Research on Innovating and Constructing the Educational Knowledge Graph from the Perspective of Artificial Intelligence

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Abstract: Domain model is the core component of autonomous learning and adaptive learning system. In recent years, with the development of artificial intelligence technology, domain model has attracted extensive attention from scholars and experts. This paper expounds the problems in constructing educational knowledge graph from the perspective of artificial intelligence, and creatively puts forward the educational knowledge graph about the relationship among knowledge, question and ability.

1. Introduction

In recent years, China's economy and science and technology has made continuous progress, and with the development of digital technology and computer technology, China's artificial intelligence technology has developed by leaps and bounds. It is necessary to study deeply the society that is stepping into the era of "artificial intelligence +" from the era of "Internet +" and the society driven by the progress of artificial intelligence technology such as knowledge graph, etc. *Action Programme of Educational Informatization 2.0* has been put into effect. It mainly discusses that it's necessary to establish and improve the current educational informatization system, to ensure its sustainable development, to build a networked, digitized, intellectualized lifelong educational system. In order to ensure the development of students' personalized learning, it is necessary to construct a new education system, and the key of which is that personalized learning cannot be separated from adaptive and autonomous learning system. In the adaptive learning system, the core components are domain model, user model, adaptive model, adaptive engine and presentation model. As an important foundation and basic structure of learning system, domain model of educational knowledge graph plays an irreplaceable role. At present, it is an important challenge to know how to construct a domain model with clear semantics and complete structure in the improvement of learning system [1]. From the perspective of artificial intelligence technology, the construction of education model represented by knowledge graph has made a major breakthrough. It is clearly pointed out in the *Development Plan of Artificial Intelligence in the New Era* that it is necessary to make a key breakthrough in the deep search of knowledge processing and to develop the core technology of visual interaction continuously so as to form a multidisciplinary and multi-data cross-media knowledge graph. However, there are still some problems in the construction of educational knowledge graph, which needs to be studied and innovated.

2. Present Situation of Constructing the Educational Knowledge Graph

At present, construction of educational knowledge graph is mainly based on the modeling technology to label and serialize the educational knowledge. The process of connecting the knowledge of various disciplines is aimed to make the knowledge more serialized and convenient for learners to study and make progress. Main methods are used in the process of constructing educational knowledge graph, including concept graph and knowledge graph, which can summarize and elaborate the expression and diagram of knowledge[2].

The earliest knowledge graph mainly focuses on metering of scientific knowledge. The graph can show the structural relationship among knowledge of various disciplines, and can connect the

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knowledge among various disciplines. Through the construction of knowledge graph, the relationship between knowledge and knowledge as well as between knowledge and educational resources can be displayed. A more solid network structure is built to facilitate the construction of learning materials and knowledge. In the process of knowledge graph operation, more semantic connections can help learners to build the model. It can also point out the personalized learning resources. And it's convenient to recommend some materials for learners or look for suitable learning materials. Compared with concept graph and knowledge graph, knowledge graph has more extensive knowledge content and semantic association, and it has higher automation in the degree of construction. However, there are still some problems in the construction of knowledge graph at this stage [3]. For example, at present, in terms of knowledge content presentation, it still focuses on the description of basic knowledge points, and it lacks the combination of other related words centered on subject keywords. So it does not form a certain knowledge unit. Secondly, in terms of customers' capability, knowledge graph mostly describes the relationship between knowledge and knowledge, but it lacks the further research on the characterization of learners' ability. Finally, in terms of construction methods, the new stage is mostly completed by domain experts through artificial construction methods which lacks the participation of artificial intelligence technologies such as machine learning and natural language processing. There are some problems in artificial programming, so it is necessary to test by artificial intelligence. Through the automatic construction of artificial intelligence technology, it can help learners complete the construction of knowledge graph.

3. Innovative Construction of Educational Knowledge Graph

3.1 Basic Concept of Educational Knowledge Graph

Educational knowledge graph is mainly used to describe the educational knowledge and the association between knowledge sets by using the method of knowledge graph. However, there is no unified conclusion on the concept of educational knowledge graph in academia, but we can analyze the concept of educational knowledge graph from the perspectives of teachers' teaching and students' learning.

From the perspective of teachers, educational knowledge graph is used to construct the network diagram of the relationship between knowledge and knowledge, which is convenient for teachers to design teaching and organize teaching activities. By referring to educational knowledge graph and observing the common characteristics of group students, teachers can design teaching arrangements which is suitable for most of students, and can formulate learning paths that meet the requirements for students. In this way, it not only achieves personalized teaching, but also realizes large-scale teaching.

From the perspective of students' learning, educational knowledge graph is the embodiment of students' cognitive state. Through personalized learning and the guiding of knowledge graph, students can recognize their own knowledge level and interests, and they can choose learning methods that are suitable for themselves so as to complete personalized learning [4].

3.2 Study on the Innovative Construction of Educational Knowledge Graph (Kqa)

At present, there are some problems in educational knowledge graph, such as the scattered knowledge content, insufficient ability description and low degree of automation. Under the background of a new round reform of the basic education curriculum, the ultimate goal of subject teaching is to improve students' core literacy through teaching of subject knowledge. Therefore, in order to improve students' thinking quality and key learning ability, it is necessary to decompose problems and complete tasks to achieve the ultimate goal. In the process of subject teaching, the problems and tasks of the subject are decomposed through the mapping of subject knowledge, and finally the ability of the subject is improved through task-based learning method. In the process of constructing model of educational knowledge graph, there are three premises, namely knowledge, question and ability. Therefore, this paper extracts the initials of "knowledge", "question" and

"ability", and names the new educational knowledge graph as educational knowledge graph (KQA) (hereinafter referred to as "KQA graph"), as shown in Figure 1.

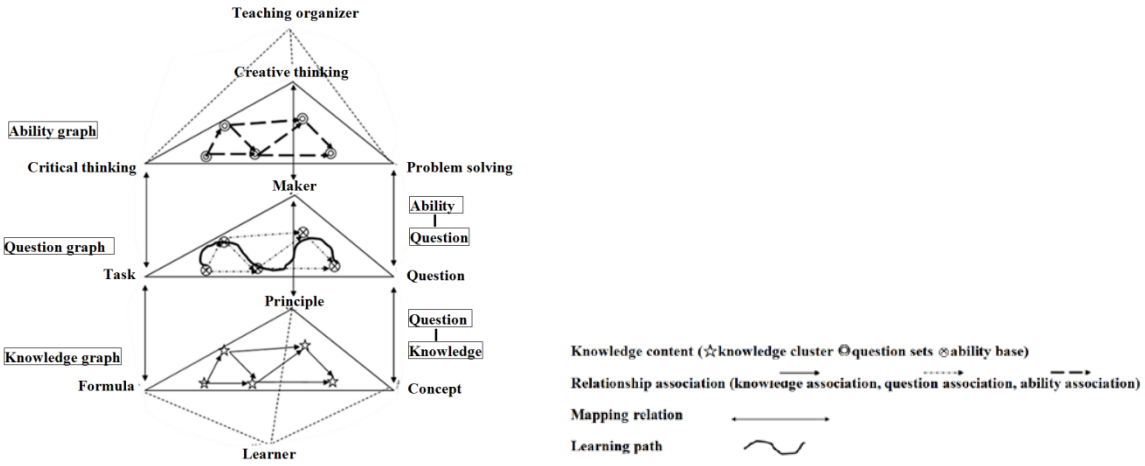

Fig.1 Educational Knowledge Graph (Kqa)

3.2.1 Analysis of the Graph

In KQA graph, the vertex represents teaching organizers which mainly refers to the teachers. In the teaching process, teachers carry out teaching design and organize teaching activities on the basis of the educational knowledge graph. And the lowest point mainly represents the vast number of learners which mainly refers to students in teaching activities. Students carry out personalized learning according to the educational knowledge graph and choose their own learning methods. In the first level of knowledge graph, the three vertices represent concept, formula and principle respectively. In the second level, the three vertices in the graph represent the question, task and maker. The three vertices of the third level ability graph represent problem solving, critical thinking and creative thinking respectively.

3.2.2 Operation Mechanism

KQA graph seems to be planar and static, but its operation process is a dynamic balance and a cyclic iteration. In the process of three-level graph operation, the mutual collaboration of each mechanism ensures the normal operation of the whole model. The correlation mechanism is provided between knowledge and knowledge, problems and problems, ability and ability throughout the teaching activities. In order to record and optimize students' learning path, a screening mechanism is constructed through the relationship among knowledge, question and ability. Through collecting the data of teachers and students' teaching activities in which educational knowledge graph is used, and using the artificial intelligence technology to optimize and reorganize the graph, the knowledge graph can be updated gradually.

4. Conclusion

In the field of education, there are still bottlenecks in the construction of knowledge graph. This paper explores the problems of vague knowledge content, lack of generalization ability in learning and low degree of automation of methods. From different perspectives and three levels such as knowledge graph, question graph and ability graph, this paper studies the innovative construction of knowledge graph. The construction of KQA graph provides a basis for intelligent learning from the perspective of artificial intelligence, which not only contributes to the effective implementation of intelligent teaching, but also can solve clearly the relationship between the questions and abilities of each discipline. If teachers choose learning path exactly and students choose learning method reasonably, large-scale personalized education can be realized and students' comprehensive quality can be improved.

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