

Personalized spoken language evaluation system based on learner characteristics and resource characteristics

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Abstract: In recent years, European and American countries have incorporated Chinese into the national education system. From the problem of the uneven distribution of online spoken Chinese education resources and the lack of personalized, individualized textbook resources, how to establish a personalized online interactive oral assessment system with Chinese as the core is the urgent need of Chinese learners and the current intelligent spoken Chinese. An important research direction in the field of study. In order to solve such problems, we have designed a personalized oral assessment Chinese oral assessment service, the core of which is divided into assessment technology and personalized technology. The oral assessment technique is developed based on the speech processing technology, application feature extraction technology, acoustic model and speech recognition algorithm of the HSK new Chinese proficiency test scene. It is a model for the evaluation of spoken pronunciation for Chinese learners. Personalized technology is to introduce learners to the vocabulary classification library to import their corresponding readings, and combine the Boosting improved classification with multi-class multi-label text classification to obtain automatic segmentation under high-precision final classifier. Finally, this paper implements a personalized oral assessment system based on the perspective of deep learning.

Keywords: Oral assessment system; speech recognition; Chinese intelligent learning platform; HSK.

1. INTRODUCTION

As the basis of interaction and exchanges between countries and countries, language has become increasingly important in its status and application. In response to the One Belt One Road policy, an online Chinese oral assessment system came into being. The online Chinese intelligent learning platform has helped the Chinese to become the official language of the participating countries in the Belt and Road. Personalized oral assessment technology refers to the provision of Chinese oral assessment service, which is based on the HSK new Chinese proficiency test scenario. Specifically, it utilizes application feature extraction techniques, acoustic models, and speech recognition algorithms.

At the same time, it also supports the evaluation of words and sentence patterns. Personalized oral assessment technology can be widely used in the application of oral English teaching. The application

scenarios include Mandarin assessment and oral assessment. The system supports multi-modal speech evaluation of Chinese characters, words, sentences, and paragraphs. We developed this system and platform to actively adapt to the changes in the Chinese boom, making Chinese learning more interesting, more convenient and more efficient.

2. PERSONALIZED ORAL ASSESSMENT

(1) Introduction to the personalized oral assessment

The personalized spoken language evaluation system supports word and sentence evaluation modes and can be widely used in Chinese oral teaching applications. Application scenarios include Mandarin learning, assessment, enlightenment, and oral exam assessment.

(2) Introduction to language recognition

As we all know, the sound is a wave. We first convert the recorded voice into a WAV file and then mute the head and tail segments by splitting the sound into frames. The MFCC features are then extracted based on the physiological characteristics of the human ear to complete the acoustic feature extraction. At this point, the sound becomes a matrix of 12 rows (assuming the acoustic features are 12 dimensions) and N (total number of frames), called the observation sequence. Each frame is represented by a 12-dimensional vector, and the color shade of the patch indicates the magnitude of the vector value. Next we will implement a matrix-to-text transformation. A recognizes the frame as a state; B combines the state into a phoneme, where we use all the initials and finals as the phoneme set, and C combines the phonemes into words. Each small vertical bar represents one frame, several frame speeches correspond to one state, and every three states are combined into one phoneme, and several phonemes are combined into one word. Then we get the probability from the acoustic model. Finally, we match the best words through the Hidden Markov Model (HMM) to form a complete sentence.

3. THE CORE TECHNOLOGY OF PERSONALIZED ORAL ASSESSMENT

(1) Speech recognition model

In speech recognition, we have creatively borrowed the FSMN framework from the University of Science and Technology to complete the construction of speech recognition technology. The frame uses a non-cyclic feedforward structure that achieves comparable results to bidirectional LSTM RNN with a small delay. Schematic diagram of the FSMN structure, which adds a module called "memory block" next to the hidden layer to store historical information and future information useful for judging the speech frame. At the same time, the two-way FSMN does not exist in the RNN training because the length of the sentence in the mini-batch is different, which requires a zero-filling operation. The feedforward structure also makes it more parallel and maximizes GPU computing power. Further, FSMN can be combined with CTC criteria to achieve "end-to-end" modeling in speech recognition, thereby completing the establishment of our speech recognition system, and then performing a scoring diagnosis of speech.

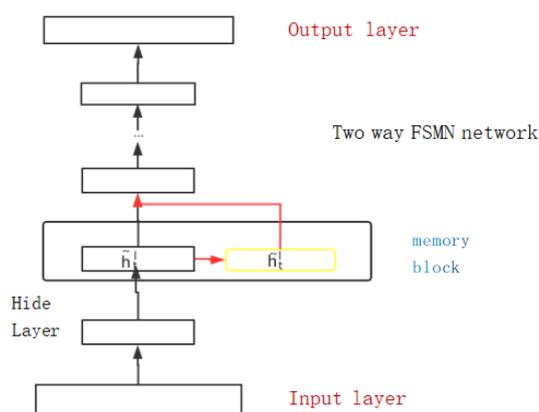


Figure 1 Two-way FSMN network

(2) Scoring mechanism

Oral assessment technology can be based on different standards of human pronunciation in different countries for evaluation, with Chinese words, sentences, and other modes as the main, the pronunciation accuracy (GOP), fluency, integrity, accent accuracy, etc. as a scoring mechanism.

The construction of the corpus occupies a critical position in oral assessment. Its richness has a great impact on the user stickiness of our oral assessment. Therefore, we have introduced an HSK dynamic composition corpus that includes the People's Daily corpus and the Chinese International Education Technology R&D Center. Better docking life, and also help the HSK Chinese proficiency test for a large number of international students.

(3) Question bank for text multi-label classification

In order to make the personalized oral assessment system automatically match the spoken language resources according to the user's needs, we use an efficient multi-class multi-label Chinese text classification to classify the problem database. After the automatic resource segmentation and dimensionality reduction of the rich resource bank, an improved Boosting classification algorithm is used to linearly combine to obtain a high-precision final classifier, and an automatic multi-class and multi-label Chinese classification model is established. Firstly, the text preprocessing is trained by the combination of the forward maximum matching method and the inverse maximum matching method. Secondly, the word segmentation and dimensionality reduction processing are established. The dimensionality reduction process can delete the high-frequency words, rare words and the uselessness of the text feature classification. A common word, etc.), a classification training set based on the Boosting algorithm is established, and the model is perfected by continuously inputting text. Finally, the oral test score database is input into the model, and the desired classification is input, and the multi-category and multi-label classification of the text for the oral assessment is completed.

4. APPLICATION IN HSK NEW CHINESE TEST

(1) Realizing the sharing of educational resources

With the continuous development of the Internet, people can quickly exchange and exchange information resources. However, in the increasingly rapid exchange of information, the cultural exchanges between many countries are not Chinese. Even though the Confucius Institute has

proliferated in recent years, the Chinese language learning software on our network has been drowned in a large amount of English learning software. We interviewed many international students from Kazakhstan and Russia. They all said they want to integrate into campus life and learn in China. However, they are troubled by the lack of systematic learning of Chinese software, which makes it difficult for them to have a deep understanding of China's 5,000-year-old profound culture. In this context, we develop an oral assessment model that aims to achieve the sharing of educational resources so that learning no longer has boundaries.

(2) Quality of resources

In order to make the personalized oral assessment system automatically match the spoken language resources according to the user's needs, and also apply to the training application of the oral test in the HSK Chinese exam, we developed a speech processing technology based on the HSK new Chinese proficiency test scenario. Chinese learners can not only choose the default question bank provided by us but also can choose to import books according to their preferences. Regarding the default question bank, we have imported a collection of existing high-frequency data questions such as the HSK dynamic composition corpus that includes the People's Daily corpus and the Chinese International Education Technology R&D Center. At the same time, it is committed to better docking the real life of Chinese learners, and also hopes to assist with the massive HSK Chinese proficiency test for international students. Help foreign learners to be closer to domestic real-life applications, implement and learn to live in Chinese, and develop popularly. The introduction of personalized reading materials can also help the Chinese vocabulary to expand and improve.

(3) User needs to choose personalized

The recommended algorithms commonly used in previous personalized learning resources are mostly based on resource content recommendation, collaborative filtering recommendation, and mixed recommendation. The core of the content-based recommendation algorithm is to identify and extract the resource content features, construct the learner feature model and the resource feature model, and recommend the learning resources with a high matching degree to the learner. This causes the problem for each user to be fixed and cannot be truly personalized. In this regard, we adopt a new personalized oral assessment system based on text multi-label classification and image semantic automatic annotation and classification. The personalized oral assessment system automatically matches spoken resources given user needs and the direction of interest at the moment.

5. CONCLUSION

This paper first introduces the background, scoring mechanism and working principle of personalized oral assessment. It focuses on the prospective application of HSK's new Chinese test oral assessment and then designs a spoken language assessment system that conforms to the operational structure of Chinese learning and education. The system not only has the function of scoring the Chinese pronunciation of learners but also can customize the function of matching the learners' needs in real-time. Under the highly accurate model of establishing the user-question database, real-time docking can also be performed. Based on implementing foreign friends' understanding of traditional Chinese culture, we will continue to deepen our understanding of the words and usage of emerging elements in China today. According to the HSK Chinese test requirements, the oral assessment function is continuously improved.

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