Research on the Solution of Vocational English Online Education Based on Artificial Intelligence

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Abstract. With the rapid development of mobile Internet, vocational English online vocational education has won the favor of a large number of users for its strong practicality and convenience. Students can make up for the limited amount of professional class hours in schools by learning relevant courses. However, due to the uneven pre-school foundation and the ability to learn and master knowledge of vocational education students, many pain points still exist, such as the teaching quality of students cannot be guaranteed in the learning process, and the knowledge learned is out of line with the needs of enterprises. To solve this problem, this paper proposes a solution for vocational education on the vocational English line based on big data and machine learning, which aims to use big data and machine learning methods to improve students' learning effect and enterprise practical ability through adaptive teaching and practical courses, and provide students with opportunities to go to enterprises for practical training by establishing contacts with enterprises, so that students can clearly understand what kind of talents enterprises need, So as to selectively learn the corresponding professional knowledge on the platform, make up for the lack of course hours, and improve the employability.

Keywords: Professional English · Big Data · Machine Learning · Solution

1 Introduction

According to the Online Vocational Education Industry Research 2017 [1], "the current scale of online vocational education is rising year by year and is increasing as a proportion of the national market size. By 2018, the online vocational education market will reach $13.4 billion". The "Online Education Industry Research 2017" pointed out that the scale of global online education growth rate will exceed 10 trillion dollars, which is much higher than that of traditional education, with the growth at 7%. By 2019, global online education market scale will grow rapidly to 560 billion dollars. According to Ai Media Consulting, China's online education market scale exceeds 260 billion yuan in 2019, and there is still room for triple growth by 2023. The compound annual growth rate

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of it will reach 31.7% in the next five years, and the field will see an explosive growth in the next few years [2]. At present, domestic online education programs for vocational skills are realized in the following forms [1, 2]: (1), online tutorials; (2), video classes on-demand; (3), webcast classes.

In the traditional learning model, students need to spare time for learning even if they have mastered some units, because the learning logic between different contents is linear and single. In addition, students are unable to receive immediate feedbacks when encountering questions. In this regard, adaptive learning is dedicated to detecting students' current learning status by computers, then adjusting the later contents and learning path accordingly to improve their learning efficiency. However, learning is a complex and implicit process, it is difficult to achieve good results simply with computer programming. Artificial intelligence adaptive learning has emerged by using big data and artificial intelligence technology, which upgraded traditional adaptive learning with new learning methods. It is of great significance in the field of education.

2 Research Ideas and Practice

Through internet technology, the online vocational English education platform based on big data and artificial intelligence provides both basic theoretical knowledge of online courseware from famous teachers and schools, and offline enterprises cooperation related to the vocational English courses, aim to consolidate students' theoretical knowledge with practical experience in enterprises cooperation. This enables vocational education to change in the direction of virtualization, openness, sharing, and practicality. The platform is also available for students to improve their English without the limitation of time and space. By tracking the students' learning effects through big data analysis methods, it is possible to make evaluation of the learning effects for further plan, as a result, education will accelerate towards virtualization, openness, sharing, etc., which truly brings disruptive changes to the traditional education industry [3].

3 Program Description

The online vocational education platform adopts a layered logic architecture model to achieve the separation and decoupling of different granularity logic functions, which is conducive to the encapsulation of system service functions and improves the scalability and maintainability of it. The platform helps students enter the enterprise by teaching close to the field and introduces related online enterprise courses and project-based teaching [4]. Meanwhile, develops practical training bases offline to create a two-way communication opportunity between students and enterprises. By using big data and machine learning methods [5] to assess students' learning effectiveness and learning ability and improve teaching effectiveness, the platform helps students improve their learning efficiency by analyzing the online learning process and exam results, in this regard, it will adjust learning content and paths by using machine learning algorithms to assess the learning effectiveness and ability. Using web crawlers, it collects a large amount of recruitment information. Using big data mining technology [6], it guides students to be employed by enterprises. The platforms of deployment mode and physical architecture are shown in Fig. 1 and Fig. 2 respectively.

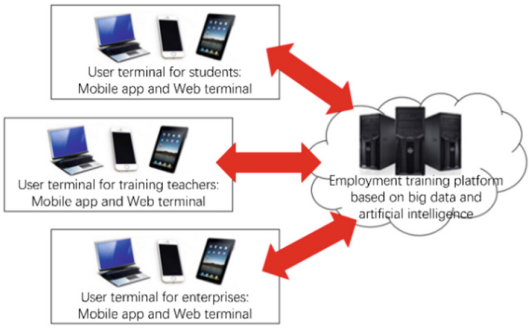

Fig. 1. The platform of deployment mode.

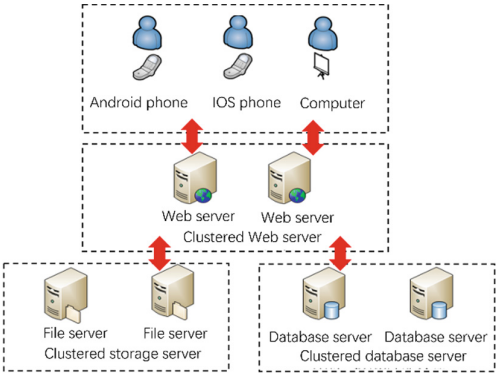

Fig. 2. The platform of physical architecture.

3.1 Platform Construction Objectives: Build a Fully Functional and High-Performance Online Education Platform

Adopts a layered logical architecture model to realize the encapsulation of system functional services so as to improve its scalability and maintainability. Uses cloud service method, to improve the response and the stability of the system operation. The cloud service includes live broadcast of practical courses, upload/download of teaching resources, online communication and consultation, user rights designation, enterprise user repository, enterprises recommendation, courses recommendation students sign in and online mock examination, assignment submission and review, recharge and payment, etc.

3.1.1 Introduce Intelligent Adaptive Education and Employment Processing Mechanism to Improve Service Quality

Analysis user's historical behaviour and recruitment information online. Main algorithms: intelligent assessment of learning ability, intelligent assessment of learning effect, intelligent recommendation of course package, intelligent recommendation of career planning, intelligent recommendation of demand personnel, intelligent recommendation of enterprise recruitment, intelligent recommendation of internship enterprises,

intelligent recommendation of resume submission, automatic crawling of recruitment information, intelligent recommendation of works, etc.

3.1.2 Carry Out Project-Based Teaching, Develop "Training Base" with Practices, Improve Students' Practical Ability and Practical Experience

Develop the training base through the two-way cooperation between enterprises and schools: consolidate students' knowledge and improve their practical experience through the combination of online and offline. Develop famous teachers' lectures of offline enterprises, enable students to interact with teachers face to face by offering lectures on live, so that students in relatively remote areas can also enjoy the same learning resources.

3.2 Platform Architecture Model

The platform which is shown in Fig. 3 adopts a layered logical architecture model.

3.2.1 The First Layer is the Client

As the interface layer, Users can access the functions like data input that provided by the platform, and obtain the processing results through computers, cell phones, tablets, and other smart net terminals. This layer contains the functions available to users and provides corresponding functional services according to different roles of users, which include teachers, students, academic administrators, system administrators.

3.2.2 The Second Layer is the Software-as-a-Service Layer, or SaaS Layer

This layer includes the portal, teacher application system, student application system, backend application system and other building blocks that serve as containers for each function in the layer and provide functional options for the tenants of the online education platform.

3.2.3 The Third Layer is the Software Platform Service as PaaS

The layer deploys containers for application services, specifically for the Apache system used in this system. This layer is responsible for responding to the operations of tenants and their users, forwarding user requests to specific processing artifacts according to the definition of the configuration file, and returning the results of processing to the user. This layer mainly deploys various business logic processing functional components, which specifically implement the functions of the online education platform and are responsible for responding to the data and instructions submitted by the users, encapsulating them formally as services, and opening the access addresses and parameter interfaces to facilitate calls from the upper layers.

3.2.4 The Fourth Layer is Infrastructure as a Service IaaS

The layer mainly adopts virtualization technology to virtualize hardware and server resources into various resources that can be used by the platform. Through software

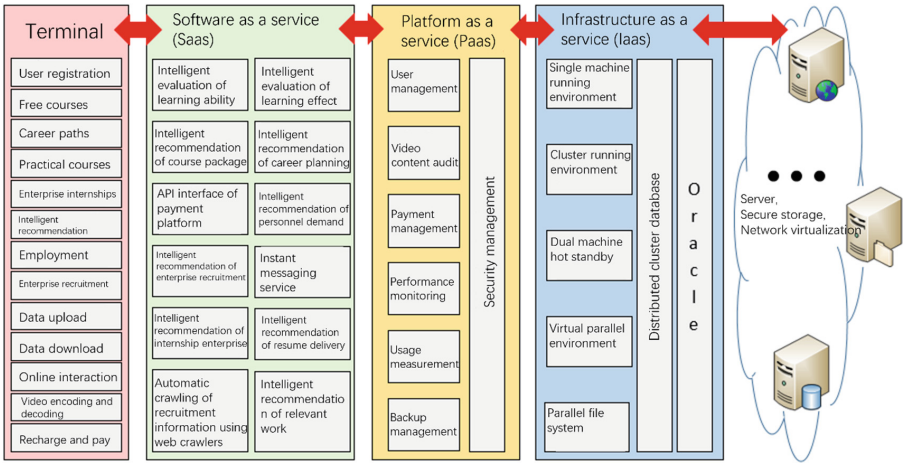

Fig. 3. Platform logic architecture design.

technology, it provides basic services such as database management, data analysis, media management, data exchange, etc., and acts as a container to host Tomcat server. Based on this structure, the functions provided by the platform to users through the client's browser, are in fact provided by the SaaS layer, after receiving data and instructions, the Apache proxy server delivers the request to the corresponding Tomcat server to invokes the Web service building blocks to complete the processing and return the result.

3.3 Core Technologies of the Platform

The core technologies involved in this program are as follows:

3.3.1 Deep Learning Based Recommendation Network

The study uses historical user behaviour data to train a recommendation model using DNNs [7] based on DNNs to improve the matching between the functions of [student user-job], [student user-course package], [student user-career planning], [business user-recruiter]\[learning situation-teaching plan development], etc. The main framework of the model is shown in Fig. 4. At beginning, the user-item rating matrix is provided to obtain the users characteristics, then import them into the neural network. In the output layer, some probability values that represent the probability of the possible scores given by the user will be obtained. Finally, SoftMax cross entropy is used for classification [8] and the output is encoded in One-Hot coding [9], with the term with an output value of 1 as the feature classification value (a learning strategy predetermined in advance).

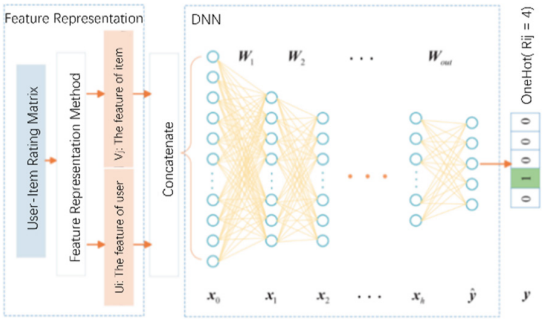

Fig. 4. Recommendation model based on DNNs.

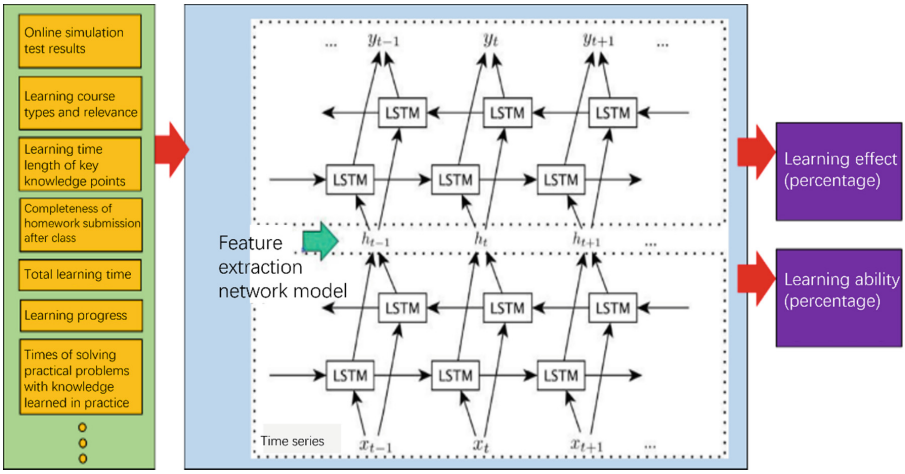

Fig. 5. Long- and short-time neural network to evaluate the learning effect and ability.

3.3.2 Intelligent Assessment System Based on Deep Learning

The LSTM + RNN [10] (Long Short-Term Neural Network + Recurrent Neural Network) network model is used to model the user's historical behaviour and exam assessment, in order to rate students' learning effectiveness and learning ability. The inputs, outputs and main framework of the model are shown in Fig. 5.

4 Platform Features

The features of this platform are as follows:

4.1 The Data-Driven Platform Provides Scalable Personalized Education

In the vocational English education industry, teachers are the core means, but quality teachers are scarce [6]. Theoretically, a quality teacher would face uncountable students

at the same time via the Internet. Then the problem of scarcity is solved. But this process lacks effective teacher-student interaction, and the time allocated by the teacher to each student for personalized service is extremely limited. This is the basic consensus of AI adaptive education practitioners. The advantages and disadvantages of traditional face-to-face education are obvious. The contribution made by online education, which has flourished during the past few years, is more about moving the traditional face-to-face education model online, without changing its essence. The ambition of artificial intelligence adaptive education lies in personalized education at scale, driven by data and technology.

4.2 The Big Data Helps Build Learning Models and Outputting Suggestions

At present, "big data collecting - learning model building - learning suggestions output" is the basic step to realize the adaptive learning of AI. The process of building a learning model is very complex and difficult to understand. Normally, it transmits information to each other through thousands of functions points, finds out the learning rules from thousands of nested functions in an exhaustive way by model evolve, like the thinking process of human brains. Its output consists of three organic elements: the learning material (e.g., an instructional video, an exercise), the criteria for assessing students' learning, and the deliver order of learning materials.

The content and duration of these three components are determined by the AI algorithm. The more time students spend using the system and the more behavioural data they leave behind, the more efficient the system will be.

5 Platform Benefits

5.1 Engaged to "Think" and "Act" Like a Good Teacher

Teachers are experience driven. Although the whole process follows a certain rhythm, the "key moment" of each step is ultimately dependent on individual teaching experience.

Teachers who have just graduated are good at answering questions, but lacking in the teaching systematization, while teachers with profound experience are skillful at overall control, but slightly lacking in being kind. Different teachers have different judgments about students' learning situations, which leads to different learning paths. Teachers with equal experiences may differ in personality and temperament, teaching style, and salary expectations, which affects their teaching effectiveness. The artificial intelligence adaptive learning system aims to gather and quantify the valuable experience of excellent teachers by using data and technology, in order to improve overall teaching efficiency and effectiveness by minimize the differences among teachers.

5.2 Self-adaptive Education Ability Helps Penetrate the Core of Teaching

The application of artificial intelligence in the field of education is the general trend. Smart products tools include assignments assigning and correcting are applied with advanced artificial intelligence technology, but the application scenarios only remain in

the process of auxiliary learning and will not directly bring about the improvement of teaching quality and effect. Artificial intelligence of self-adaptation is going to penetrate artificial intelligence technology into the core of teaching, which helps to fundamentally improve the concept and method of learning.

The whole educational process can be divided into five links: content development - teaching (learning) - practice - assessment - management [11], and there are scenarios where AI adaptive learning can be applied in these links. Among them, adaptive content development is the foundation of the other four links, which requires a huge amount of work. At present, few domestic companies specialize in this work as their main business, and most of them often only consider it as a precursor to internal product development. Adaptive management refers to intelligent early warning, reminder and tracking for users by analyzing students' data in teaching, assignments, and assessment, which is an additional product after the successful application of the other four links. The application of artificial intelligence adaptive learning technology in the three links of teaching, which is the core links practice and evaluation helps directly face C-terminal users and with a broad market. The application of teaching links impact on learning effect greatly, represent the most core, complex and difficult part of the entire education process. With users' intensive demands for personalization and effects, certain boundaries are blurred between different links, and a full-process adaptive learning system that can be applied into five links at the same time has also appeared on the market.

6 Conclusions

The margin of this plan is obvious, and the initial investment is large, but later the data feeds back strong, the stronger it is. As more and more students choose the product, the amount of data collected by it will increase. In general online education products, these data will be stored and used for product optimization through manual mining and analysis; while in artificial intelligence adaptive learning products, these data will be fed into artificial intelligence algorithms like "fuel" In this "big boiler" [8, 9], the data is used to train the algorithm to output a learning model that is closer to the real situation, giving the learning system better performance and more advanced functions to attract student users. Students use the system to generate more data by repeating the above processes. In addition, the system's "knowledge of students" based on data increases over time, and the cost of switching products for students appears to be high. As the result, the artificial intelligence adaptive education industry acquires more obvious marginal benefits than the general online education industry.

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