Design and Implementation of Web-based Independent Learning Platform

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Abstract. With the continuous maturity of Internet and computer technology, it has had a profound impact on people's lives. At present, the Internet also plays an extremely important role in education. Its application in teaching promotes the transformation of teaching mode and breaks the limitation of traditional classroom teaching. Especially in recent years, in order to adapt to the teaching reform, cultivate learners' awareness of independent learning and improve learners' comprehensive learning ability, people have established various types of independent learning platforms based on the Internet. However, as far as the existing learning platform is concerned, it still pays too much attention to the role of teachers, and the personalized needs and interactivity of users of the independent learning platform are not reflected. The purpose of this paper is to explore the design of the Web3.0 environment independent learning platform and strive to build an independent learning platform that ADAPTS to the development of The Times. This paper first gives an overview of Web3.0, and then designs and analyzes the independent learning platform. Then it proposes the specific implementation of the independent learning platform, and tests the platform with the help of data fusion algorithm. The experimental results of this paper show that the research and development of the Web3.0 environment independent learning platform can meet learners' personalized needs, promote learners' independent learning and effectively stimulate learners' interest in learning.

Keywords: Independent Learning Platform, Data Fusion, Design and Implementation

1. Introduction
The continuous progress of computer technology and Internet information technology has had a profound impact on social development, which is especially reflected in knowledge and information. Due to the extensive application of the Internet in education, the current education model in China is also changing, and the traditional teaching model is beginning to change to the direction of network teaching model. Independent learning has become the main trend of current learning. In recent years, people have developed a variety of autonomous learning platforms based on Web2.0 technology. But these independent learning platform is still too much attention to teachers "teaching", did not fully consider the network to learn the user's individualized demand, overall Web2.0 environment still exist
many problems of autonomous learning platform building and so needs to be improved, based on this 
the paper puts forward the design and development of an autonomous learning platform based on 
Web3.0, insufficient to make up for the moment of the autonomous learning platform.

The existing main problems of independent learning platform is the user personalized demand and 
the lack of intelligent platform, to make up for these deficiencies, provide convenience for the user's 
autonomous learning, this article on the basis of Web3.0 technology and combined with the meaning 
and features of autonomous learning, puts forward the Web3.0 environment design and realization 
scheme of autonomous learning platform [1-2]. Before carrying out the research in this paper, the 
author has looked up a large number of research materials. Through the collation of existing relevant 
research materials, we can find that at present, domestic and foreign researches on independent 
learning platforms mainly focus on the design of platforms based on Web2.0 technology, while the 
design of independent learning platforms for Web3.0 environment is still in its infancy [3]. In addition, 
eexisting independent learning platforms mainly focus on the organization of knowledge and content, 
with less consideration for user needs, and the characteristics of independent learning are not fully 
reflected in the platform [4-5]. From this point of view, there is still a lot of room for improvement in 
the research of autonomous platform.

Through the design and implementation of the Web3.0 environmental independent learning 
platform, this paper aims to make up for the shortcomings of the existing independent learning 
platform and realize the personalized and intelligent development of the independent learning 
platform, so as to promote the continuous improvement of the independent learning efficiency, 
stimulate the enthusiasm of learners and promote the progress of the overall education of the society 
[6-7]. This paper first gives an overview of Web3.0 technology and environment, and then designs and 
analyzes the independent learning platform of Web3.0 environment. Then, it proposes the specific 
implementation method of the independent learning platform, and carries out relevant system function 
test experiments on the platform with the help of data fusion algorithm [8]. Through the test of the 
platform function, it is found that the design of the platform in this paper is a reliable and safe 
platform, which is conducive to promoting the efficiency of independent learning. On the one hand, 
the research in this paper promotes the scientific establishment of the Web3.0 environment 
independent learning platform, and on the other hand, it lays a certain theoretical foundation for future 
relevant researches [9].

2. Method

2.1 Summary of Web3.0

Web3.0 is a new Internet method based on Web2.0. Compared with previous Web2.0, this Internet 
method can further demonstrate the labor value of network users. Artificial intelligence (AI) is the 
core of Web3.0, which enables intelligent learning and understanding of semantics. With the 
continuous maturity of Internet technology, its influence on people's life is becoming more and more 
profound. Under the Web3.0 environment, Internet technology is further developing towards the 
direction of intelligence, humanity and precision [10-11]. At the same time, compared with Web2.0, 
Web3.0 shows new features, mainly reflected in the following four aspects: Second, it is suitable for 
various types of terminal platforms. The Web3.0 mode can be connected with mobile phone ports, 
PAD ports and other ports of various types, with strong universality. Third, the Web3.0 environment 
focuses on the needs of different users, highlights the personalized features, and realizes the rapid 
processing of different types of user data. Fourth, Web3.0 is a new digital technology that can 
effectively integrate all kinds of data. Applying Web3.0 technology to the design of independent 
learning platform can fully realize the personalized and intelligent development of learning platform, 
and effectively make up for the shortcomings of the existing independent learning platform [12-13].
2.2 Data Fusion Algorithm

Data fusion is a kind of network algorithm which can process the data information synthetically and quickly. There are many types of data fusion algorithms, among which the most representative ones are bayesian algorithm and SVM algorithm. Bayesian algorithm is an algorithm frequently used in data fusion. It describes the unpredictability of the measured thing with the help of conditional probability, and then calculates the posterior probability with the help of bayesian inference. The specific algorithm is as follows:

\[ P(X = x) = \sum_{i=1}^{n} P(Y = y_i) P(X = x | Y = y_i) \]  

(1)

Bayesian algorithm is a medium calculation, all the assumptions exist independently is the specific requirements of this algorithm, and must first be given the prior probability and conditional probability, and all the probabilities need to be calculated to ensure the relevance and consistency, which requires a lot of computing experiments to be verified. Combined with the theory of confidence distance, a data fusion method based on bayesian estimation is proposed, which can process the measured data of the same parameter of multiple sensors of the same kind in a more detailed way.

In order to ensure the accuracy of the calculation results, the algorithm needs to be improved to make it consistent with the data type characteristics of the autonomous learning platform. The improved algorithm is based on statistics and structural risk minimization. It USES the nonlinear transformation defined by the kernel function. The specific calculation formula is as follows:

\[ \gamma = y(w^T x + b) = y.f(x) \]  

(2)

The original feature space was dimensionally increased, and the optimal linear classification interface was found in the high-dimensional space. The improved bayesian algorithm effectively solved the problems of small sample, nonlinearity and high-dimensional.

3. Testing Experiment of Web3.0 Environment Independent Learning Platform

The main purpose of testing the independent learning platform is to test the fit between the platform design and the needs of users. With the help of relevant testing tools and combined with specific testing procedures, the overall operation and performance of the independent learning platform are analyzed and tested in depth, so as to ensure the normal use of the platform in practice. The experimental method adopted in this paper is the combination of unit detection and integrated detection. Unit detection is mainly used to detect the use of each sub-module of the autonomous learning platform. When unit detection is carried out on each sub-module, unit coding should be carried out first to prevent confusion in the detection process and data errors. The integration test is mainly used to test the overall performance of the platform. With the help of the integration test, it can test the inadequacies in the actual operation of the independent learning platform, and make timely adjustments to quickly correct the errors so as to ensure the normal operation of the independent learning platform. The testing experiment of Web3.0 environmental independent learning platform involves a wide range of testing, mainly including the testing of the overall system of the platform, the testing of the platform interface and the testing of the platform functions. The testing of the platform functions includes the testing of various parts of the platform. During the test, Web3.0 and Web2.0 technology-supported autonomous learning platforms can be put together for comprehensive comparison.

4. Discuss

4.1 Design and Implementation of Web3.0 Environment Independent Learning Platform

(1) System function design and implementation
In order to make up for the shortcomings of the existing independent learning platform in terms of interaction and student body, this paper designs the system functions of the independent learning platform with the support of Web3.0 technology. The autonomous learning platform of this paper divides the system into two parts, namely the foreground system and the background system. The foreground system includes the release of learning resources, the login system and the query of data information. Background system including courses, users and announcement management and other functions. The system administrator can manage the learning user in various aspects, such as the rights and registration of the learning user, through the verification and login of the front desk, and at the same time maintain the user data. Teachers can set relevant parameters with the help of the independent learning platform, so as to realize the intelligent management of teaching, such as the management of students' learning content, progress and students' independent learning results. After entering the independent learning platform through the front desk system, users can choose the corresponding learning content according to their own needs, and interact with teachers through messages or online consultation. The daily management and system maintenance of the independent learning platform are mainly completed by the background system, which can only be accessed by administrators and teachers, and can be operated within the scope of authority.

(2) Design and implementation of database structure

The design concept of the autonomous learning platform in the Web3.0 environment has basically achieved sharing and intelligence, which can meet the personalized learning needs of different learning users. Compared with the previous independent learning platform supported by Web2.0 technology, this learning platform shows great advantages, which are mainly reflected in the powerful support of the background database to the foreground system. Due to the continuous progress of network technology, the data processed by it is more complex and diverse, and the processing process has become difficult. In order to improve the data processing capability of the self-learning platform in the Web3.0 environment and realize the intelligence of data processing, on the basis of consulting a large number of research materials and combining with the characteristics of Web3.0 technology, the database of the self-learning platform in this paper is the Access database, and db study is the database name of the self-learning platform. The database consists of six data tables, which can process the mass data intelligently and quickly. The data information contained in the database mainly includes tutorial information, language type of member information, announcement information, message information and other data information.

(3) Design and implementation of database tables

| Field name | Data style | Default value | Required field |
|------------|------------|---------------|----------------|
| ID         | Char       | /             | No             |
| Name       | Char       | /             | Yes            |
| Pass       | Int        | /             | Yes            |
| Zname      | Char       | /             | No             |
| Sex        | Char       | /             | Yes            |
| E-mail     | Char       | /             | Yes            |
| IDcard     | Int        | /             | Yes            |
| PassQuestion| Char     | /             | Yes            |
| PassSoultion| Char     | /             | Yes            |
| LoginDate  | Date       | Now()         | Yes            |
| Lock       | Int        | /             | NONE           |

*Data came from the in-depth analysis of financial data in the experiment*

After completing the design of the overall database table, in order to make the data reflection of the independent learning platform more intuitive, it is necessary to carry out the design of the database table, and the database represents the reflection of the data logical structure. The database table of the autonomous learning platform in this paper mainly includes announcement information table, member information table, voice tutorial information table, message information table, etc., the functions of
each information table are different. The following member information table is taken as an example to illustrate the main data composition of the database table. The member information table is shown in table 1. The data in the table is the result of the author's arrangement.

4.2 Test Results of Web3.0 Independent Learning Platform

Through the above testing experiments and data fusion algorithm, we can draw the conclusion that compared with the Web2.0 independent learning platform, the Web3.0 independent learning platform has great advantages. The independent learning platform in this paper has stable performance in all aspects and good operation status. However, under the current Web3.0 technology level, the actual operation effect of the independent learning platform still fails to reach the ideal effect, which needs to be further improved. The specific experimental data are shown in table 2 and figure 1. The data in the chart are the results of the author's experimental arrangement.

**Table 2. Test data of Web3.0 autonomous learning platform**

| Name          | Reaction time | Stability | Intelligent rate |
|---------------|---------------|-----------|------------------|
| System function | 2.1s          | 88.62%    | 91.47%           |
| Database      | 1.3s          | 87.41%    |                  |
| Data table    | 1.5s          | 89.13%    |                  |
| Actual score  |               | 85.1      |                  |
| Ideal score   |               | 94.6      |                  |

*Data came from the in-depth analysis of financial data in the experiment

![Figure 1. Web2.0 vs. Web3.0 performance comparison](image)

It can be found from table 2 that all parts of the autonomous learning platform of this paper show advantages in reaction time, stability and intelligence, especially the longest reaction time is only 2.5 seconds, which can be almost ignored. As can be seen from figure 1, compared with Web2.0, Web3.0 autonomous learning platform is far more intelligent, personalized and interactive than Web2.0. All these indicate that the design of autonomous learning platform in this paper is reliable. At the same
time, we can also find from the data in table 1 that the current independent learning platform has not achieved the desired effect, which needs further research and improvement.

5. Conclusion
Supported by Web3.0 technology, combined with the characteristics of autonomous learning autonomous learning platform, design Web3.0 environment is not only beneficial to make up for the inadequacy of existing autonomous learning platform, also implements the study the intelligent processing and retrieval of information, meet the personalized needs of user study, better reflects the user active learning characteristics, to meet the needs of the development of education at the present stage. The construction of autonomous learning platform is a long-term process, which needs to be adjusted according to the changing times.

References
[1] Ren, Yong Dong. The Design and Implementation of Web-Based Autonomous English Learning Platform [J]. Advanced Materials Research, 2017, 33(2):850-851.
[2] DU Jing, Chengdu Aeronautic Polytechnic. Design of Autonomous Learning Platform of English Listening in Vocational Colleges[J]. Journal of Chengdu Aeronautic Polytechnic, 2017, 12(5):117.
[3] Cao, Cai Feng, L, Gen Shen. Research and Design of Open and Autonomous Learning System Based on HTML5[J]. Advanced Materials Research, 2017, 13(6):756-759.
[4] Xiao, Shou Bai. The Exploration and Implementation of the Interactive Multimedia Network Autonomous Learning Platform [J]. Applied Mechanics & Materials, 2017, 12(8):599-601.
[5] CONG Wen-jing, MA Xiao-xia, ZHAO Min. Construction of Autonomous Learning Platform for Engineering Drawing[J]. Research & Exploration in Laboratory, 2018, 11(7):123-125.
[6] Cao, Cai Feng, Liang, Guo Chao, Luo, Yao Zu. Research and Implementation of Autonomous Learning Platform about Web System Development Course[J]. Applied Mechanics & Materials, 2017, 8(1):211-214.
[7] Zhou, Yu Mei, Yang, Wan Qing. Construction on Autonomous Learning Platform for College English Based on Network[J]. Applied Mechanics & Materials, 2017, 15(1):2300-2303.
[8] Liu, Ying, Yao, Jun. Research of Autonomous Learning System of University Based on Virtualization Technology[J]. Applied Mechanics & Materials, 2017, 13(8):530-531.
[9] Zhao Shan, Li Menlou, Guo Lia. Design and implementation of Inet-based autonomous learning platform [J]. Computer Engineering and Design, 2018, 29 (15): 4067-4069.
[10] Li Menlou, Li Qing. Construction and implementation of a web-based self-learning platform for graduate students [J]. China Education Informatization, 2019, 32(1):45-47.
[11] Hui Li, Zhang Ning, Xu Hui. Research on key technologies of self-learning platform based on Web2.0 [J]. Journal of Natural Science of Heilongjiang University, 2018, 26(1):72-74.
[12] Ma Qihua. Intelligent decision-making of book acquisition in university library based on Web3.0[J]. Modern Intelligence, 2019, 29 (4):117-119.
[13] Zhao shan, Li Menlou, Guo Jia. Design and implementation of Inet-based autonomous learning platform [J]. Computer Engineering and Design, 2018, 29(15):4067-4069.