Architecture Design of Employment Education Network Platform Based on Blockchain Technology

Weiwei Zhang(✉)

Changchun University of Finance and Economics, Changchun 130000, China
zhangww6565@163.com

Abstract. The Employment education network platform because of its convenience its business has been rapid development, too much platform integration and paid knowledge spread also breeds the platform and users and users and users with data sharing security issues. At the same time, the development of Internet technology also increases the education platform knowledge rights protection and fight against piracy difficulty. To this end, the employment education network platform architecture based on blockchain technology is designed. Based on blockchain technology, an employment and education network platform composed of network layer, infrastructure layer and business application layer was built. Intelligent contract was compiled by online editor Remix to design intelligent contract function of employment and education network. Based on the integral incentive mechanism contract, the teaching resource sharing function is designed. Design employment education data recommendation function based on residual neural network. The test results of the platform show that the fastest response time of the platform is 1.24 s, and the maximum amount of data that the platform can manage at the same time is 40000 Byte when the user visits are 5000 times. The platform can operate normally and has extremely high operating efficiency.

Keywords: Blockchain Technology · Employment Education · Network Platform · Platform Architecture · Residual Neural Network

1 Introduction

At present, with the continuous development and application of information technology, people's demand for knowledge and skills is also increasing. Especially when it comes to employment and career development, people are paying more attention to the quality and effect of education. For the job market, traditional recruitment methods also have some problems, such as cumbersome recruitment process, asymmetric information and high recruitment costs [1]. At the same time, with the popularization and development of Internet technology, many new Internet enterprises began to emerge. They have profound insight into and driving force to open up the Internet job market, and are in urgent

L. Yun et al. (Eds.): ADHIP 2023, LNICST 549, pp. 96–109, 2024.
https://doi.org/10.1007/978-3-031-50549-2_7

need of a new, efficient recruitment mode that can meet the recruitment needs of enterprises. Therefore, under the current social background, it has become an urgent issue to study the way of employment education based on the network platform and establish a more fair, just and transparent employment mechanism. The network platform can not only realize information openness and transparency, ensure consensus among students, enterprises and educational institutions on the authenticity and accuracy of information, but also provide students with more personalized and professional career development suggestions through big data analysis and other means, to help enterprises find the right talents more quickly and accurately. Therefore, the research and exploration of the architectural design of an employment education network platform has become one of the urgent problems to be solved.

Liu Xuejing [2] proposed the design of ideological and political education platform based on network multimedia technology. With the control of the computer, the compression technology is taken as the core technology, and the camera with adjustable position and the pickup with high sensitivity are installed to collect all kinds of video and audio materials, complete the compression and preservation processing in the hard disk video recorder, and use the network transmission to the server point-to-point connection and internal multipoint broadcasting to realize the on-demand and live broadcasting in the platform. Peng Xiaohua et al. [3] proposed the design of an online education platform for multi-concurrent high-speed communication. By analyzing the buffer and bandwidth at the receiving end, network delay and loss rate, the distribution shunt strategy of communication network link was designed. Then, combined with Greedy algorithm, Pareto distribution and queuing model theory, a multi-stream concurrent communication transmission control model in heterogeneous network environment is established. Finally, the firefly swarm algorithm is used to simulate the optimal solution target and complete the overall design of the system.

Blockchain technology provides a new way to solve the above problems. The characteristics of blockchain technology, such as decentralization, intamability and transparency, provide guarantee for information exchange and trust building among schools, enterprises and students, and also provide new opportunities and possibilities to realize information sharing and collaboration among students, schools and enterprises [4]. The employment education network platform based on blockchain technology can improve the traditional way of employment education by building trust, improving the reliability and security of information, and improving the effect of education and the quality of talents. Therefore, the research and exploration on the architecture design of the employment education network platform based on blockchain technology has both practical application value and theoretical academic value. A three-tier architecture pattern is adopted: Network layer, infrastructure layer and business application layer, through P2P network technology to provide services for the communication between nodes in the blockchain, establish the employment education network platform architecture, through the employment education network intelligent contract function, teaching resource sharing function, employment education data recommendation function, realize the employment education network platform based on blockchain technology; Furthermore, the education resources of students and employment education courses are embedded in the residual neural network model to predict the degree of students' preference for

target resources. Experimental verification shows that the fastest response time of the platform designed in this paper is 1.24 s, which can effectively solve the problems of inaccurate information matching and inaccurate information often existing in traditional employment information platforms.

2 Employment Education Network Platform Architecture Design

The main purpose of the construction of the employment education network platform is to provide more convenient, efficient and comprehensive vocational skills training and employment services [5], help the majority of workers adapt to economic development and changes in employment situation, improve employment competitiveness and self-development ability, and promote employment stability and economic development. In addition, online platforms can also facilitate enterprises' recruitment and talent matching, speeding up industrial restructuring and talent cultivation. Therefore, this paper builds an employment education network platform based on blockchain technology. On the basis of making full use of high-quality teaching resources in various universities, it provides a convenient network platform for students and teachers, which can help users develop personalized learning plans more quickly and accurately according to their own learning conditions. At the same time, it can also recommend courses, so that users can obtain a wider range of educational opportunities [6]. In this paper, when using blockchain technology to design the overall framework of the employment education network platform, the idea of layered architecture should be followed, as shown in Fig. 1:

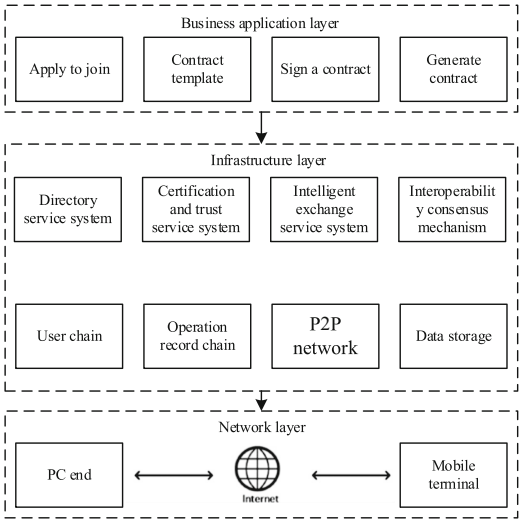

Fig. 1. Architecture diagram of Employment education network platform

As shown in Fig. 1, the employment education network platform designed in this paper mainly adopts three-level architecture mode: network layer, infrastructure layer

and business application layer. The network layer mainly realizes information interaction and provides services for communication between nodes in the blockchain through P2P network technology, so as to achieve effective point-to-point communication. The network layer transmits the business information of each node and synchronizes the block information of adjacent nodes, which effectively improves the robustness of the system so that the system will not crash due to the attack of the information of a node. In this way, all nodes in the blockchain network can jointly maintain the system and manage the system data equally.

Infrastructure layer is the core layer of the whole model, which can provide support for basic services of mutual trust and interoperation of employment and education resources. It mainly covers three service support systems: blockchain directory service system, certification and trust service system and intelligent exchange service system. The blockchain directory service system provides overall management for all education resources on the blockchain network, carries out unified registration of employment education resources, provides organization and storage of information resources, as well as educational resource inquiry and jump services; The certification and trust service system provides unified trust services for all entities and educational resources on the blockchain network, and solves the mutual trust and trust between all nodes.

Sharing and other issues; The intelligent exchange service system provides a consensus mechanism to realize the consistency of information of all nodes.

The business application layer encapsulates the application scenario of the employment and education network platform, and provides corresponding programs and interfaces for the needs of users. Users interact with the blockchain through the protocols and contracts built into the application. To sum up, this paper uses blockchain technology architecture to design a three-tier employment and education network platform, which can improve user data security, data sharing efficiency, education certificate credibility, institutional fairness, and create a better learning experience.

3 Function Realization of Employment Education Network Platform

3.1 Intelligent Contract Function of Employment and Education Network

Smart contracts, the most important feature on the platform, are automated programs that can safely interact with the blockchain, avoiding the problem of human intervention. Smart contracts used on the platform can facilitate information exchange and transactions between educational institutions and students, ensuring the security and fairness of the platform. Strictly reviewing the indicators, automatically issue the qualification level certificate formulated by the authorities, through the pre-set certification standards and systems, without manual intervention, the system is on duty all day long, under the supervision of enterprises, schools, society and other parties to complete the issuance of certificates. The e-certificate based on block chain is the only certificate for authentication of the authenticity of the certificate. By tracing the block information attached to the e-certificate, any educational institution and recruitment unit can track and query the online education of students learning and certificate authenticity, in order to ensure

the credibility and effectiveness of the e-certificate, to solve the problem of certificate fraud.The implementation of intelligent contract function of employment and education network is shown in Fig. 2.

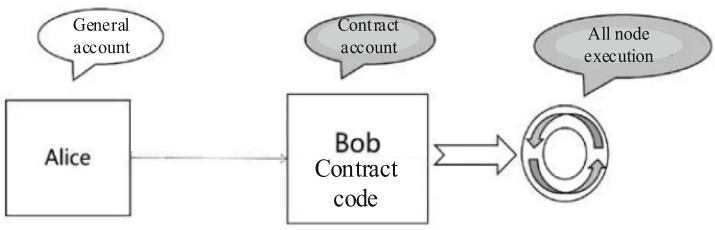

Fig. 2. Employment and Education Network smart contract function

The smart contract is compiled through the online editor Remix to obtain the corresponding binary coding file and application binary interface (ABI), and submit the deployment contract request on any blockchain node. The ABI interface defines the name of the function that the smart contract can call, input/output data format, gas consumption, and other parameters. Then, after the request is recorded on the chain, the address and block hash value containing the intelligence contract are returned to the request originator. The nodes in the synchronous state will update the block height in real time to obtain the successful deployment of smart contract information. Platform users can invoke smart contracts using Python's Web3 library to initiate platform login requirements. The specific operations are as follows: 1) Check node interconnection status; 2) Call the inter-process communication (IPC) file when the check status is synchronous; 3) Unlock the account and check the address. If the check is valid, continue; if it is invalid, unlock the account again; 4) Define ABI interface of intelligent energy contract; 5) Define the deployment address of the intelligent energy contract; 6) A real example of the Contract between ABI interface and deployment address; 7) Use Web3 library Contract class function to call smart contract.

3.2 Teaching Resource Sharing Function

Teaching resource sharing functions include personal data sharing, teaching resources sharing, teaching results sharing and evaluation system sharing. Specifically, students' personal information, class schedule, transcript and other data can be stored on the blockchain of the platform. These resources can be independently authorized by students and shared with recruitment companies or other educational institutions to demonstrate their learning process and results. Educational institutions can upload their courses, courseware, handouts and other teaching resources to the blockchain of the platform and share them with other educational institutions. Students' graduation works, project experience and other teaching results can be stored on the platform's blockchain and shared with recruitment companies or educational institutions. This can enhance the competitiveness of students in employment and facilitate the translation of learning results into employability and work experience. The platform can store students' evaluation records

and evaluation results on the blockchain for reference by other educational institutions and facilitate recruitment enterprises to evaluate and screen students.

Therefore, in the employment education network platform designed in this paper, a point incentive mechanism is set up to ensure that the rights of uploaders and downloaders of educational resources of employment education courses can be guaranteed. The point incentive mechanism mainly takes the number of educational resource uploads of employment education courses as the evaluation index, and provides corresponding points rewards to users who upload resources. Therefore, the course resource sharing function of the platform is set up in this paper, as shown in Fig. 3:

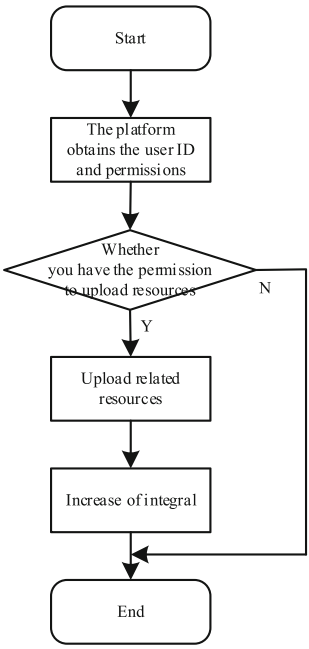

Fig. 3. Business logic diagram of the integral incentive mechanism contract

As shown in Fig. 3, the intelligent contract with the incentive mechanism of points designed in this paper gives corresponding rewards mainly through the user's resource uploading behavior. When a teacher registers an account on the platform, the platform will call the insertScore contract as the initial score under the current account, and then give corresponding rewards according to the initial score. When teachers log in to the platform and choose to upload education resources of employment education courses, the platform will call updateScore interface function to modify user credits and increase corresponding credits according to the number of resources uploaded by teachers [7]. Of course, in the teaching resource sharing function designed in this paper, if the administrator finds infringement or other problems in the employment education course resources uploaded by the teacher, the platform can implement the remove Course interface function to delete the uploaded course resources and return the result to the

teacher's account. The above intelligent contract of incentive mechanism is used to realize the business logic of the teaching resource sharing function. The platform will call the corresponding contract to ensure the smooth implementation of resource sharing operations such as uploading and downloading by users.

3.3 Employment Education Data Recommendation Function

In order to improve the utilization rate of teaching resources, the data recommendation function is set up on the employment education network platform designed in this paper. By studying the corresponding teaching data recommendation algorithm, this paper decides to use residual neural network to realize the employment education data recommendation function of the platform [8]. Residual neural network is a special deep learning model. The implementation of employment education data recommendation function is shown in Fig. 4.

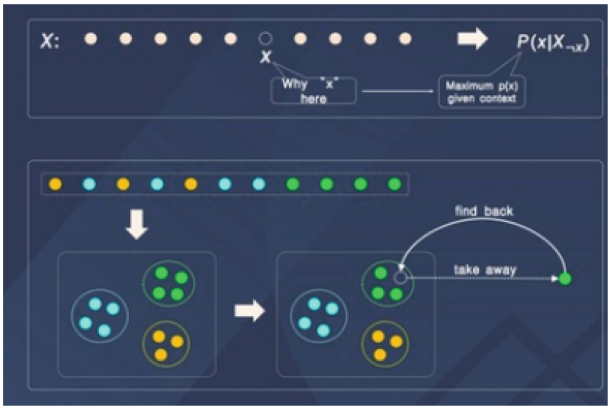

Fig. 4. Recommendation function of employment education data

In the process of training and learning, problems such as model degradation and gradient dissipation often occur in the ordinary deep neural network model, which affects the recommendation effect of employment and education data. Therefore, this paper introduces residual neural network to alleviate problems such as gradient dissipation and model degradation caused by the deepening of network layers. Improve the operation performance of the employment education network platform [9, 10]. When the employment education data recommendation function of the residual neural network design platform is used, the text information features of the education resources of the employment education course are extracted through the network. In this process, two parallel extractors with independent weights are adopted in the design platform, that is, the title and abstract information of the education resources of the employment education course are extracted respectively as the final text features. As follows:

$$T = Q([B; Z]) \tag{1}$$

where, T is the extracted text information characteristics of educational resources of employment education courses; Q is the fully connected layer of the residual neural network model [11, 12]; B is the title features of teaching resources. Z is the abstract characteristics of teaching resources. Then, the potential of students and teaching resources are obtained through the residual neural network. As students' learning interest, the potential factors of educational resources of employment education courses are assumed to be Y, and the calculation formula is as follows:

$$Y_{t\leftarrow T}^{L+1} = f\left(\omega \cdot Y_{t\leftarrow T}^{L} + p\right) \tag{2}$$

where, $Y_{t\leftarrow T}^{L+1}$ is the potential factor of text information feature T of educational resource t of employment education course in layer $L+1$ of residual neural network; $Y_{t\leftarrow T}^{L}$ is the potential factor of text information feature T of educational resource t of employment education course in layer L of residual neural network; f is the aggregate function; ω is the weight matrix; p is biased. At the same time, according to the dynamic preferences of students within a certain period of time, the potential factor of students' learning interests is determined to be X [13]. Finally, according to the students' learning interest, the recommendation of educational resources of employment education courses can be realized. The expression is as follows:

$$H_{i,t} = Loss(X, Y) \tag{3}$$

where, $H_{i,t}$ is student i preference for educational resources t of employment education course [14, 15]; $Loss$ is the loss function of residual neural network. As shown in Formula (3), students' preference for target resources can be predicted by embedding the educational resources of students and employment education courses in the residual neural network model.

4 Platform Test

In order to verify whether the employment education network platform based on blockchain technology designed in this paper has practical effects, this paper tests the platform. The final test results will be developed in the form of a comparison between the ideological and political education platform based on network multimedia technology proposed in literature [2], the multi-concurrent high-speed communication online education platform proposed in literature [3], and the employment education network platform based on blockchain technology designed in this paper. The specific platform test process and results are as follows.

4.1 Test Procedure

Before the platform test, this paper first debugs the platform hardware, mainly the mobile scene debugging. In a mobile phone or tablet computer, test the movement of the ARM-7 chip. The ARM-7 chip is a 32-bit processor based on RISC architecture, which is characterized by high performance, low power consumption and low cost, and generally runs at about 100 MHz. In order to debug the Linux controller, the serial cable is

used to connect the computer to the serial interface of the device, and ensure that the correct serial port type and correct data cable are selected. Open a terminal tool on your computer and select the correct serial port number and baud rate. Platform interface operation processing is required to enter the platform's write mode by sending specific commands or pressing specific buttons on the device (such as the RESET button).After the hardware debugging is completed, connect it with the platform software and enter the login interface as shown in Fig. 5.

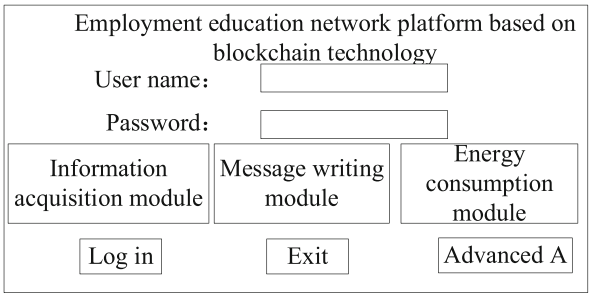

Fig. 5. Platform login interface

As shown in Fig. 5, employment and education data information can be collected in real time in the information collection module; Information writing module can modify, write, Delete employment and education data information at will; The energy consumption module can analyze the energy consumed by the platform. Each module will have a template of corresponding information data. If the template is consistent with the actual information data, it proves that the software debugging is complete; otherwise, the software needs to continue debugging until the actual information data is consistent with the template. After the hardware and software debugging of the platform is completed, the normal operation of the platform can be guaranteed.

4.2 Test Result

In order to test the employment and education network platform based on blockchain technology as a whole, this chapter conducts functions and performance from two aspects. One is to verify whether the platform designed in this paper can meet user expectations, and the other is to verify whether various indicators of the platform are normal. The functional test is mainly based on the earlier use-case analysis. The following is the main functional test content of the employment education network platform, as shown in Table 1.

Table 1 shows that the functions of the employment education network platform designed in this paper can be used normally. On this basis, in order to ensure the smooth and efficient operation of the employment education network platform, the platform performance will be tested in detail below. Taking the response time as an example, the ideological and political education platform based on network multimedia technology proposed in literature [2] and the online education platform based on multiple concurrent

Table 1. Functional test cases of employment education network platform

Function	Test content	Expected output	Test results
User registration	Input necessary information as required by the platform, such as user name and password, to verify the expression information	The authentication is successful, prompting the user	Normal
User login	Log in to the platform using a registered user account	Log in successfully and go to the page	Normal
User management	Modify and delete the personal information of registered users	The deletion or modification succeeds, and a result message is displayed	Normal
Integral management	Users view personal credits and administrators modify user credits	Show credits and details, modify successfully and update the modified credits	Normal
Resource upload	Upload local employment education and teaching resources to the platform	Successful upload	Normal
Resource download	Download platform resources to a local directory	Successful download	Normal
Data recommendation	Browse the resources on the platform and click the "Data recommendation" button	The platform can recommend appropriate course resources according to the user's learning situation	Normal
Resource search	Use keywords to search for the course resources you want to view	Displays the resource information matching the keyword	Normal

high-speed communication proposed in literature [3] are selected as the control group to compare with the platform designed in this paper, and the performance of each platform is recorded in time during the operation process, as shown in Table 2:

It can be seen from the data in the table that the response time of the designed platform in this paper is the fastest 1.24 s, and the response time of the platform in literature [2] and the platform in literature [3] is the fastest 2.32 s and 3.29 s. The performance of the designed employment education network platform in this paper is superior to that of the control platform in all aspects. With the increasing number of user requests, the platform designed in this paper can not only maintain a fast response speed stably, but also run stably, which indicates that the platform designed in this paper has excellent performance and can effectively solve the problems of inaccurate information matching and inaccurate information that often exist in traditional employment information platforms.

Table 2. Performance test results of employment education network platform

Performance index	Platform	Number of requests/times		
		10	50	100
Response time /s	Design platform	1.24	1.31	1.28
	Platform of literature [2]	2.32	2.86	3.17
	Platform of literature [3]	3.29	4.31	5.93

Under the above testing environment, this paper selects different user visits, and compares and tests the ideological and political education platform based on network multimedia technology proposed in literature [2], the online education platform based on multiple concurrent high-speed communication proposed in literature [3], and the maximum amount of data that can be managed simultaneously by the employment education network platform based on blockchain technology designed in this paper. The test results are shown in Table 3.

Table 3. Test results

User access	The maximum amount of data /Byte that can be managed simultaneously by the platform in reference [2]	The maximum amount of data /Byte that can be managed simultaneously by the platform in reference [3]	This paper designs the maximum amount of data /Byte that the platform can manage simultaneously
5,000 times	11000	12000	40000
10,000 times	10000	11000	35000
15,000 times	9000	8000	30000
20,000 times	8000	7000	25000
25,000 times	7000	6000	20000
30,000 times	6000	5000	20000
35,000 times	5000	4000	20000

As shown in Table 3, the maximum amount of data that can be simultaneously managed by the platform in reference [2] is small. When the user visits are 5,000 times, the maximum amount of data that can be simultaneously managed by the platform is 11,000 Byte. When the user visits are 35,000 times, the platform can manage the least amount of data simultaneously, which is 5000 bytes. In reference [3], the maximum amount of data that can be managed by the platform at the same time is small. When the user visits are 5,000 times, the maximum amount of data that can be managed by the platform at the same time is 12,000 bytes. When the user visits are 35,000 times, the platform can manage the least amount of data simultaneously, which is 4000 bytes. This proves that the maximum amount of data that can be simultaneously managed by the

platform of literature [2] and the platform of literature [3] will decrease with the increase of user access, and the effect of data management will decline accordingly. However, the platform designed in this paper can manage a large amount of maximum data at the same time. When the user visits are 5,000 times, the platform can manage the maximum amount of data at the same time, which is 40,000 bytes. When the user visits are 25,000 times, 30,000 times and 35,000 times, the amount of data that can be managed by the platform at the same time is maintained at a stable state of 20,000 Byte. This proves that the maximum amount of data that can be managed by the design platform in this paper will not decrease with the increase of user access, and the data management effect is good, which is in line with the purpose of this paper.

In the above test environment, the test interval was set as 2 s, and the consumption of calculated and stored resources was calculated during the test period of 100 requests. The test results are shown in Fig. 6.

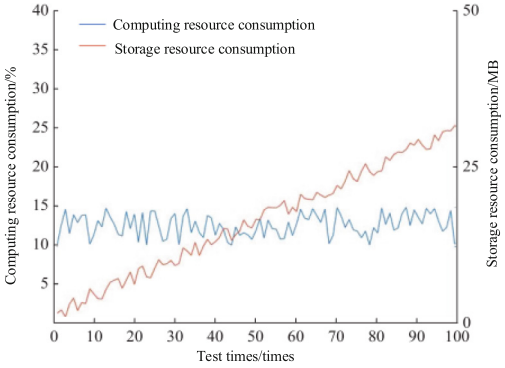

Fig. 6. Performance test results

As shown in Fig. 4, during 100 tests, the computing resource consumption remained within the range of 10% ~ 15%, and the storage resource consumption basically had a linear relationship with the total number of requests initiated. In conclusion, under the above technical framework, the request confirmation time of second time level and low resource consumption can basically meet the application requirements of the employment education network platform on a certain scale. However, in a larger scenario scale, there is still a triangle contradiction of decentralization, scalability and security, and the blockchain technical architecture still needs to be further optimized.

5 Conclusion

At present, the development of Internet technology has brought new opportunities and challenges to employment education. Various online employment education platforms have emerged one after another, but these platforms have problems with security and credibility, such as user privacy disclosure, certificate falsification and other risks. Therefore, this paper designs the employment education network platform architecture based

on blockchain technology. Based on blockchain technology, the employment education network platform composed of network layer, infrastructure layer and business application layer is constructed. Through P2P network technology to provide services for communication between nodes in the blockchain, to achieve effective point-to-point communication. The smart contract is compiled via the online editor Remix, the corresponding binary-coded file and application Binary interface (ABI) are obtained, and the deployment contract request is submitted on any blockchain node. Teaching resource sharing includes personal data sharing, teaching resource sharing, teaching results sharing and evaluation system sharing. The potential factors and teaching resources of students are extracted by residual neural network. A three-layer employment education network platform is designed, which can not only manage the background easily and quickly, but also realize the intelligent contract, teaching data sharing, data recommendation and other functions of the employment education network. At the same time, this paper verifies through platform testing that the platform has high reliability, can maintain efficient operation efficiency, and provides strong help for the development of employment education information management in our country. However, this study has some limitations, due to the decentralized nature of the blockchain and a large amount of encrypted computing, its processing power is limited and processing speed is slow. The popularization of blockchain technology requires more advanced hardware equipment and higher technical level, thus increasing the cost of operation and maintenance of the platform and the threshold of use. At present, the penetration rate of blockchain application is low in China, and many users do not understand blockchain technology, which also limits the promotion and application of the employment and education network platform based on blockchain. In the follow-up research, we can consider the integration of blockchain technology, artificial intelligence technology and 5G communication technology from the perspective of development, giving full play to the advantages of 5G transmission bandwidth and the characteristics of artificial intelligence self-learning, guide blockchain technology into more traditional industries and help industrial upgrading.

References

1. Haji, S., Hafidh H. A . Youth employment creation factors in the EA countries data and policy analysis. Asian J. Educ. Soc. Stud. 2021, 18(3) (2021):13–29
2. Liu, X.J.: Design of ideological and political education platform based on network multimedia technology. Tech. Autom. Appl. **41**(3), 177–181 (2022)
3. Peng, X.H., Li, K.L., Zhong, L.H., et al.: Design of online education platform for multi-concurrent High-speed communication. Mod. Electron. Tech. **44**(18), 92–96 (2021)
4. Hasan, M.K., Alkhalifah, A., Islam, S., et al.: Blockchain technology on smart grid, energy trading, and big data: security issues, challenges, and recommendations. Wirel. Commun. Mob. Comput. **2022**(9), 1–26 (2022)
5. Esen, M., Seren, G.Y.: The impact of gender inequality in education and employment on economic performance in Turkey: evidence from a cointegration approach. Equality Diversity Inclusion: Int. J. **41**(4), 592–607 (2022)
6. Scanlon, G., Doyle, A.: Transition stories: Voices of school leavers with intellectual disabilities. Br. J. Learn. Disabil. **49**(4), 456–466 (2021)

7. Shenfu, C., Guofu, L., Changzai, R., et al.: Remote resource sharing simulation of interactive experiment platform based on blockchain. Comput. Simul. **39**(6), 233–237 (2022)
8. Mcway, R.: Cruising through school: general equilibrium effects of cruise ship arrivals on employment and education. Am. Economist **67**(1), 5–23 (2022)
9. Krause, J.S., Dismuke-Greer, C.L., Rumrill, P., et al.: Job retention among individuals with multiple sclerosis: relationship with prediagnostic employment and education; demographic characteristics; and disease course, severity, and complications. Arch. Phys. Med. Rehabil. **103**(12), 2355–2361 (2022)
10. Elsayed, M.S., Le-Khac, N.A., Jurcut, A.D.: Dealing with COVID-19 network traffic spikes [cybercrime and forensics]. IEEE Secur. Priv. Mag. **19**(1), 90–94 (2021)
11. Fan, L., Xia, M., Huang, P., et al.: Research on educational information platform based on cloud computing. Secur. Commun. Networks **2021**(1), 1–11 (2021)
12. Liu, H.: Application and strengthening strategies of network resources in the construction of teaching platform. J. Phys. Conf. Ser. **1915**(4), 042056 (2021)
13. Hoi, V.N., Hang, H.L.: Student engagement in the facebook learning environment: a Person-centred study. J. Educ. Comput. Res. **60**(1), 170–195 (2022)
14. Milton, P.: Intelligent and deep learning collaborative method for E-Learning educational platform using Tensorflow. Turkish J. Comput. Math. Educ. (TURCOMAT), 2021, 12(10):https://turcomat.org/index.php/turkbilmat/article/view/4881
15. Gheorghiu, C. I., Deaconu, I. D., Chirila, A. I., et al. Educational platform for an underground smart parking using programmable logic controllers. In: 2021 International Conference on Applied and Theoretical Electricity (ICATE). 2021
16. Diguiseppi, G., Clomax, A., Rampton Dodge, J., et al.: Social network correlates of education and employment service use among youth experiencing homelessness: a longitudinal study. Child. Youth Serv. Rev. 129 (2021)
17. Mladenov, V., Chobanov, V., Seritan, G. C., et al.: A flexibility market platform for electricity system operators using blockchain technology.Energies, 15 (2022)
18. Mishra, M. K., Balamurugan, M., Roy, R. R., et al.: Blockchain technology empirical studies on the demand of distributed network. J. Phys. Conf. Ser., 1964(4):042012 (2021)