Research and Application of College English Education System Based on Speech Recognition Technology

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Abstract. In the reform and development of modern education, college English education, as an important discipline to cultivate talents, has many problems in practical education management, such as too much knowledge of specialized courses, too tedious homework, not enough time for independent learning and so on. According to the accumulated experience of college English education in recent years, how to create a high-quality teaching environment for college students, so that they can independently learn English knowledge at any time and any place to exercise their English expression ability, is the main problem of English education innovation in the new era. On the basis of understanding the composition of college English education system, this paper proposes to use speech recognition technology to set up a spoken English learning system, the purpose of which is to improve students' college English learning level and strengthen their ability to express themselves.

Keywords: College English; Education system; Speech recognition technology; Voice data; Database

1. Introduction

College English, as a public basic course, not only transmits basic theoretical knowledge to students, so that they can quickly pass different levels of English tests, but also cultivates students' self-learning awareness and strengthens their comprehensive English application ability. According to the accumulated experience of college education in recent years, among the many professional courses, only college English has been promoted to the strategic height of the national education quality and education reform project by the education department for many times, which is an important content of cultivating comprehensive development talents in the new era. [1]Especially after entering the era of big data, the social economy is developing in a trend of globalization. In order to quickly adapt to the fundamental needs of international exchanges and social development, the education department has put forward a number of preferential policies related to college English education based on the goal of social talent training. However, from the perspective of overall development, the expected effect of education research is still not achieved. [2.3]The reason for this phenomenon is that students need to consume a lot of time and energy when learning specialized knowledge, it is difficult to have enough time to learn English knowledge, let alone use spare time to exercise their English expression ability. Therefore, in the innovation and development of modern education, colleges and universities pay more attention to creating a high-quality teaching environment for students, so that students can learn English at any time and anywhere, and solve the problems faced by college and English education at once. The new learning mode based on wireless mobile communication network technology and wireless mobile communication equipment is the main issue in college education at present, and domestic and foreign enterprises and researchers have put forward a number of research topics. For example, Europe has put forward a special mobile learning research plan called "Mobllearn Action". Ericsson and other commercial enterprises have carried out research on mobile learning projects; In China, the Education Laboratory of Modern Education Center of Peking University participated in the pilot project of the Department of Higher Education -- Theory and Practice of mobile learning. The School of Education Technology of Beijing Normal University participated in the application research of handheld network learning system in subject teaching.[4-6]

In the 21st century, with the rapid development of network information technology, people's way of production and life has undergone tremendous changes, and the information communication between each other has become more convenient. Researchers in various fields have strengthened the research on artificial intelligence, with the purpose of making human life more intelligent. Speech recognition technology is the core content of modern science and technology exploration, and the practical research work has strong commercial value. How to apply this technology and science to the commercial field and daily life, so that human beings can enjoy more modern services is the focus of scientific research. With the development trend of economic globalization, the communication between countries in the world is getting closer and closer. After the reform and opening up, China has not only achieved great success, but also increased the cultural and economic exchanges with other countries. As one of the most widely used languages in the world, it is very important to be proficient in English language knowledge. However, from the perspective of English teaching in Chinese colleges and universities, oral English learning has always been the main factor affecting the effect of practical education. There are many problems in oral English learning, such as English vocabulary, reading and listening. The reasons for this phenomenon are as follows: First of all, influenced by the pronunciation of their mother tongue, Chinese people are accustomed to using the pronunciation features of Chinese to practice English when learning spoken English, which will lead to more pronunciation mistakes; Secondly, college English teaching model is too old-fashioned, students lack of independent training opportunities and time. In the traditional sense, the teaching mode is dominated by teachers, who prepare the teaching content in advance and directly indoctrinate the knowledge learned to students, but students can only accept it passively without the opportunity to think and speak independently. Meanwhile, there are few opportunities for communication between teachers and students, which cannot arouse students' interest in learning from the basis. Finally, there is a shortage of more excellent oral English teachers in China. Although most college English teachers can tell students about professional theoretical knowledge, they cannot help students to conduct oral training for some special circumstances, which will inevitably affect the effect of practical education. Although there are a large number of professional English learning software on the market, a comparative analysis of such software shows that it has a positive impact on the development and application of English interpretation learning system. Therefore, on the basis of understanding the structure of college English education system, this paper puts forward a spoken English teaching system with language recognition technology as the core, and then combines practical cases to verify and analyze the system function and application design, so as to provide an effective basis for the development of modern education.[7-9]

2. Methods

2.1 College English Mobile Education System

This paper studies the college English education system based on WAP technology platform and J2EE, using JSP development language and WML technology to design and implement the college English mobile education system, the specific structure is shown in Figure 1 below:
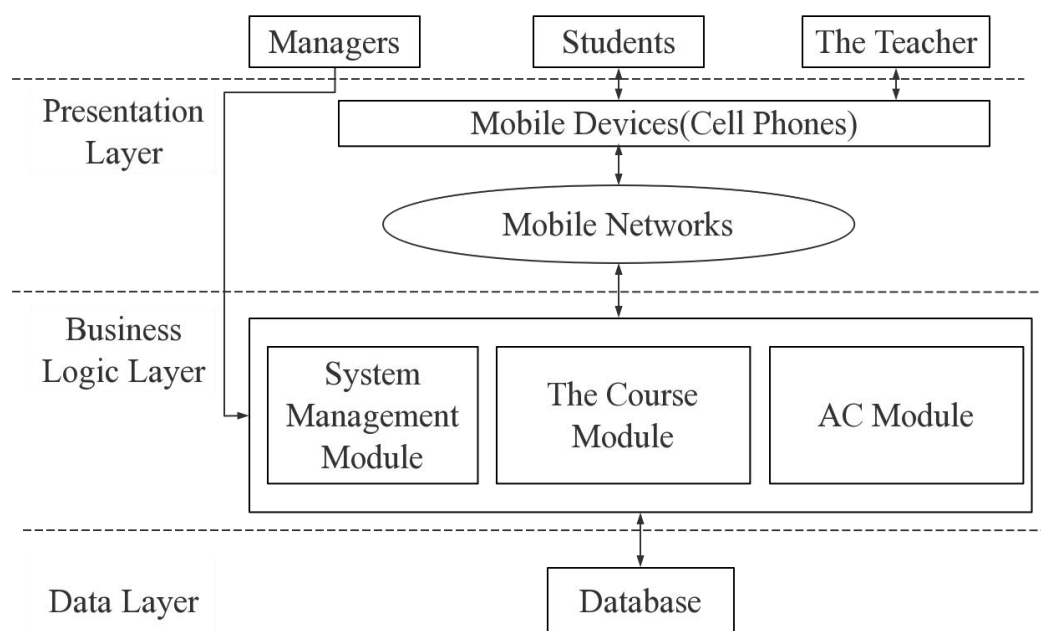
Figure 1. The structure of College English Mobile Education system

According to the above analysis, the overall design includes the following levels: First, the presentation layer. This layer design can provide access interface for system users, respond to client requests, verify the legitimacy of user input data, and then transfer the data to the back-end application logic layer according to the request, which is responsible for feedbacks of processing results to users; Second, the business logic layer. This level design is mainly responsible for processing various functions, according to the user submission request to achieve specific operations, such as data extraction, data storage and so on; Finally, the data layer. This level design includes user information, course data, audiovisual documents and many other contents.[10]

2.2 Speech recognition system

Generally speaking, speech recognition system consists of three modules, the first is the preprocessing module, the second is the feature value extraction module, and the last is the pattern matching module. During the training process, the system can clear the redundant information of the original speech sample, extract the basic characteristic parameters of the speaker, and store them in the database. On this basis, the corresponding network model is constructed, which can provide technical support for the subsequent system operation. In the process of recognition, the trained neural network model can be used to obtain recognition results after the pre-processing of the measured speech. The pre-processing process of speech signal is shown in Figure 2 below:[11-13]
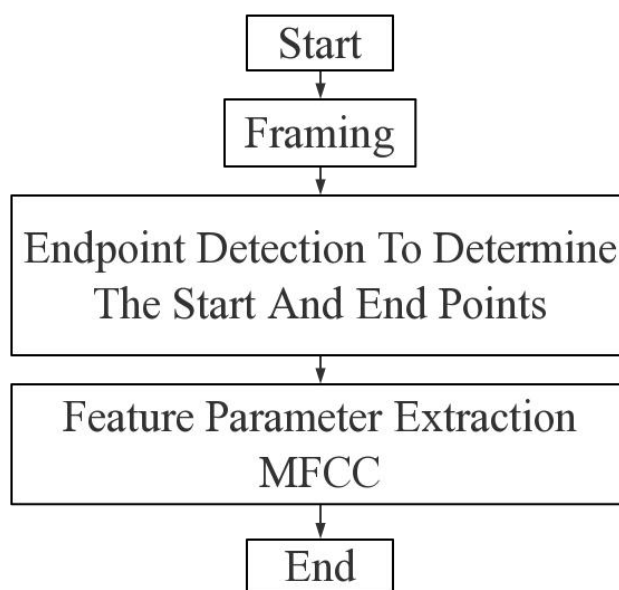
Figure 2 Speech signal preprocessing flow chart

2.3 Speech recognition based college oral English learning system

From the perspective of modern college English education, the application of speech recognition technology to college oral English teaching should ensure that the overall system runs fast, the operation process is smooth, the content loading time is reduced, the overall page design is optimized, and the system users can obtain the required data in a short time. Traditional oral English teaching is mostly led by teachers and followed by students, but there are many problems in this way, such as teachers' non-standard pronunciation, fewer times of repeated reading, students' memory decline, unable to confirm whether the pronunciation is standard, etc. In the long run, it is easy to reduce students' interest in learning. Therefore, speech recognition technology is used to help students complete oral training independently. It is an important part of current research. In this study, the HMM model and Android platform are used to build a speech recognition system as shown in Figure 3, with the purpose of providing students with a good English learning platform.[14-15]
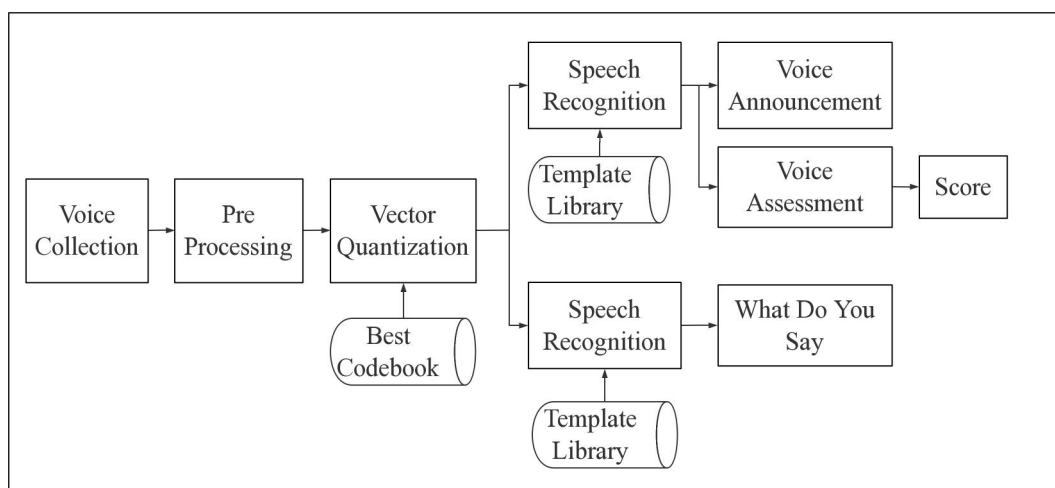

Figure 3 System structure diagram

Combined with the analysis of the system function module shown in Figure 4 below, it can be seen that it mainly includes the following contents: First, login. This module can provide a number

of functions for system users. For example, new users can directly log in to the system by entering the user name and password after registration. If the user forgets the password, the system provides the function of resetting the password. Second, speech recognition. This module can complete the basic function of converting speech into text, including speech acquisition, data preprocessing, data feature extraction, model training, model recognition and so on. Third, voice assessment. In this module, after the user repeats English words or English sentences, the system will score the voice test, and use the volume algorithm to feedback the final score to the user; Fourth, voice broadcasting. This module will input a text, it will be converted into a voice message, and then use natural, accurate and fluent voice broadcast; Fifth, oral dialogue. The core function of this module is to realize man-machine dialogue.
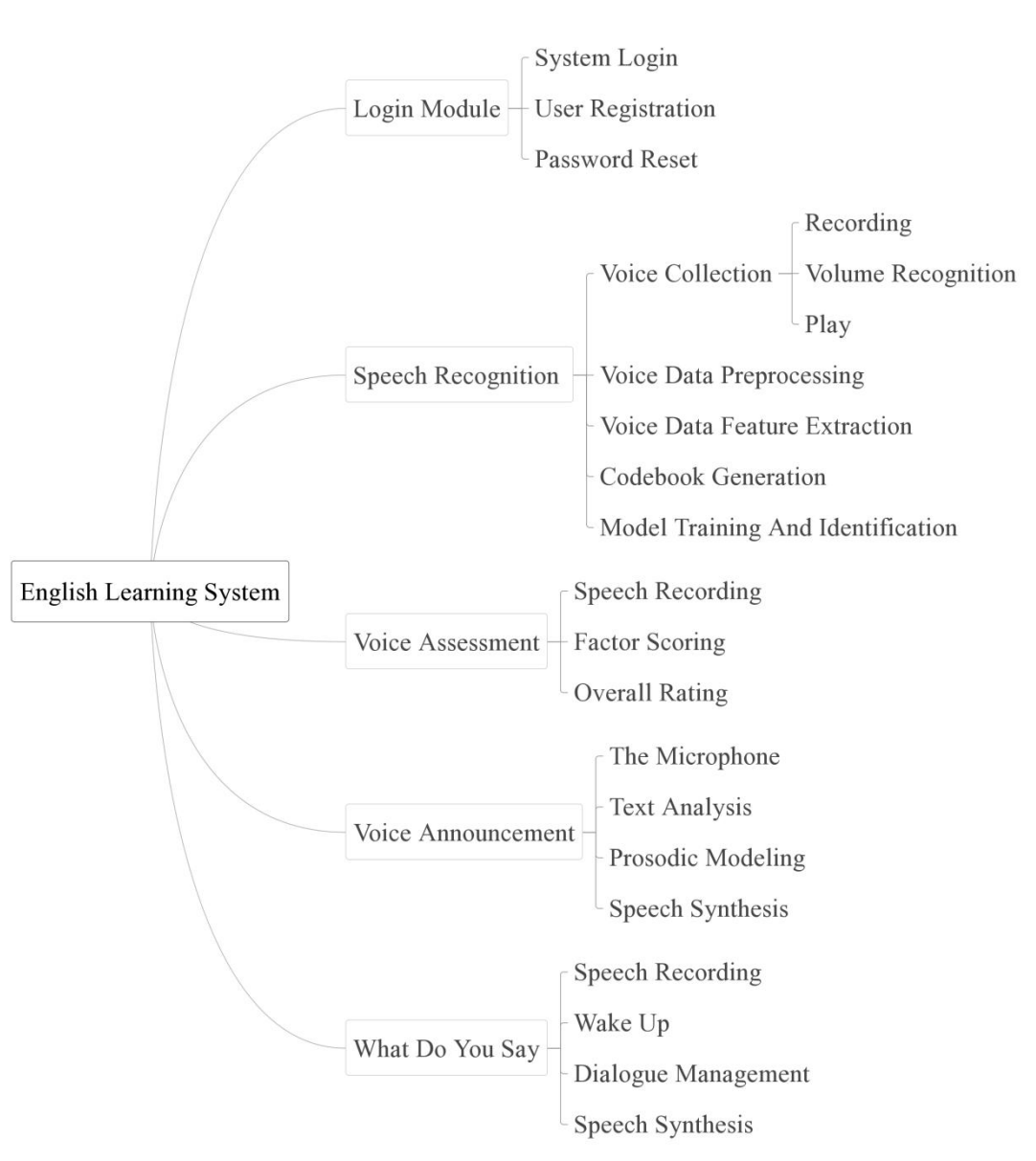

Figure 4 Structure diagram of system function module

3. Result analysis

In order to ensure the normal operation of the above research system, this paper tests and analyzes the application functions of the client, detects and confirms each sub-function module of the system one by one, defines the recognition rate and real-time performance of the system

operation, focuses on discussing the corresponding test time under different working conditions, and analyzes whether the final test results meet the requirements of speech recognition scenarios. This will provide strong support for the innovation of modern college English education. The test results of the speech recognition and speech evaluation sub-module are shown in Table 1 below:

Table 1 Analysis of speech recognition and speech evaluation results

Use Case number	Prerequisites	Test Procedure	Expected result	The actual result	Conclusion.
1 Recording	1. Enter the voice evaluation module. 2. Click Start Recording	Click to end recording	1. The volume changes during the recording. 2. Click the Play button after the recording is finished to play the audio data just recorded	1. The volume changes during the recording. 2. Click the Play button after the recording is finished to play the audio data just recorded	The test passed
2. Speech recognition and Evaluation	1. Input may need to review English sentences and words, 2. Click start recording	Finish typing and click to end recording	Display the user's oral English test score	Display the user's oral English test score	The test passed

Based on the analysis of the above table, it can be found that the application of speech recognition technology in college English education system has finally passed the test. In the analysis of the system identification implementation test, the system should identify the voice data input by the user as soon as possible. Therefore, this paper chooses five independent word speech data as the test target, excluding the test time. The time required for this process is accurately recorded from the beginning of endpoint detection to the end of the return of the voice recognition result, and the final result is shown in Table 2 below:

Table 2 Test results of real-time performance of the system

Response time/seconds					
1	2	3	4	5	Average time
0.322	0.256	0.266	0.403	0.305	0.310

Based on the analysis of the above table, it is found that the real-time response time of the system is 310 milliseconds, which meets the basic requirements of the system operation. When testing the performance of the system, different data sets should be selected and different model parameters should be used for testing and analysis to compare and study the accuracy and running speed of the system. Because the system in this paper uses Intel Xeon fusion processor, it can further improve the system processing speed and meet the system performance requirements. This proves that the spoken English learning system designed in this paper can be widely used in college English education, each module function has been well realized, and can fully meet the needs of college English teachers and students.

Conclusion

To sum up, when studying the college English education system with speech recognition technology as the core, this paper designs and puts forward the spoken English learning system, which can better meet the users' basic needs of learning and training spoken English anytime and anywhere, and provide a convenient learning and training environment for college students. Therefore, under the background of extensive application and in-depth research of speech recognition technology, Chinese scientific research scholars should start from the perspective of innovative development of college English education and continue to explore how to reasonably use speech recognition technology to teach guidance. Only in this way can we provide a diversified platform for college students to learn spoken English.

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