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Design of a Smart Teaching Management Platform Integrating Artificial Intelligence Technology under the Perspective of Resource Sharing

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ABSTRACT

With the development of sharing economy, educational resource sharing has become the focus of experts and scholars to explore and practice. In this paper, from the perspective of resource sharing, a smart teaching management platform is successfully designed by combining artificial intelligence technology. This research adopts YOLOv5s algorithm for face recognition and prediction in the design process, which is convenient for teaching management. Relying on the Hadoop cloud resource base, the teaching resource sharing database is designed, and the system computing logic is optimized by the distributed file system HDFS. It is analyzed that the maximum number of interactions per second of the intelligent teaching management platform designed in this paper can reach 207, and the maximum interaction response time is about 68ms, and the load performance is completely better than that of the traditional teaching resource platform. At the same time, the intelligent teaching management platform can accommodate nearly 300 people to study online at the same time, which is far more than the previous mode of learning in the classroom. With the use of the intelligent platform, the development of "Internet + education" is greatly promoted.

Keywords: Resource sharing, artificial intelligence, intelligent teaching management, YOLOv5s algorithm, Hadoop

1. Introduction

With the continuous development of artificial intelligence technology, smart tools have entered people's daily life [1]. In the field of education and teaching, China attaches great importance to the in-depth integration of artificial intelligence technology and education, which introduces a variety of intelligent teaching tools in the classroom, promoting the traditional classroom gradually to the "smart classroom" [2-3]. Artificial intelligence technology is the backbone of the development of smart education, smart teaching tools are the material carrier of artificial intelligence technology, which is

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the embodiment of the deep integration of artificial intelligence and education [4]. In recent years, under the guidance of constructivism theory and embodied cognition theory, each school gradually realized the importance and inevitable trend of changing the classroom teaching mode by combining smart teaching tools [5]. In line with the national strategy and school reform actions, there are more and more smart teaching tools, and their types are becoming more and more complicated [6].

In the era of artificial intelligence, the combination of digitalization, intelligence and education, the professional development of teachers needs to continuously improve teachers' own wisdom teaching competence, in order to cope with the challenges brought about by the digital transformation of education [7-8]. However, at the junior high school stage, China has a large teaching force, and the conditions of smart teaching vary among different regions, so there is an urgent need for a set of targeted system of teachers' smart teaching competence to help teachers clarify the direction of future development [9].

Artificial intelligence has a wide range of applications in smart teaching, which can improve students' learning efficiency and teaching quality and promote education reform [10]. First, personalized education, according to students' learning habits, levels, and interests, AI can provide each student with an independent learning plan and educational resources, including learning materials, exercises, tests, and assessments [11]. The second is adaptive learning, which monitors students' learning and feedback in real time through AI algorithms, identifies students' learning difficulties and weaknesses, and helps students to check for gaps [12]. Third, intelligent assessment, AI can assess students' learning effects and feedback based on their test answers and learning history. Fourth, interactive learning, AI can simulate a real learning environment and facilitate students' language communication and knowledge sharing through artificial voice and dialog interaction [13-14].

Literature [15] points out that in the era of mobile Internet, cloud computing, Internet of Things and so on have made great progress, modern educational data sets, learning analytics technology and so on are integrated into Chinese language teaching to promote the improvement of the quality of language teaching. Literature [16] conducted in-depth research and analysis on intelligent recognition and teaching of English fuzzy text through parallel projection and region expansion, and obtained the lexical affiliation distribution of global meaning of polysemous words. Literature [17] applied the artificial intelligence module combined with knowledge recommendation to the system, compared with the ordinary teaching and learning system, developed the online English teaching system, which can help students to improve the learning efficiency and make the learning content more targeted. Literature [18] developed an intelligent teaching system for teaching Chinese as a foreign language, which has high overall stability and can effectively improve students' learning efficiency. Literature [19] With the in-depth development of "Internet +", it is necessary to actively explore the in-depth integration of "Internet +" and classroom teaching, and build a smart classroom, especially for courses that require thinking training. Literature [20] shows that smart classrooms, because of their characteristics in terms of technological development, environmental conditions and processes, show high appropriateness in the use of problem- and project-based learning, case studies and collaborative inquiry methods. Literature [21] states that smart classrooms integrate different components of traditional classrooms through the use of different technologies such as artificial intelligence, ubiquitous and cloud paradigms to improve the learning process as well as the outcomes. Literature [22] suggests that smart classrooms work on several research areas such as ICT, machine learning, sensor networks, mobile computing and hardware to reach an unprecedented state of intelligence.

This paper focuses on the design and development of a smart teaching management platform integrating artificial intelligence technology under the perspective of resource sharing. On the basis of improving and perfecting the YOLOv5s algorithm, the study stores the teaching resource data into the cloud database based on Hadoop technology, and completes the design of the intelligent teaching management platform based on the YOLOv5s algorithm. Finally, the study verifies the reliability and feasibility of the platform by analyzing the designed platform in terms of loadability, capacity, and algorithm prediction accuracy.

2. Method

2.1. YOLOv5s algorithm

YOLOv5s target detection model can extract the features of the objects in the image and output the location and category information of the target.

2.1.1. Feature extraction network. The feature extraction network of YOLOv5s model is divided into two parts: the backbone network and the neck. Among them, the backbone network part uses the common convolutional structure CBS module with the residual structure C3 module and adds fast spatial pyramid pooling at the end. Figure 1 shows the CBS module, Figure 2 shows the C3 module, and Figure 3 shows the SPPF module.

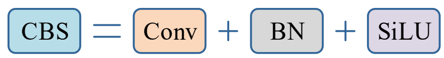


Fig. 1. CBS module

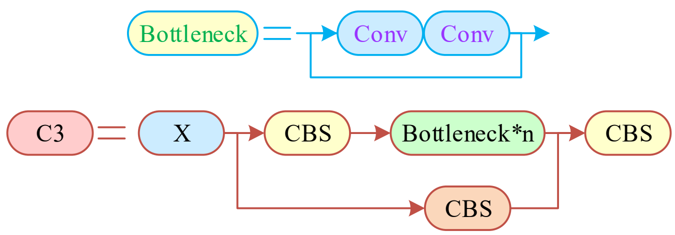


Fig. 2. C3 module

Fig.3. SPPF module

Among them, the CBS module, is composed of a 2D convolution, batch normalization, and activation function; the C3 module draws on the cross-stage local network structure to further enhance the feature learning ability of the network. the SPPF module effectively avoids image distortion caused by cropping and scaling operations on the image region.

The Neck structure, on the other hand, combines the feature pyramid network with the path aggregation network, and the specific structure is shown in Fig. 4.

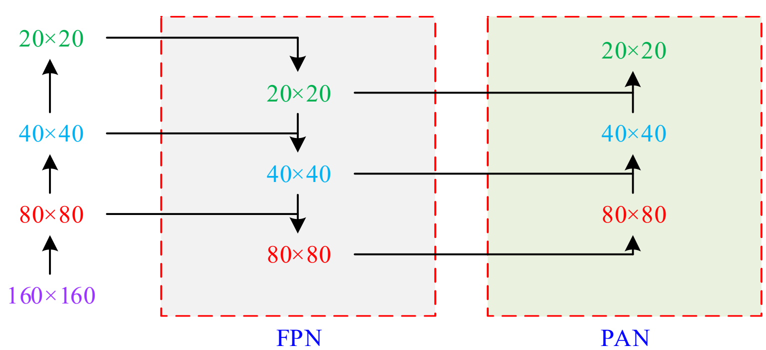


Fig. 4. Structure of the neck

In this case, FPN passes top-down semantic information from high-level feature maps with smaller resolution carrying high-level semantic feature information, thus enhancing the semantic expression ability at multiple detection scales; PAN passes bottom-up localization information from low-level feature maps with larger resolution carrying localization information, this is because the feature pyramid structure is very blurred with localization information at the higher level after passing through multiple layers of the network,. Therefore PAN incorporates a bottom-up route to compensate and strengthen the localization ability of each detection scale.

2.1.2. Targeting and categorization of objectives.The YOLOv5s model uses multi-scale detection to detect targets from three different scales, the three different detection scales come from three different outputs in the neck structure, when the input image size is (640×640), the three different depths of the feature maps are sized as (80×80), (40×40), and (20×20), the bigger the feature maps the more able they are to detect the small scale targets, and vice versa. smaller feature maps are more likely to detect large targets.

2.1.3. YOLOv5s modeling.The overall structure of the YOLOv5s model is shown in Figure 5.

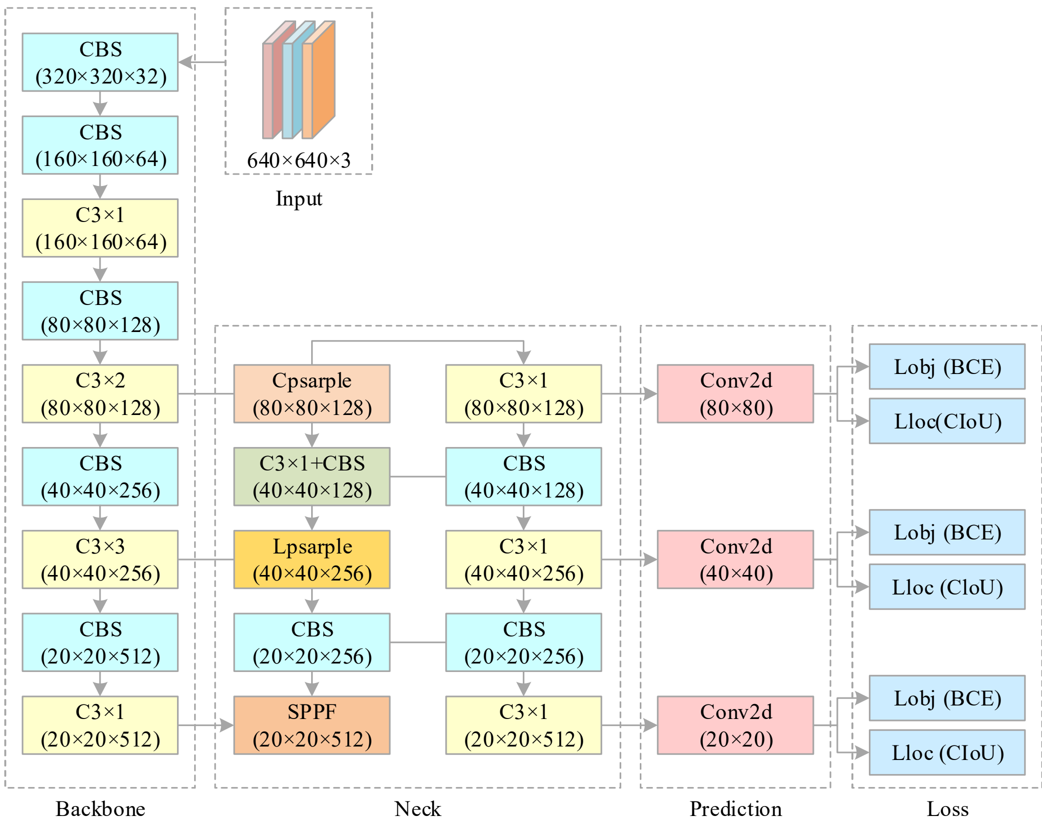


Fig. 5. Overall structure of the YOLOv5s model

2.2. Localization Loss Function Improvement

In the YOLOv5s algorithm, the loss function measures three kinds of gaps between the results predicted by each training and the real target: (1) localization, (2) target confidence, and (3) category. Where localization refers to whether the length, width, and center point of the model-predicted target frame are consistent with the real target frame; target confidence refers to whether the model-predicted target frame contains the real target; and category refers to whether the category of the object in the model-predicted target frame is consistent with the real target. Therefore, there are three loss functions in the YOLOv5s model: localization loss, confidence loss, and categorization loss. The localization loss uses the CIoU Loss function, while the confidence loss uses the binary cross-first loss function.The relevant formulas for the YOLOv5s loss functions are as follows:

$$Loss = \lambda_{Ioc} L_{Ioc} + \lambda_{abj} L_{abj} + \lambda_{cls} L_{ds} \tag{1}$$

Confidence loss L_{obj} (binary crossover loss function):

$$L_{BCE}\left(L_{obj}\right) = -\frac{1}{N}\sum_{n}^{N} l_n \tag{2}$$

$$l_n = -\omega\left[y_n \cdot \log\sigma\left(x_n\right) + \left(1 - y_n\right)\cdot\log\sigma\left(1 - x_n\right)\right] \tag{3}$$

$$\sigma\left(x\right) = \frac{1}{1 + \exp\left(-x\right)} \tag{4}$$

where l_n is the loss corresponding to the n rd sample in the batch data containing N samples; $\sigma\left(x_n\right)$ is the predicted value; and y_n is the true target.

Localization loss L_{Ioc} (CIoU Loss loss function):

$$L_{CIoU}\left(L_{Ioc}\right) = 1 - IoU + \frac{\rho^2\left(b, b^{kt}\right)}{c^2} + \alpha v \tag{5}$$

$$IoU = \frac{\left|box_T \cap box_p\right|}{\left|box_T \cup box_p\right|} \tag{6}$$

$$\alpha = \frac{v}{\left(1 - IoU\right) + v} \tag{7}$$

$$v = \frac{4}{\pi^2}\left(\arctan\frac{w^{gt}}{h^{gt}} - \arctan\frac{w}{h}\right)^2 \tag{8}$$

Where, IoU is the intersection and concurrency ratio between the predicted frame and the real frame; $\frac{\rho^2\left(x_1, x_2\right)}{c^2}$ represents the center distance between the predicted frame and the real frame; αv represents the aspect ratio gap between the predicted frame and the real frame, where α is the trade-off parameter, v is the parameter used to measure the consistency of the aspect ratio, when the predicted frame of the model is inconsistent with the aspect ratio of the real frame, the YOLOv5s model will automatically adjust the width and height of the predicted frame.

In Equation 9, the gradient of v with w, h is calculated as shown below:

$$\frac{\partial v}{\partial w} = \frac{8}{\pi^2}\left(\arctan\frac{w^{gt}}{h^{gt}} - \arctan\frac{w}{h}\right) \times \frac{h}{w^2 + h^2} \tag{9}$$

$$\frac{\partial v}{\partial h} = -\frac{8}{\pi^2}\left(\arctan\frac{w^{gt}}{h^{gt}} - \arctan\frac{w}{h}\right) \times \frac{w}{w^2 + h^2} \tag{10}$$

The CIoU Loss function integrates the three regression elements of overlap area, center point distance, and width-to-height ratio between the predicted frame and the real frame. However, the CIoU Loss function reflects the difference between the width-to-height ratio of the predicted frame and the real frame by the v in the formula, instead of calculating the real difference between the width-to-height of the predicted frame and the width-to-height of its real frame, respectively, so it sometimes prevents the model from being optimized effectively. For example, when the relative ratios of the width and height of the predicted frame to the real frame w^{gt}/h^{gt} and w/h have equal values, the penalty term $\alpha v = 0$, which does not work during the model propagation process, indicates that the parameters are not updated in this model training, but the real situation still has differences between the real frame and the predicted frame lengths and widths. And from the above equation (9) and equation (10), we can calculate $\partial v / \partial w = -(h/w) \times (\partial v / \partial h)$, which proves that the model is optimized in the opposite direction at any moment, where one of h and w increases or decreases, and the other increases or decreases. This is not reasonable in both cases $w > w^{gt}$, $h > h^{gt}$ and $w < w^{gt}$, $h < h^{gt}$.

Considering the above reasons, in this paper, we use the Focal-EloU Loss function which takes the square of the Euclidean distance between the predicted frame and the real frame width and height as a penalty term instead of the CIoU Loss function as the localization loss function for the algorithm in this paper, and the formula of Focal-EloU Loss is as follows:

$$L_{Focal-EloU} = IoU^{\gamma} L_{EloU} \tag{11}$$

$$L_{EloU} = L_{IoU} + L_{ais} + L_{asp} \tag{12}$$

$$L_{IoU} = 1 - IoU \tag{13}$$

$$L_{diss} = \frac{\rho^2 \left(b, b^{gt}\right)}{c^2} \tag{14}$$

$$L_{asp} = \frac{\rho^2 \left(w, w^{gt}\right)}{C_w^2} + \frac{\rho^2 \left(h, h^{gt}\right)}{C_h^2} \tag{15}$$

In the formula, c, w, h, w^{gt}, h^{gt} and CIoU Loss function related to the same meaning in the formula; C_w for the coverage of the prediction box and the real box of the minimum width of the outer frame; C_h for the coverage of the prediction box and the real box of the minimum height of the outer frame; γ for the suppression of the outliers of the degree of a parameter.

The Focal-EIoULoss function divides the localization loss into three parts, the overlap IoU loss L_{IoU}, the centroid distance loss L_{dis}, and the loss of the edge length between the predicted and real frames L_{asp}. Parts L_{IoU} and L_{dis} are the same as in the CIoULoss function, while L_{asp} is the Euclidean distance squared between the predicted frame and the edge length of the real frame is directly used as a penalty term to make the target frame regression process converge faster and with higher accuracy.

The positive and negative sample sampling strategy of the YOLOv5s model will contain a large number of positive samples where the overlap between the predicted and true frames is not high, making the model focus on these unimportant positive samples. The Focal-EloU Loss function in the Focal can be a good solution to this problem, which is somewhat different from the traditional Focal Loss, the traditional Focal Loss for the more difficult samples the greater the loss, play the role of mining difficult samples. And according to the above formula (11): the higher the IoU of the prediction frame and the real frame, the higher the loss of the prediction frame, which is equivalent to the weighting effect, to give a better regression target a large loss, which helps to improve the regression accuracy.

2.3. Design of Smart Teaching Management Platform Supported by YOLOv5s Algorithm

2.3.1. Overview of the Cloud Computing Framework Hadoop.Distributed technologies are at the core of processing big data, and Hadoop is the quintessential representative of distributed big data frameworks. Broadly speaking, Hadoop refers to an ecosystem of Big Data components. The Hadoop system has been continuously updated and improved by the efforts of many groups, and today it has successfully formed an ecosystem as shown in Figure 6.

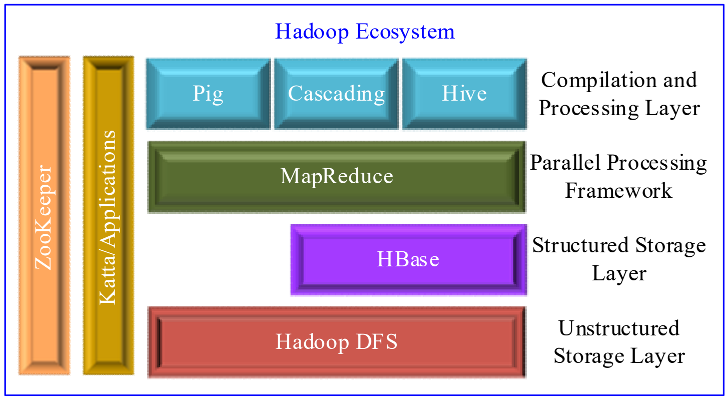


Fig. 6. the Eco-System of Hadoop

2.3.2. Distributed File System HDFS.Hadoop is an open source architecture used to process big data, received the influence of Google's file system and architecture, Hadoop uses a distributed file system HDFS to store the data, and uses MapRrduce programming model to analyze the data.The data storage of HDFS adopts a master-slave architecture pattern, and its overall architecture is shown in Figure 7.

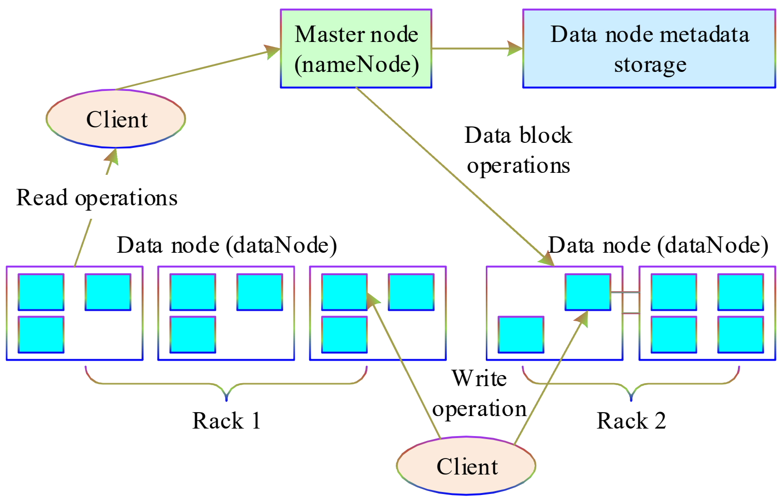


Fig. 7. The Architecture of HDFS

HDFS consists of four main components: the HDFS client, NameNode, Secondary NameNode, and DataN-ode.The HDFS client performs operations related to files or directories through the NameNode, including opening, deleting, and creating files or directories, etc.The DataNode is a data node, also known as a slave node, which is used to store the actual blocks of data.The NameNode is mainly responsible for issuing task commands.The DataNode receives the commands and performs the corresponding operations, which include reading and writing data.The DataNode periodically sends information to the NameNode through the heartbeat mechanism.The NameNode responds to the information it receives and sends new commands to the DataNode. Through the above steps, the nodes in the entire Hadoop cluster can realize good information interaction and task allocation.SecondaryNameNode mainly serves to assist NameNode to complete the merging of log files and metadata backup, and at the same time share certain workload for NameNode. In addition, when the cluster fails, the Secondary NameNode can assist the NameNode to recover some metadata.

HDFS by cutting the file into a number of data blocks for storage.Hadoop2.x, the default size of the data block is 128M, these data blocks are scattered to the Hadoop cluster on each DataNode, the storage steps are as follows:

1) The user establishes a connection with NameNode through the client and sends a file upload request. After receiving the file upload request, NameNode determines whether the user has the upload privilege or not, and if the user does not have the file upload privilege, it will not be able to carry out the subsequent operations. If the user does not have file upload privileges, the subsequent operation will not be possible. Then, check whether there is a file with the same name in the corresponding HDFS directory, if there is, the file cannot be uploaded normally either. If both the user has upload privileges and the file does not exist in the corresponding HDFS directory, the NameNode sends feedback to the client, indicating that the file can be uploaded.
2) After the client receives the information that the file can be uploaded, it slices and dices the file according to the data block size (default 128M) set by HDFS. Then, it sends a request to upload the first data block to NameNode to get the available DataNode address.
3) After the NameNode receives the data block upload request, it allocates the data blocks according to the replica mechanism and network topology of the Hadoop cluster. In a Hadoop cluster, data blocks are stored in three different racks or servers by default to realize distributed storage. According to the above rules, NameNode obtains three available DataNode addresses and feeds them to the client.
4) After the client receives the DataNode address, it establishes a connection with the DataNode and then uploads the first data block to that DataNode. When the first data block is successfully uploaded, the client resends the upload request for the second data block to the NameNode, which returns the three DataNode addresses to the client and repeats the upload operation of the data block until all the data blocks are uploaded.

2.3.3. Intelligent teaching management platform system framework design.The smart teaching management platform is designed based on Hadoop technology and YOLOv5s algorithm, and the overall system structure of the platform is shown in Figure 8. The platform is divided into the following parts according to system responsibilities:

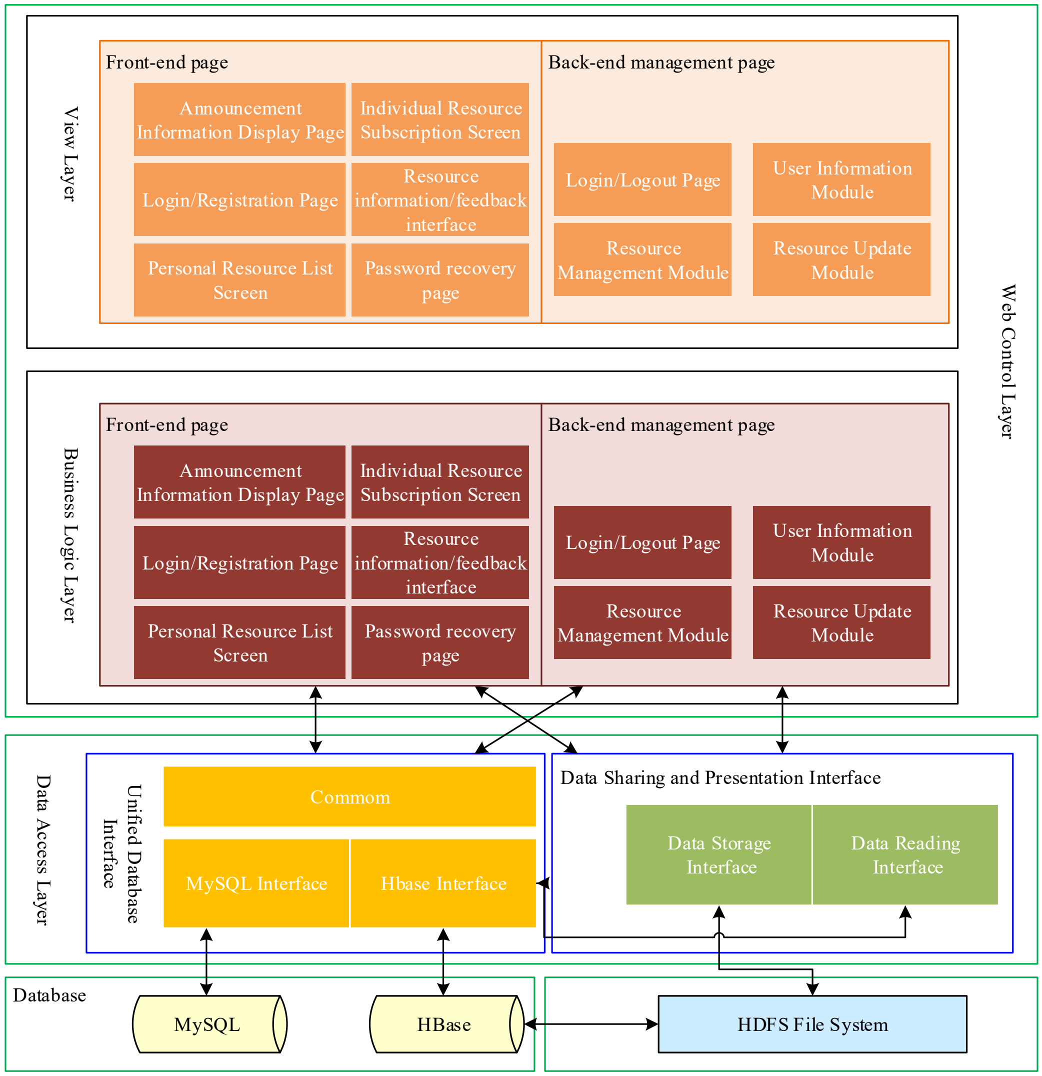


Fig. 8. the Framework of Cloud Platform of Instructional Resources

The platform can be divided into five modules according to its functions: teaching information module, student information module, teacher information module, examination information module and system management module, which realizes the distribution of teachers' questions, uploading materials, marking and grading, students' online examination, downloading materials and consulting questions, examination information and course information. According to the analysis of the processing flow of the teaching management system, the whole system can be divided into 2 subsystems with different functions: online education module and online examination module. The main functions of each sub-module are:

1) Login and Logout Module: Users log in the system through their personal login name and password, enter the corresponding interface according to different roles, and logout function realizes users' safe exit from the system.

2) Teaching Information Module mainly realizes the release of teaching information and school dynamic announcements by teaching staff, as well as the announcement of examination arrangement information.

3) Teacher Information Module: It realizes the operation of adding, modifying, deleting and inquiring teacher information, the release of course information by teachers, the uploading of learning resources and the answering of questions by teachers after class.

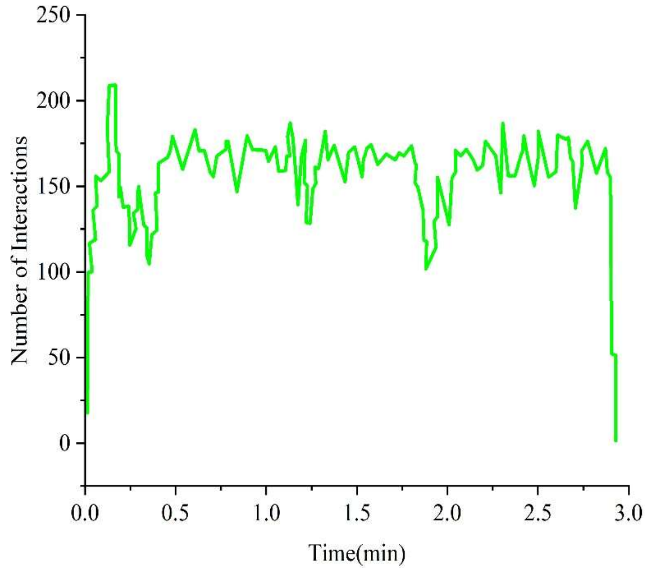
4) Student Information Management Module: It includes student's personal download resources, after-school Q&A function and student's grade management. Teachers can upload student's grades, and teaching staff can add, modify and delete student's grades, and both teachers and teaching staff can query the grades according to the student's student number or class level. Students can only modify their own personal information and view their own grades, while other students' information cannot be viewed or modified.
5) Supplementary Exam Results Management Module: Manage students' supplementary exam results, can add, delete, change and check students' supplementary exam results.
6) Modify password module, each type of user of the system can log in to the website at any time to modify the password.
7) Teachers' course scheduling module, which performs various operations on the teachers' class scheduling.
8) System Management Module is a part of the system's background data operation and system maintenance for the academic staff.

The platform has three types of users: students, teachers and teaching staff, and assigns different privileges to different user roles for each module. Students can modify their own personal information and view their own examination results, but they cannot view or modify the personal information and results of other students, download teaching resources of the subjects they are interested in, and participate in the Q&A module for discussion. Teachers can publish teaching information about their own courses and upload teaching resources, but they cannot modify the teaching information and resources of other teachers. They can participate in Q&A activities in any community and upload students' grades, but once uploaded, they cannot be modified. Academic staff can manage all users in the system, including all students' grades, system user information, etc., as well as the management of teachers' class starting status and class appointment status, and academic staff can use all the functions of the system.

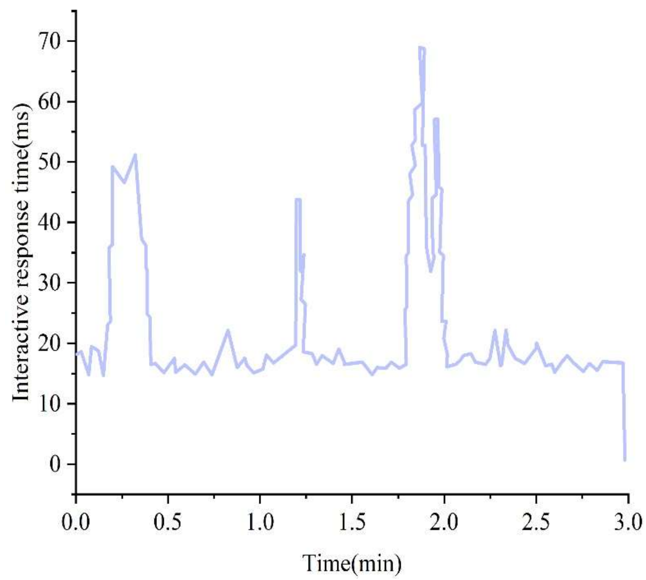
3. Results and Discussion

3.1. Intelligent Teaching Management Platform Load Performance Testing

The first test is conducted after completing the preliminary hardware resource simulation and cluster application deployment, starting the cluster according to the startup sequence of cluster services and confirming that all services are ready, then opening the test. Affected by the virtual environment, in order to ensure that the virtual host is not affected by the large load of concurrency, the duration of each test is about 3 minutes. The completed smart teaching management platform test data is shown in Fig. Among them, Fig. 9 shows the experimental group of the smart teaching management platform tested in this study, and Fig. 10 shows the control group of the traditional teaching resource platform. Part (a) of the figure shows the number of interactions completed by the current test platform per second, and part (b) demonstrates the response time required by the current test platform to complete an interaction. Both parts of the data change in real-time as concurrency occurs. In the two result images, we can see that with the output of concurrency, the number of interactions processed per second by the intelligent teaching management platform is relatively smooth compared to the traditional control test in the same time period, and the fluctuation of the curve is less drastic than that of the traditional control platform, and the maximum number of interactions per second in the experimental group of the intelligent teaching management platform is about 207, and the maximum response time of interaction is 68ms, whereas that of the traditional teaching resource platform is about 207, and the maximum response time of interaction in the control group is about 207. The maximum number of interactions per second in the control group is about 200, and the maximum interaction response time is about 137 ms. The results show that the ability of intelligent teaching management platform to balance the load when processing requests is better than that of traditional teaching resource platform.

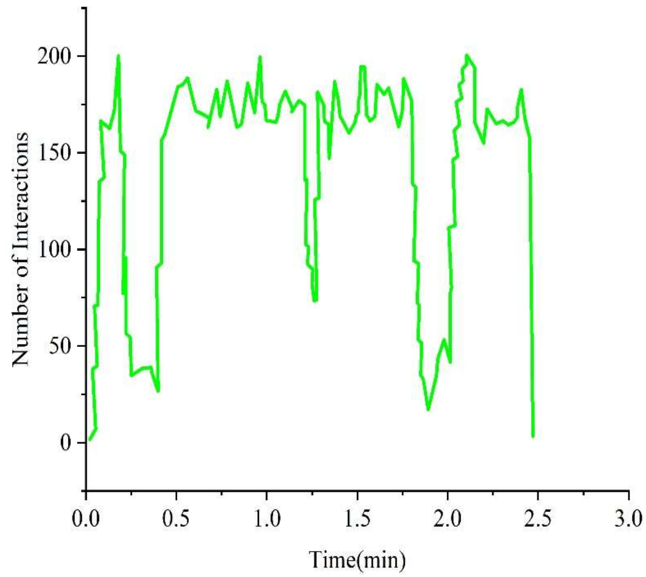


(a) The number of interactions completed per second



(b) The response time required to complete an interaction

Fig. 9. Test results of cloud teaching resource platform



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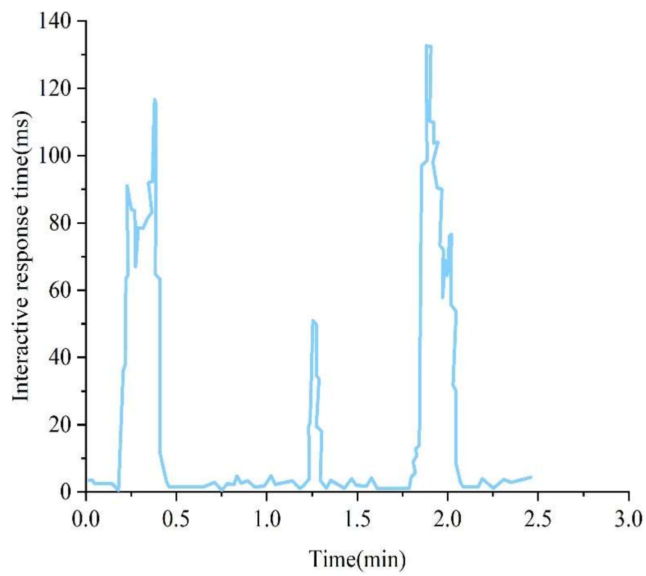

(b) The response time required to complete an interaction

Fig. 10. Test results of traditional teaching resource platform

3.2. Capacity Analysis of Intelligent Teaching Management Platform under Resource Sharing

The logging and face recognition functions of the smart teaching management platform based on the YOLOv5s algorithm can better record the smart teaching process, thus enabling the use of big data thinking to analyze teaching activities. Analyzing the management platform system data yields the results shown in Figure 11. As can be seen from the figure, in the traditional teaching management method, when teaching activities are carried out in a fixed place, the number of students accommodated in the classroom can only be maintained at about 50, while the intelligent teaching management platform proposed in this paper makes it possible to increase the number of students accommodated at the same time to 250 to 300, so that the students can complete their learning in any place, with higher efficiency and better results in learning, stronger interest in participating in learning, and more active motivation in learning. The learning efficiency is higher, the effect is better, the interest in learning is stronger, and the subjective initiative of learning is greatly improved. According to the platform punch card and face recognition records, the intelligent teaching platform designed in this paper is characterized by flexible use and large capacity, and a variety of teaching software supports the use of a variety of Internet terminals. Compared with the traditional way of learning in the classroom, the number of students participating in the intelligent teaching platform and the choice of learning materials are more selective.

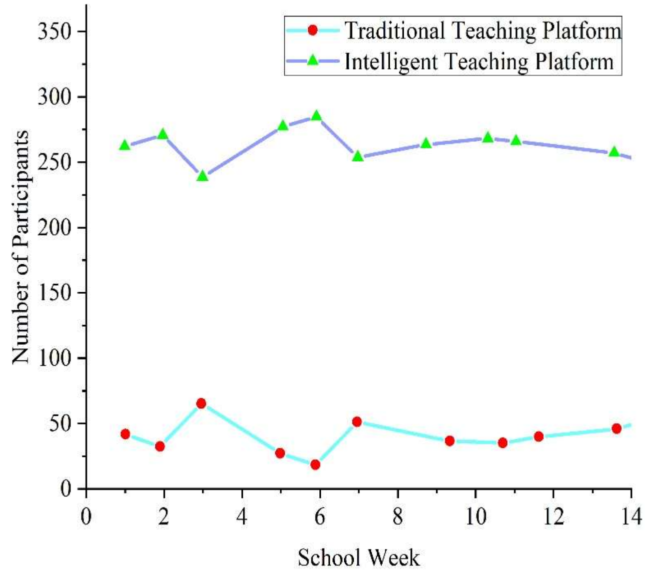

Fig. 11. Statistical analysis of the number of students participating

3.3. YOLOv5s algorithm face recognition accuracy analysis

In this paper, we use YOLOv5s algorithm to perform face recognition after face super-resolution reconstruction and compare it with face recognition after using different super-resolution reconstruction algorithms and face recognition without using super-resolution reconstruction methods, and the experimental results are shown in Table 1. From the table, it can be seen that when the image is normal size (95-125) and medium size (60-95), the recognition effect of only using the face recognition model has achieved good results. And when the resolution is reduced to 30-60, the recognition accuracy of other algorithms using face recognition algorithms alone is not as good as it should be, and the recognition accuracy using DeepFace algorithm, FaceNet algorithm- and ArcFace algorithm are 80.6%, 72.9% and 87.3% respectively. In contrast, using the super-resolution reconstruction algorithm GFPGAN and using the ArcFace algorithm for face recognition, the recognition accuracy reaches 95.9%, which is 8.6% higher compared to the recognition accuracy using the ArcFace algorithm alone; using the CodeFormer algorithm and using the ArcFace algorithm for face recognition, the recognition accuracy reaches 95.1%, which is 8.6% higher than the recognition accuracy using the ArcFace algorithm alone, the recognition accuracy is improved by 7.8%. Using the YOLOv5s algorithm in this paper for face recognition, the recognition accuracy is greatly improved to 99.6%, which is 12.3% higher compared to the recognition accuracy using the ArcFace algorithm alone, which again demonstrates the effectiveness of the algorithm used in this paper.

Table 1. Comparison of accuracy of recognition results

Experiment	Method	Recognition accuracy		
		95-125	60-94	30-60
Experiment 1	DeepFace	97.3	94.8	80.6
Experiment 2	FaceNet	98.2	93.3	72.9
Experiment 3	ArcFace	98.6	95.7	87.3

Experiment 4	GFPGAN+ArcFace	-	-	95.9
Experiment 5	CodeFormer+ArcFace	-	-	95.1
Experiment 6	YOLOv5s	-	-	99.6

The reliability of the platform constructed in this paper is verified based on the above performance tests and analysis of load performance, platform capacity, and face recognition. With the help of this platform, teaching activities are carried out smoothly and daily teaching matters are satisfied. Moreover, within a reasonable range of student users, the platform capacity fully covers the needs of intelligent teaching in different scenarios. Meanwhile, the excellent recognition rate also ensures the authenticity of the platform users and realizes effective classroom management.

4. Conclusion

The purpose of this research is to design a smart teaching management platform integrating artificial intelligence technology, aiming to promote the sharing of educational resources and the development of "Internet + Education". The following conclusions are drawn from the research and analysis:

1) The maximum interaction volume per second of the intelligent teaching management platform under YOLOv5s algorithm is about 207, and the maximum interaction response time is about 68ms, which is 3.5% higher than that of the traditional teaching resource platform and 50.36% higher than that of the interaction response time, indicating that the intelligent teaching management platform designed in this paper is more loaded and better adapted to the actual needs.

2) The intelligent teaching management platform has a great improvement in the number of accommodations due to its flexibility and the fact that it can be participated anytime and anywhere. Tests found that the intelligent teaching management platform designed in this paper can simultaneously accommodate nearly 300 people for online learning, which is nearly five times higher than the number of people studying in a fixed classroom. This change in the situation greatly stimulates students' active participation and active learning motivation.

3) The YOLOv5s algorithm with face recognition function used in this paper can achieve 99.6% recognition accuracy when the resolution is 30-60, which is 4.5% and 3.7% higher than that of CodeFormer+ArcFace algorithm and GFPGAN+ArcFace algorithm, respectively, and 12.3% higher than that of ArcFace algorithm alone. The improvement of the accuracy of face recognition will provide solid technical support for teaching management activities on the smart teaching management platform.

4) As the development of curriculum reform and the integration of information technology and curriculum become a trend, the traditional teaching mode will also change, and teachers will need to change their teaching ability according to The Times, and will be able to make full use of the technical platform to promote the personalized development of students and help the current curriculum reform.

References

[1] Wu, S. . (2022). Design of intelligent customer service questioning and answering a system for power business scenario based on ai technology. Mathematical Problems in Engineering, 2022.

[2] Zhang, X. , & Chen, L. . (2021). College english smart classroom teaching model based on artificial intelligence technology in mobile information systems. Mobile information systems.

[3] Tedre, M. , Toivonen, T. , Vartiainen, H. , Jormanainen, I. , & Pears, A. . (2021). Teaching machine learning in k–12 classroom: pedagogical and technological trajectories for artificial intelligence education. IEEE Access, PP(99), 1-1.

[4] Liu, Y. , Thoff, A. , & Chen, H. . (2021). Research on the evaluation method of students' classroom performance based on artificial intelligence. International Journal of Continuing Engineering Education

and Life-Long Learning, 31(1), 1.

[5] Akbar, M. , & Yunendar, W. . (2019). Model Pembelajaran Intelligent Teaching and Learning with Computers (iTALC) Fokus Demo dan Let Student Show Demo pada SMKN 6 Takalar.

[6] Wang, J. , & Yu, Z. . (2021). Smart educational learning strategy with the internet of things in higher education system. International Journal on Artificial Intelligence Tools.

[7] FENG-Zeyu, & ZHAO-Erhu. (2018). Survey of senior high school students' understanding and demand for artificial intelligence. Electronics World.

[8] Wu, S. , & Wang, F. . (2021). Artificial intelligence-based simulation research on the flipped classroom mode of listening and speaking teaching for english majors. Mobile Information Systems.

[9] Roberto, M. M. , Vanessa, E. , Katerina, M. , Antonette, S. , Gloria, F. N. , & Jurgen, S. , et al. (2022). Moodoo the tracker: spatial classroom analytics for characterising teachers' pedagogical approaches. International Journal of Artificial Intelligence in Education.

[10] Zhu, M. , & Sun, G. . (2022). Factors influencing analysis for level of engineering english education based on artificial intelligence technology. Mathematical Problems in Engineering, 2022.

[11] Chamba-Eras, L. , Gomez, A. , & Aguilar, J. . (2021). Multi-agent systems for the management of resources and activities in a smart classroom. IEEE Latin America Transactions, 19(9), 1511-1519.

[12] Liu, M. , Zhou, R. , Dai, J. , & Feng, X. L. . (2022). Analysis and practice of using modern information technology for classroom teaching mode reform. Mobile information systems(Pt.19), 2022.

[13] Sun, Y. , & Zheng, H. . (2022). Research on improving the accuracy of ideological and political education in colleges under artificial intelligence technology in the era of big data. Mobile Information Systems.

[14] Guo, X. . (2018). Evaluation of teaching effectiveness based on classroom micro-expression recognition. International Journal of Performability Engineering, 14(11).

[15] Qi, Y. , & Huang, Y. . (2022). A chinese intelligent teaching platform for colleges based on cloud computing. Mobile information systems(Pt.6), 2022.

[16] Liu, L. , & Tsai, S. B. . (2021). Intelligent recognition and teaching of english fuzzy texts based on fuzzy computing and big data. Wireless Communications and Mobile Computing, 2021(1), 1-10.

[17] Sun, Z. , Anbarasan, M. , & Kumar, D. P. . (2020). Design of online intelligent english teaching platform based on artificial intelligence techniques. Computational Intelligence.

[18] Jia, Z. . (2022). Designing an intelligent teaching system of chinese as a foreign language under the internet background. Scientific programming(Pt.15), 2022.

[19] Shen, H. , & Chen, X. . (2022). Virtual reality-based internet plus smart classroom. Journal of Internet Technology(2), 23.

[20] Gisela Cebrián, Palau, R. , & Mogas, J. . (2020). The smart classroom as a means to the development of esd methodologies. Sustainability, 12.

[21] Aguilar, JoseSanchez, ManuelCordero, JorgeValdiviezo-Diaz, PriscilaBarba-Guaman, LuisChamba-Eras, Luis. (2018). Learning analytics tasks as services in smart classrooms. Universal access in the information society, 17(4).

[22] Saini, M. K. , & Goel, N. . (2019). How smart are smart classrooms? a review of smart classroom technologies. ACM Computing Surveys, 52(6), 1-28.