Research and Exploration for Deep Learning of Artificial Intelligence Based on Intelligent Voice Interaction in Engineering Experiment Project Guidance

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ABSTRACT

With the deep exploration and application of AI deep learning in the field of education, deep learning is widely used and promoted especially in the experimental projects of Engineering in Colleges and universities so that many projects' intelligent characteristics can be accurately described and simulated by machines. Nowadays, deep learning has been widely used in image, speech, natural language processing, CTR evaluation, big data feature extraction and so on. This paper discusses the exploration and application of deep learning based on intelligent voice interaction to solve the students' repeated problems in the guidance of engineering laboratories through the solutions provided by machine itself..This could help to reduce the workload of teachers, make the experimental guidance more efficient and improve the learning effect of students more obviously.

Keywords: Intelligent voice, deep learning, engineering laboratory

1. INTRODUCTION

With the development of higher education in China, the proportion of people who receiving higher education is rising. Faced with the increasing enrollment rate of colleges and universities year by year, engineering laboratories have to accept a large number of students to participate in the experiment. In the process of experimental guidance, the experimental instructor usually needs to allocate a professional experimental assistant to guide the experimental project. In the process of experimental guidance in the face of batch after batch of students, the problems encountered by students in the experiment are always repetitive and the teachers have to provide the similar solutions every time. That is because most of the problems encountered in an engineering experiment are the same. In this process, the teachers have to solve the repeated problems like a machine. To some extent, it wastes a lot of time in the process of experimental teaching guidance. These problems could be resolved through the application of deep learning based on intelligent voice interaction. Firstly, collect the problems that teachers are likely to encounter in the experimental teaching. Secondly, through using the voice search, the machine could provide a solution automatically. Then, the teachers who provide the standard guidance of the experimental could be replaced by the machine with deep learning. In the process of experiment, more and more repeated problems could be solved accurately and timely so that teachers' workload is reduced. Meanwhile, the key steps of the experiment, standardized operation process, troubleshooting in the experimental process, collection of experimental data and formation of experimental report are completed by the machine with deep learning function. In China, there is no machine to guide students to complete the research case of experimental guidance. The research of this project will help to improve the phenomenon of low students' sense of participation caused by the experimental complexity of engineering majors.

2. THE ROLE OF DEEP LEARNING TECHNOLOGY IN ENGINEERING LABORATORY

Deep Learning is to learn knowledge critically based on understanding. This learning method has the characteristics of critical understanding, knowledge integration, transfer and application and problem solving. Deep Learning methods include image recognition, speech recognition, natural language processing, etc. New types of artificial intelligence products are gradually transferring to voice interaction modes with the demand for intelligent products expanding from

communication to recognizing users' emotions and instantaneous feedback. At present, affective acoustic models are constructed through deep learning and abstracted into a mathematical model [1].

This paper will start from speech recognition in deep learning, by establishing a model, constructing a loss function, providing training data, learning parameters and extracting features. Finally, the test data are obtained, from a complete closed loop to help solve some problems encountered by students in a course experiment. The application of deep learning will provide solutions to students' repeated problems and guide the students to successfully complete all experiments of the course.

3. THE IMPLEMENTATION OF DEEP LEARNING BASED ON INTELLIGENT SPEECH IN EXPERIMENTAL GUIDANCE

3.1 Collect the problems of the Engineering Experimental Projects

The collected data includes: Problems and difficulties encountered by teachers in the process of experimental guidance, students' technical problems in the process of experiment, standardized operation, treatment of experimental results and so on.

For example, in the digital electronic technology course of engineering, the experimental collected contents include the design and testing of integrated logic gate circuits, the application of encoders and decoders, the application of shift registers, the application of sequential logic circuits, and the results of almost every experiment are the combination of 1 and 0, and the results are unique.

3.2 Summarize These Problems

Through transfer the problems to the machine with the intelligent voice interaction technology, the research could be carried out on the problems summarized with appropriate deep learning algorithms. Using machine learning and logical reasoning, [2] then it could provide correct solution feedback to students, enable students to successfully complete the experimental project. The machine records the students' learning behaviors and be able to provide the student' complete experimental report.

The endpoint detection method based on CO complexity can effectively overcome the impact of noise environment on speech endpoint detection system and is suitable for the requirements of robust speech recognition system [3].

3.3 Intelligent Voice Interaction Technology

This technology could improve the correctness of human speech recognition by machine. It also helps to resolve the speech training set parameter optimization problem and speech complexity problems.

In this case, we choose HMM (Hidden Markov Model), which is a method to study probability transfer over time. It is an ideal speech recognition model so far. [4] The English speech recognition function is realized by the HMM, which strengthens the processing ability of speech signal, and the intelligent speech equipment is applied to the engineering laboratory. [5] HMM has unique advantages in training model and recognition for diagnosing faults. [6]

HMM elements include variables, implicit and observed parameters, initial probability vectors, and transition and transmission probability matrices.

3.4 Voice Search Technology

As the voice can be well recognized, [7] After the speech is correctly recognized, how to quickly find the correct search target and provide the correct solution. This requires pre-set entries. In this example, the principle of establishing contact between the speech recognition module and the control module (computer) is that the speech recognition module will output the bound recognition result from the serial port after recognition, and the result is a serial port data. For example, after inputting the first level term "digital electronic technology experiment", the voice module prompts the next level term to specify a certain experiment. At this time, the second level term "74LS138 decoder experiment" is spoken again. Then, we continue to speak out the data "0 or 1" of each interface connected according to the prompts of the voice instruction. After the system operation, the voice assistant will give the correct experimental results. Meanwhile, you can estimate whether your experiment is successful or not by comparing your experimental results with the results generated by the system.

3.5 Deep Learning Technology

Through understanding and learning the problems in natural semantics, machine can determine the network structure to use through the model of in-depth learning. It also can determine the numbers of layers and the number of neurons in each layer and finally achieve the optimal solution.

Deep Learning is divided into supervised learning and unsupervised learning. Gaussian mixture model (GMM) is often used in speech recognition and processing. It is an unsupervised, parallelized, and tensor-based approach that algorithmically works with entropy estimations [8]. Speech emotion recognition is one of the latest challenges in speech processing. [9] In this paper, we don't use speech emotion recognition.

By constructing the gradient and complexity of deep learning, training and optimized the test set continuously, the recognition rate of machine facing students' problems is more than 92% and the satisfaction rate of solutions is more than 70%.

Through the implementation of the technologies above, the machine can undertake more than 50% of the teacher's guidance workload of engineering experimental courses.

4.   IMPLEMENTATION PROCESS AND MODEL DESIGN

4.1 Data Collection

In the early stage, we need to spend a lot of time following the teachers to participate in the experimental course completely, and extract valuable information in this process.

4.2 The Collected Data Is Sorted into Records and Refined to Form a Voice Interactive Navigation

Navigation can prompt students to carry out the experiment according to the correct steps. The pre-designed term classification can guide the user to interact with the machine, i.e. the first-class term and the second-class term. Entries can simplify the complexity of voice interaction and help to give the results of user requests quickly and accurately. Support teams can conveniently solve their queries. [10]

4.3 The Correctness of the Problem Solution

Through the implementation of the above technical path, machines can replace more than 50% of the guidance workload of teachers in engineering experimental courses.

5.   RESULT PREDICTION

5.1 The High Recognition Accuracy of Intelligent Speech Interaction

Facing the problems raised by students, the machine can extract the vast majority of voice content and translate it into text. It has been proved that using "statistical model based speech recognition technology" HMM can greatly increase the accuracy of speech recognition. The recognition Accuracy of Intelligent Speech Interaction Is More Than 80%.

5.2 The High Efficiency of Voice Interaction and Fast Responding

The speech corpus of the machine can reach 500 records. By the way, the corpus can be hierarchically set, such as the first-class corpus and the second-class corpus, which are similar to the first-class navigation and the second-class navigation in the web page. This can increase the efficiency of voice interaction and the machine can give feedback quickly.

6.   CONCLUSION

Research and practice of Deep Learning in engineering laboratory can reduce the workload of teachers, make the experimental guidance more efficient and improve the learning effect of students more obviously. The viewpoints and technologies proposed in this paper provide a new perspective for the transformation of teaching activities. The main position of students in teaching activities has been implemented. Students can simulate "participate" in the practice of

human social history in teaching activities, and form core qualities that are conducive to future development. Form core literacy conducive to future development, the role and value of teachers are also fully realized in Deep Learning.

The deep learning technology mentioned in this paper aims at the positive transfer of students' boring learning in the process of experiment. Through the training of deep learning, the machine guides students to learn, stimulates students' sense of participation, acquisition and cognition, and makes learning a happy and joyful thing. Thus it alleviates the pressure in the process of students' learning and improves the efficiency of learning and reduce the workload of teachers. It can effectively improve the learning status of college students, improve students' ideological consciousness, improve students' core literacy, stimulate students' interest in learning, and enable students to form a good habit of autonomous learning. The English speech recognition function is realized by the Hidden Markov model, which strengthens the processing ability of speech signal, and the intelligent speech equipment is applied to the engineering laboratory.

7. ACKNOWLEDGEMENTS

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