

Research on Online and Offline Integrated Teaching Mode of Artificial Intelligence Courses Based on Flying Paddle AI Studio Platform

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Abstract: At present, there are many problems in the teaching of deep learning courses, the most important of which is that it is difficult to carry out experiments in an orderly manner. To solve this problem, this paper puts forward an online experiment scheme based on Baidu Flying Paddle AI Studio platform, so as to realize the teaching mode of online and offline integration. This paper introduces the specific implementation scheme in detail.

Keywords: Baidu Flying Paddle, AI Studio, Deep learning, Integrated teaching.

1. Introduction

Today is an information, digital and intelligent era, and there is a strong demand for artificial intelligence talents. Both science and engineering talents and humanities and social sciences talents need to know and master the related technologies of artificial intelligence. In the study of artificial intelligence, Deep Learning is one of the core courses, a required course of computer science and technology, and an elective course for students of humanities and social sciences. Machine learning course includes theoretical teaching and practical teaching. The practice of "Deep Learning" course requires high hardware conditions, and it is difficult for personal computer hardware configuration to meet this requirement. An online cloud platform is urgently needed to meet the needs.

Online-offline mixed teaching mode is a teaching mode that integrates online virtual teaching with offline face-to-face teaching by using the Internet [1-3]. The hybrid teaching mode based on Flying Paddle AI Studio platform adopts offline teaching in the theoretical part, which realizes the interaction between teachers and students from time to time; Part of the practice is put on the platform of Flying Paddle AI Studio, which realizes surfing the Internet, programming and running at any time, thus avoiding the cumbersome environment configuration and the difficulty of personal computers in running a large number of computers. The hybrid teaching mode based on Flying Paddle AI Studio platform is a kind of teaching mode which is guided by constructivist learning theory and combines the traditional offline face-to-face teaching with online independent practice and independent construction learning. This way promotes students' autonomous learning outside the classroom, and stimulates their initiative and interest in learning.

Flying Paddle AI Studio is an artificial intelligence-related course learning and training platform based on Baidu deep learning open source platform Flying Paddle, which provides students with powerful online training environment, free GPU computing power and storage resources.

2. Problems Existing in Current Deep Learning Courses

2.1. Due to The Limitation of Conditions, Theoretical Teaching Is Still the Mainstay

At present, the teaching of deep learning courses is mainly based on theoretical teaching, that is, teachers speak, and students often can't keep up with listening and practice. The main reason is that the running of deep learning programs requires high-profile servers. If it takes a long time to run on ordinary computers, it is often impossible to run a program for two classes. In-depth study is a practical course. If it can't be practiced, it will seriously affect students' learning enthusiasm.

2.2. The Lack of Big Data Restricts Curriculum Practice

The foundation of deep learning artificial intelligence algorithm is big data, which trains the parameters of the model through big data. Now, deep learning practice is faced with the problem of lack of training data, and the collection of a large amount of data is a very difficult thing for teachers.

2.3. The Lack of Practice in The Course Examination

At present, the examination of the deep learning course is mainly based on the theoretical examination of the test paper, which lacks the practical examination environment. The main reasons are the complex development environment, high hardware configuration and lack of data for training the deep neural network model.

3. Advantages and Features of Baidu Flying Paddle AI Studio Platform

PaddlePaddle, a deep learning platform produced by Baidu, is a completely domestic product in the mainstream deep learning framework. It is as famous as Google TensorFlow and Facebook Pytorch. In 2016, Flying Paddle was officially open-source, and it was the first industrial-level deep learning platform in China with comprehensive open-source, leading

technology and complete functions. Compared with other platforms in China, Flying Paddle is a deep learning platform with complete functions, and it is also the only mature and stable deep learning platform with large-scale popularization conditions.

Baidu Flying Paddle AI Studio Education Edition is an AI online education platform configured on the cloud based on Baidu's brain. It can set up online teaching classes, provide lesson plans, experimental projects, online and ready-to-use development environment, and a huge number of project databases, thus realizing the one-stop solution of the whole process of integrating online training environment and teaching management. It is a very practical platform for deep learning teaching management.

4. The Online and Offline Integrated Teaching Scheme Based on Baidu Flying Paddle AI Studio Teaching Platform

4.1. Online and Offline Integration of Theoretical Courses Teaching Program

Online-offline integration teaching refers to a kind of teaching mode that uses the Internet to integrate online virtual teaching with offline-to-offline teaching [4-5]. The online and offline integrated teaching of in-depth learning course is based on Baidu Flying Paddle AI Studio teaching platform, which is divided into online independent learning and offline classroom face-to-face teaching.

1) Online learning. Online learning is a supplement to offline teaching. It is divided into two parts: preview before class and review after class.

① Preview before class. Before class, the teacher pushes the course video containing the knowledge points necessary for class to the students on Baidu Flying Paddle AI Studio platform. By watching these videos, students preview and evaluate their own learning.

② Review after class. Students finish their homework through the online test system, feed back the learning effect through the system, and learn what they have not mastered for the second time.

2) Learn from the opposite side below the line. The classroom is divided into three parts: the teacher's explanation, the student's experiment and the student's experimental results display.

① Let the teacher explain. First of all, the teacher will review the key points in the previous section, which can be done by asking students to answer questions. Then, the teacher talks about new content and adopts example teaching, which makes boring and difficult knowledge intuitive and vivid, and guides students to think positively. For example, when explaining convolutional neural networks, there are many mathematical formulas derived, which are boring and abstract, so my students don't understand them. However, it can be intuitively understood by actually running an example program to identify cats and dogs through AI Studio platform.

② Experimental link. First, students verify according to the examples given by the teacher, and then write new tasks assigned by the teacher on this basis. For example, in class, the teacher first explains the principle of convolutional neural network, and then, in order to facilitate everyone's understanding, give an example of a program to identify cats. After speaking, let everyone verify on the AI Studio platform

first, and then give you a new task to write a program to identify dogs. Students can make new applications on the AI Studio platform by using what they have learned.

③ Students' experimental results show. Give students a period of time to write a new topic assigned by the teacher on the AI Studio platform. Students who have written a program and run it successfully in the specified time will come to the podium to explain the programming ideas and run the written program, and the teacher will comment on it. In this way, students' learning initiative can be mobilized, and their ability to think positively and solve practical problems by drawing inferences.

3) Online course management of AI Studio platform.

Studio platform has the functions of creating courses, setting course information, publishing teaching contents, publishing homework/exams/competitions, publishing announcements/establishing discussions, etc. Teachers can publish teaching videos, courseware materials, online homework/ exams/ competitions on the evaluation platform, and students can study accordingly. They can test their learning situation through tests, competitions, etc., and they can also exchange some unknown problems in the discussion area, thus promoting the atmosphere of self-learning and helping each other solve problems.

4.2. Design of Experimental Teaching Scheme Based on Project-Based Comprehensive Practice

1) Project-based comprehensive experimental design in class. In addition to explaining the theory of deep learning in class, teachers also need to design related experimental courses so that students can write programs and run them, and have an intuitive understanding of the application of deep learning. The course teacher designed eight related experiments, the details of which are as follows:

① Experiment 1: the development environment of PaddlePaddle, a deep learning framework; The experiment includes the installation of Python; PaddlePaddle; is installed under the Windows operating system; Use PyCharm development tool; Learn the use of AI Studio platform.

② Experiment 2: Boston house price forecast. The experiment includes defining a deep neural network model; Define the loss function of the deep neural network model; Define the optimization method for training; Create an actuator; Train the network with historical house price data; Forecast house price.

③ Experiment 3: MNIST handwritten digit recognition. The experiment includes defining input layer, convolution layer, pool layer, convolution layer, pool layer, output layer, loss function of network model, optimization method for training, creating an actuator, training the network with handwritten digit data set, and recognizing handwritten digits.

④ Experiment 4: Emotion analysis of movie review data set. The experiment includes environment setting, data preparation, model configuration of recurrent neural network, model training, model evaluation, and model prediction of film reviews.

⑤ Experiment 5: Generate the actual combat against the network-enhance the data set. The experiment includes environment setting, data preparation, model configuration of recurrent neural network, model training, model evaluation and model generation of new data sets.

⑥ Experiment 6: Strengthen study and actual combat. The

experiment includes installing dependency database, setting environment variables, constructing multilayer neural network, constructing DQN algorithm, Agent and experience pool, creating Agent instance and training model.

⑦ Experiment 7: Transfer learning-flower type identification. The experiment includes data reading and brief processing, model building (structure description), model training, model evaluation, and model identification of flower types.

⑧ Experiment 8: pavement garbage detection based on PP-PicoDet v2. The experiment includes data preparation, model selection, model training, model evaluation, model prediction, model deployment and model optimization-compression.

2) Homework design.

Besides theoretical teaching and project practice in class, it is also necessary to arrange corresponding exercises for students after class to strengthen the learning content and cultivate their ability to solve practical problems. A total of 8 homework assignments were designed, with the specific contents as follows:

① Homework 1: Develop a fully connected neural network with PaddlePaddle framework to predict house prices.

② Assignment 2: Develop a face key point detection with PaddlePaddle framework.

③ Assignment 3: Use U-Net deep neural network to realize pet image segmentation.

④ Homework 4: Realize handwritten digit recognition with convolutional neural network.

⑤ Assignment 5: Analyze and predict the epidemic situation in COVID-19 with deep neural network.

⑥ Assignment 6: Use PaddleHub to analyze CT images of pneumonia.

⑦ Assignment 7: Use PP-YOLO model in PaddleDetection to identify pests.

⑧ Assignment 8: Calculate the bone age according to the hand X-ray image by using the deep learning model.

3) Open competition.

In addition to face-to-face theoretical teaching in class, in-class experiments and homework, online deep learning competitions can also be held through the platform of Flying Paddle AI Studio. Excellent students can be selected to participate in domestic artificial intelligence competitions to improve their academic performance. Two competitions have been prepared. The specific contents are as follows:

① Twelve cat classification experience competition. This competition requires contestants to classify twelve kinds of cats, which is a classic image classification task in CV direction. As the cornerstone of other image tasks, the image classification task can help people get started with computer vision more quickly.

② PALM's prediction of pathological myopia.

Myopia has become a global public health burden. About 35% of myopia patients have high myopia. It leads to the prolongation of the axial length of myopia, and may cause pathological changes of retina and choroid. With the increase of myopia diopter, high myopia will develop into pathological myopia. Therefore, early diagnosis and regular follow-up are very important. This competition is to predict the myopia of the images taken by the eyes.

4.3. Design of Multi-angle Assessment Method Based on Process

In the aspect of curriculum assessment, both theoretical

knowledge and practice are emphasized, and both results and process evaluation are emphasized. The assessment is divided into classroom performance, homework after class, and the final exam is divided into theoretical and practical exams, and competition results. The specific assessment situation is shown in Table 1:

Table 1. Weight Table of Teaching Assessment Items

type	Assessment items	Comprehensive proportion
Usual grade	Classroom performance, homework after class	40%
Final grade	Theoretical and practical achievements	50%
Competition results	game results	10%

Classroom performance: refers to whether students can listen attentively, experiment carefully, answer the teacher's questions correctly and actively participate in classroom discussions when they are in class face to face.

After-class homework: it refers to whether students can finish their homework carefully and whether their homework is correct.

Final exam: The final exam results from theory and practice, and finally gives a comprehensive score.

Competition results: when students participate in the competition held by teachers on the platform of Flying Paddle AI Studio, it is an important means to select outstanding students by giving them a certain score according to the competition results and rankings.

5. Conclusion

Baidu Flying Paddle AI Studio platform is used to realize the online and offline integration of teaching methods, the integration of theory and practice, the sublimation from practice to innovation, and the improvement of teaching quality. In the future development of education, the teaching mode of online and offline integration, theory and practice complement each other can better stimulate students' interest and initiative in learning, realize students' subjectivity in teaching, and thus cultivate a new generation of college students who work on their brains and innovate constantly.

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