The Construction of Artificial Intelligence MOOC

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Abstract. Many universities offer artificial intelligence courses. Not only the content of the course is abundant and intricate, but also much complicated calculation is contained in the course. The study found that it is difficult to learn this course by traditional teaching methods depend on blackboard and textbooks. So, this paper presents a design of MOOC for this course as follows. Firstly it constructs the knowledge system of this course. Secondly, it gives different teaching methods for different content. Thirdly, it gives the construction of the MOOC, which includes video, forums, exercises and testing. MOOC uses animation and video to illustrate the complex contents, by this way it make the abstract content be intuitive and interesting. The students can study at any time and in anywhere by the MOOC mode, which can improve their learning efficiency.

1. Introduction

Massive open online courses (MOOCs) are among the latest e-learning initiative to attain widespread popularity among many universities [1]. MOOCS were first introduced in 2006 and emerged as a popular mode of learning in 2012[2]. MOOC is an ideal curriculum model and gives full play to the advantages of a variety of information technology, and it includes network technology, multimedia technology, media technology, cloud computing, and big data analysis technology, etc. The strong advantage of MOOC not only is the expression that the students can share the online course resource flexibly, but also is the presentations that the learning content is attractive. The learning method of MOOC is very suitable for fragmentation learning in the digital era, by this way the learner can choice the learning time and content according to their own situation[3][4].

MOOCS are developed and built since 2013 in China. SPOC, (Small Private Online Course) is the mainly model adopted in many universities. The teachers use the combination method to teach, which include the online teaching model and offline teaching model. Some colleges and universities adopt personalized MOOC teaching method, by this way it allows the student to choose the study content and study time according to their actual situation. MOOC platform can track each student's learning process, and conduct reasonable guidance and assessment. MOOC overturned the classical teaching and learning model, whose mainly process is the classroom teaching by teacher and the students arrange their study schedules according the examinations.

The development of AI (artificial intelligence) industry is very rapid in recent years. For example AlphaGo defeated the world champion Lee Sedol, Baidu launched unmanned vehicles; IBM and Microsoft launched their AI platform. Almost all computer science majors of university have set up AI courses. More and more attentions are being paid in AI courses. Most universities offer AI courses for undergraduate students except for master and doctors. AI course is a highly interdisciplinary subject, which has many knowledge points and their content is very abstract. The traditional methods cannot meet the teaching requirements for this course. Therefore, this paper presents a design of the AI MOOC. By using the multimedia technology, network technology, and data analysis technology, the emphasis and difficulty knowledge points of AI course are illustrated by animation, video, etc. By MOOC model, it is not only can visualize the abstract knowledge, but also can facilitate the students to study at any time and in anywhere [5-7].
2. The Characteristics and problems of Artificial Intelligence Course

The technology of AI is developing rapidly at present. It studies how to use computer to simulate the human intelligence behavior (for example, perception, learning, and thinking, etc.), and how to extend the human intelligence. AI technology is very widely used in computer science and other fields. AI course is offered for high school students in computer major. The goal of AI course is as follows: understanding the basic concepts of AI technology; mastering the principles, methods and techniques of AI knowledge (it includes knowledge representation, advanced search, expert system, uncertainty reasoning, machine learning, knowledge discovery, natural language understanding, etc.); improving students' logical thinking ability, operating ability, and innovation ability. By learning this course, the students can lay the foundation for developing AI technology in future. Compared with other courses, AI course has the characteristics as follows.

2.1 Many Prerequisite Courses.

AI course requires many prerequisite courses. It requires that the students have enough basic knowledge in computer major. The students need to learn a number of prerequisite courses before learning AI course. For example, The students should have learned the discrete mathematics course before they study knowledge representation and reasoning, the students should master the knowledge of algorithm design when they learn advanced search section, and the students should master probability theory, random process theory, numerical analysis, and higher mathematics when they study the content of machine learning. So, the prerequisite courses of AI course not only include many mathematical theory (such as linear algebra, probability theory, mathematical statistics, linear algebra etc.), but also include many courses of computer science (such as computer algorithm design and analysis, data structure course, computer programming, etc.) In addition, the natural language understanding part’s learning also needs the knowledge about linguistics and information theory.

2.2 Abundant Content.

There are abundant concepts and theories in the course. It is a comprehensive subject, involving control theory, biology, neurology, and linguistics etc. This course is rich in content, and the main content of the course is as follows: AI definition and development, knowledge representation, advanced search, expert system, uncertainty reasoning, machine learning, knowledge discovery, natural language understanding, robot, etc. Each part contains much knowledge. For example, the advanced search algorithm includes genetic algorithm, simulated annealing algorithm, ant colony algorithm, particle swarm algorithm, etc. And each algorithm has its own theory and method. For example, the ant colony algorithm includes three parts: the first is how the ants can able to find the shortest path between nest and food; the second is the implementation methods of this algorithm whose content include pheromone left and volatile theory; the third is how to use this algorithm to solve practical problems. It can be concluded that the content of the course is abundant and intricate.

2.3 The Correlation between the Knowledge Points.

The knowledge points of this course are self-contained and relatively independent. Although there are some inherent between these knowledge points, the associations between them are weaker than other courses. For example, the advanced search algorithms are for solving the optimization problems, machine learning is for simulating or achieving human learning behavior, and the theories of the two parts are different and have no relations. Even in the same chapter, the relations between the knowledge points are relatively weak. For example, in the advanced search algorithms, the theory of genetic algorithm is based on Darwin's theory of evolution, simulated annealing algorithm simulates the slowly physical process of solid annealing to get lowest inner energy, and the ant colony algorithm simulates the process of ants foraging. Although these algorithms can solve the optimization problems, each above algorithm has its own method and has no common basic theory. It is difficult to give an exercise which can contain all the knowledge of AI course. That is to say, the correlations between the knowledge points of this course are weak.

2.4 Multi-level Contents

The difficulty is different to study different content in this course. Some contents are simple, for example, the definition of artificial intelligence and its development, and it is easy to study. Some
chapters are very abstract and complex. It is difficult to study the contents such as machine learning, knowledge discovery, natural language understanding and so on. To learn the knowledge, the students need to master a lot of prerequisite knowledge (mathematical theory, linguistics, computer science etc.). And the knowledge is abstract and is difficult to understand. For example, when study the knowledge of neural network, the students need to study the basic unit of human brain, and then need to learn the mathematical model of artificial neuron, finally need to study the learning rules and the model of network structure. All these above knowledge is abstract and esoteric, and it needs a long time to understand and master them.

2.5 Development level

Artificial intelligence is a developing subject, and its application field is wide. With the progress of science, AI technology is constantly developing. And the teachers need to track the development of this domain, and search the latest information and recent developments in this field. In order to fellow the development, the teachers should update and adjustment their teaching content timely. At present, the application of AI is extensive, including search, autopilot, robot, intelligent assistant, translation and so on, that is to say, AI technology can be used in any work.

In conclusion, the AI course has the following characteristics: there are abundant concepts and theories in the course; there are many related course; its theories are very complex; it is a developing subject; and its application field is wide. The study found that it was difficult to learn and master this course by traditional teaching methods. For example, the complex content in textbooks is abstract and boring, and it’s a dull job for student to study them. In order to well master the complex knowledge, the students need to study and comprehend them repeatedly. It is obviously that the traditional method cannot meet the AI teaching requirements. So, this paper presents a design of the MOOC for AI course. On the one hand, the key and complex chapters are made into animation and video, which can visualize the abstract knowledge and it facilitate the students to learn. On the other hand, students can use fragments of time to study the course at anytime and anywhere by iPad, smart phones, and computers. This study process can repeat several times according to the student need, which can help him understand and master the knowledge well.

3. Design of Artificial Intelligence MOOC

According to the characteristics of AI course, the MOOC is composed of four parts in this paper: video, exercises, discussion and examination. The video design is the core content of MOOC, and their general lengths are 5-15 minutes. The video lessons involve exercises, discussions and tests. The detailed process is as follows.

3.1 Construction of the Knowledge System.

To construct the knowledge system for AI courses, the course is divided into three parts. The first part is the simple knowledge, which includes basic concept, research content, its development, and its application. The second part is the theories and methods of AI. The third part is the application of AI technology, such as exporter system, application of artificial neural network. Through analyzing the teaching objectives and syllabus, it can find out the correlation between knowledge in the above three parts. And the knowledge models are established according to their intrinsic structure.

3.2 Choosing Teaching Methods of Each Knowledge Points.

This paper adopts different presentation and teaching methods for each knowledge point according to its intrinsic characteristics.

For the knowledge about AI history and AI application is easy to learn, it uses lecture teaching methods and discussion teaching methods. The discussion teaching methods emphasize the role of students in the learning process, and it can change the students' passive attitude and stimulate the interest to learn this course. Its detailed process is: firstly, the teacher gives a learning topic in advance, then the students find and read the relative materials, and written report about the topic, finally the teacher and the students discuss the reports together. This part of AI MOOC is mainly using video to display and using forum to discuss. In where, the videos is used to introduce the knowledge points,
which enable the students to understand the basic content. By the forum, the teacher can do these works as follows: publishing a topic and the detailed requirements, dividing the students into groups, and guiding the students to search and reading the relative materials. The students can use forum to do these things as follows: getting the teacher's guidance, communicating and discussing with each other, and uploading reports. The teacher organizes the students to discuss their reports by the forum online when the student finished their reports, and give the reviewer and summarization of each report. Finally, each student writes a report to summarize the study experience, which can help the other student to study and help the teacher to improve his teaching methods.

This paper uses case-based teaching methods to teach the basic concepts and principles, which are the moderate difficulty knowledge in AI course. It designs interesting cases for knowledge points in this teaching method. For example, it uses "monkey pick bananas” case to explain the content of knowledge representation; it uses “paper becomes expensive in Luoyang” case to explain the rules of knowledge generated, and it makes the student to feel the charm of natural language processing by the case of chat robot Alice. This part of the AI MOOC mainly adopts video and exercises. In where, the video is mainly used to explain the content of knowledge points and introduce the cases. When design the videos, we not only consider the interest of the case, but also choose the case which form daily study and life. For example, it uses Othello game case to introduce the knowledge of game-tree, by which the teacher gives the questions: "how is the machine playing chess?", "How to win?" After stimulating the students learning interest, the teacher explains how chess games use game-tree to search and use alpha and beta pruning to speed up. This teaching method can increase the students' sense of participation and improve the learning efficiency. Finally, it can get the learning and mastering situation of students by exercises, which includes machine judge and companions review. And it gives the guidance of next learning.

For the knowledge of the algorithm principle is difficult, we use lectures and task-driven teaching methods. On the one hand, it organizes the knowledge into a special lecture, which is used to introduce its basic theory and method. On the other hand, it gives the students a real task which is interested and related to the current knowledge points. The “task” can let the students in positive states and stimulate their desire for learning the knowledge. The students can propose the solutions combined with their own experience after learning. This part use video, forum discussion, and task assessment. We search and collet materials of experts researches about the specific knowledge, and turn them into video or PowerPoint which integrate the text, image, and animation etc. Every teaching unit specific is a topic. This teaching method prompts a clear learning purpose for students, by which the students can grasp the key and difficult content. It is also convenient for students to review and do help for them to improve their self-study ability. The teacher divides the complex content into several “tasks” which are easy to solve, and these “tasks” are interesting and closely related to the current topic. The teacher issues the "tasks" by the forum or video. After receiving these “tasks”, the student uses their knowledge and experience to analyze the "tasks". In the process for solving a task, the teacher can conduct online or offline guidance by the forum. The students can also group, cooperation and communication. After completing the “task”, the students submit their solutions to the corresponding modules. The teacher evaluates each solution by the mechanism given the module, and feeds back the evaluation results to the students. By this way, the students can know their learning situation, and it helps them understand the knowledge well.

3.3 MOOC Content Design and Construction

In this paper, MOOC design and construction includes four parts: video, forums, exercises and testing. The video of MOOC must be short and pithy, its length usually is 5-15 minutes, and the theme must be clear. Each video is only about one knowledge point or a part of the knowledge point, and its content must be complete. And the design must be meeting the requirements as follows: logical, vivid, concise, and easily understand. The forum of AI MOOC should provide the following functions: information publishing function, online and offline communication function. It makes the teachers publish topics or “tasks” timely by information publishing function. Online communication function can help students to communicate with each other or cooperation, and it help the teachers to guide
students online. Offline communication function allows students to publish learning experience, and help the teachers to answer and summarize questions. The AI MOOC combines with exercises, testing and discussion when students learning. It’s examines includes exercise, test, and final examine. There are a large number of interactive exercises, and the students must finish the exercises. The students can learn the next video when the answers are correct. By this way, it ensures that students can keep up with the teaching progress, and focus their attention on learning this course. It can significantly improve students’ learning efficiency. Finally, it must have feedback mechanism of AI MOOC, which can record and manage the learning process and teaching process. It not only can improve learning and teaching methods, but also is the first-hand information of teaching effect evaluation.

4. Conclusion

MOOC is a new online teaching mode, and it has many advantages as fellows: massive, open, repeatable, online, and interactivity etc. Its core is emphasis on learning experience. It turns the traditional teaching method into student learning. By this method, the students feel that learning is high freedom, and can study at any time and in everywhere. This paper analyzed the characteristics of AI course and the existing problems in teaching, and gives the MOOC construction of AI as follows. Firstly it constructs the knowledge system of AI course. Secondly, it designed different presentation and teaching methods according to different knowledge content. Thirdly, give the design and construction of AI MOOC, which includes video, forums, exercises and testing. It uses animation and video to illustrate the complex content by using multimedia technology, network technology, data analysis technology etc., and it can visualize the abstract knowledge. The students can study at any time and in anywhere by MOOC learning mode, which can improve learning efficiency.

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6. References