively dissatisfied	Dissatisfied
Student	52%	31%	10%	5%	2%
Teacher	67%	24%	6%	2%	1%

4.2 Evaluation of Learning Effect

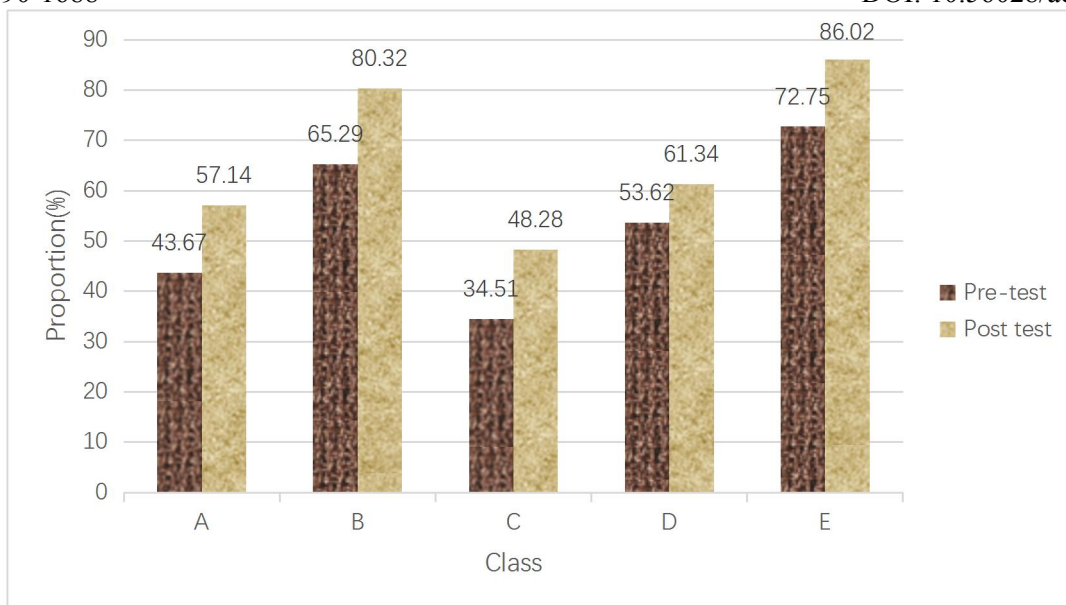(1) Improving the interest in English reading

Figure 2. Comparison of the proportion of people who are interested in Reading before and after using the software

Five classes were randomly selected for testing in a university, and the results are shown in Figure 2. In the early stage of using the auxiliary teaching software to learn, the number of students in the five classes who are interested in reading accounted for 43.67%, 65.29%, 34.51%, 53.62% and 72.75% respectively. After learning with auxiliary teaching software, 57.14%, 80.32%, 48.28%, 61.34%, and 86.02% thought English reading is interesting, respectively. The students who think English reading is interesting are 1.31 times, 1.23 times, 1.40 times, 1.14 times, and 1.18 times more. The data comparison shows that through the application of English auxiliary teaching software, students not only like to learn English in the way they like, but also make students love English more, feel that English reading is interesting, and also allow students to learn more when they conduct learning tests. Appreciation from others, which increases students' self-confidence and willingness to express themselves.

(2) Expanding English vocabulary

English learning is a process of accumulation. When students have difficulty learning English, their most direct feeling is that they cannot understand and do not want to learn. The reason is that the foundation of words is not strong. Word learning is the basis of language learning. Every student should focus on word learning, but boring word teaching will make students stop. Following the introduction of the auxiliary teaching software for English Reading, the use of the software by students shows that it not only expands vocabulary, but also improves reading comprehension.
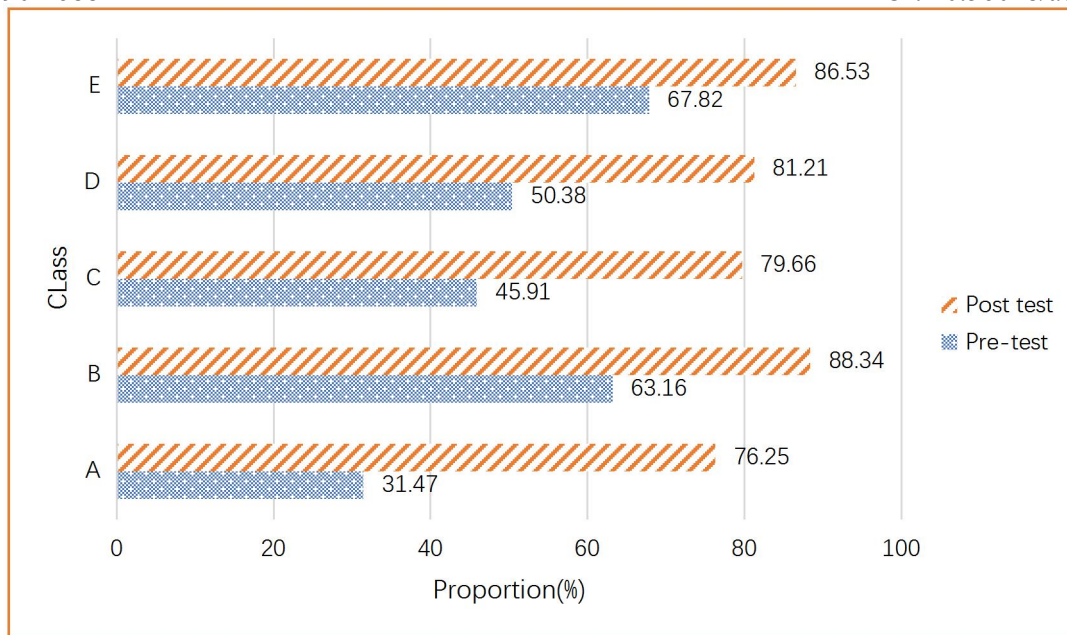
Figure 3. Comparison of the pass rate of students' English test before and after using the software to learn

As shown in Figure 3, according to the comparison between the pre-test and post-test of students' English proficiency, it is found that after students use the software, their academic performance has increased significantly, and the number of passers in English tests has increased considerably. The data comparison shows that the number of people who can pass the pre-test papers in the five classes accounts for 31.47%, 63.16%, 45.91%, 50.38%, and 67.82% of the students participating in the experiment, respectively. Through the use of English teaching software, the pass rate is as high as 75%. It can be seen from this that after using the English software, the students have made great progress in their learning. Their vocabulary has increased, and their reading level has improved greatly.

5. Conclusion

This paper uses the relevant theory of machine learning to design the auxiliary teaching software for English reading . The software is equipped with fingerprint collection function and wireless communication function, which can replace the traditional attendance and teaching mode to a certain extent, and is more suitable for classroom tests in normal classes，saving the manpower and time. Meantime, the software has high reusability, and the data storage volume is large and not easy to be lost. The application of this software has significantly improved students' interest in English reading and enhanced students' reading level and the quality of teaching.

Acknowledgement

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