Application and Research of Computer Big Data Based on Structure in Internet Learning

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Abstract

At this stage, Internet technology has been widely used in various industries in China, people's daily life, study and work are inseparable from the support of network data. Big data can not only improve resource utilization, realize resource sharing, but also let people get a lot of information. With the progress of Internet technology, network relational data is emerging and expanding. The structure analysis of network data has become a research hotspot in the field of machine learning and network application. In the era of big data, the pace of social development is getting faster and faster, and many industries begin to use the Internet, as well as the education field. Therefore, we should also strengthen the application of big data in teaching. But after all, big data appears for a short time, and it is a new technology. When it is applied to Internet teaching, it is necessary to carefully analyze the corresponding strategies and have the necessary technical means, so as to realize the in-depth application of big data.

Keywords*: Network structure, Computer big data, Internet learning*

Ⅰ. Introduction

Based on the progress of society, the level of science and technology is also increasing, and people have been living in the background of big data [1]. At present, people's life, study and work are inseparable from the support of Internet technology. According to the application of Internet technology, it not only improves the quality of people's life and study, but also improves China's economic ability and scientific and technological level to a certain extent. For example, when applied in education, Internet technology is combined with online education, and scientific and technological researchers have developed many online intelligent learning systems. Students can avoid limitations and use mobile computers to apply online learning resources [2]. The most important point is that the Internet has a very powerful memory function, which can push the required content for students according to their preferences, and help students learn related knowledge more accurately and easily [3]. According to the application of Internet technology in education, the use of Internet means can improve the ease of students' learning, enable students to consolidate their learning knowledge, and thus help Internet technology to play its true value [4]. At present, Internet learning has become the main trend. With the advantage of computer big data structure, online and offline teaching and learning models are carried out to make up for the lack of traditional education and realize the effective learning, cognition and understanding of knowledge for students [5]. Structure analysis is an important part of network research, and it is the basis for understanding network function and analyzing network dynamics behavior correctly, which helps people to explore the essential laws hidden behind the network. Among many network statistical models, SBM has become a hot research topic in the network field because of its advantages in network structure pattern discovery. It attracts the extensive attention and in-depth research of scholars [6]. Through the integration of computer big data technology and online education, science and technology researchers have developed more online learning systems, including online live teaching, the use of learning software, etc., to achieve a good education and learning model, and through Internet learning, students can get the information of on-time class attendance and schoolwork completion, thus improving the effectiveness of students' Internet learning [7]. The so-called computer big data, which is a term for huge amounts of information, can provide people with all the resources they need, and change the way of learning and communication controlled by time and space in the past [8]. As a core component of the computer application field, online teaching has outstanding advantages. Learners can talk to famous teachers anytime and anywhere, formulate their own learning

plan, and eliminate knowledge blind spots. Using it for Internet learning is an inevitable trend of the development of the times, and relevant personnel must attach great importance to it [9]. In the computer big data, network teaching is also a very important component, breaking the limitations of traditional classroom, and students can communicate with teachers in time through the network, teachers can give timely help to avoid the impact of learning efficiency due to difficulties, teachers can also use more flexible ways to carry out teaching, promote the innovation of traditional teaching, Therefore, it is necessary to analyze the application of computer big data in Internet Learning [10].

Ⅱ. Application of Computer Big Data in Internet Learning

A. The Application of Computer Big Data in Internet Learning

From its birth to the present, computer big data has undergone continuous improvement and development. Many new application technologies have emerged. When they are applied to network learning, the required learning resources can be accurately located through technologies such as big data mining, and at the same time, you can choose The most helpful resource for learning, so that learning needs can be better met [11]. Moreover, the application of computer big data for network learning can establish the corresponding database, collect relevant resources on the Internet and put them into the database, at the same time, it can also deal with some outdated data and replace them with new data [12]. In recent years, online live teaching is the most popular teaching method. The reality of online live teaching is that teachers of related subjects use the Internet platform to teach the required users. It is very convenient to use the Internet learning platform, and the operation process is also very easy. Teachers or professionals who want to teach can directly apply the live teaching learning service platform only by completing simple registration, and students who want to listen to online teaching can attend classes directly as long as they complete the appointment or sign in and punch in [13]. Teaching methods like this are also carried out by simulating real classroom activities. According to remote control, students and teachers can ask and answer questions and perform other learning activities as in the classroom.

In addition, through this online live teaching, students can be supervised to attend class on time and finish their homework in time. Due to the influence of China's family planning and the current high housing prices, most families have only one child, which is the most obvious phenomenon in cities. Therefore, most students often return home without discussion, learning is also a person, which is not conducive to students' active thinking, but also not conducive to the exercise of students' communication skills. On-line interactive teaching just solves this problem. Students can log on to the online interactive teaching platform at the same time and enter the discussion group for a certain subject. Students can choose the subject they want to enter the discussion group at any time, communicate online without any obstacles, and discuss related problems in learning. At the same time, teachers can enter the study discussion group, select typical questions raised by students or questions that students have not solved after discussion, answer questions, and summarize relevant knowledge points mentioned to improve students' ability to learn knowledge systematically. Figure 1 shows the application flow chart of big data in the Internet + online learning platform.

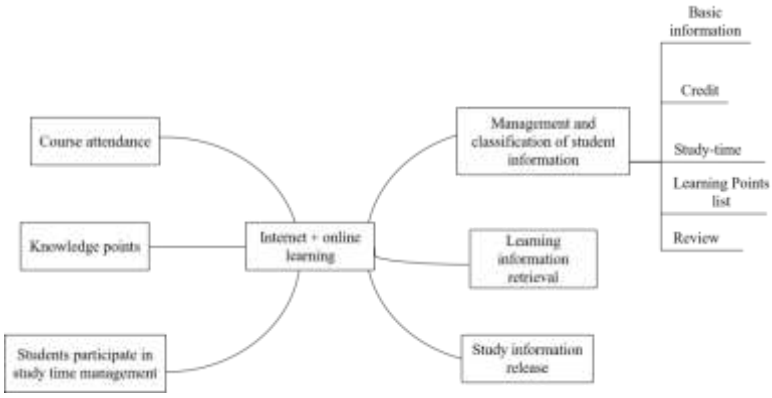

Fig.1 Application Process of Big Data in Internet Plus Online Learning Platform

Table 1 Describes the Main Technical Aspects and Contents of Big Data Processing Technology Stack. Each Layer of the Technology Stack Has Its Own Functions and Characteristics.

Table 1 Big Data Processing Technology Stack

Big data application layer	Big data application and service layer	Transportation/Telecom/Medical/Financial/Public Security/Commercial/Biology/Remote Sensing/Mineral Exploration...
		Domain application/service demand and analysis model
	Application design development layer	Big data application development environment and tool platform
Big data analysis algorithm layer	Comprehensive analysis algorithm layer	Social network analysis, image processing, natural language processing, biological information processing, media analysis and retrieval, Web information mining and retrieval, visual computing, etc.
	Basic algorithm layer	Parallel basic analysis algorithms (basic machine learning algorithms, data mining algorithms)
Big data computing layer	Parallel Computing System Platform	General parallel computing system Hadoop, Spark, graph computing system GraphLab, stream computing system Storm, etc.
	Parallel computing mode	Batch processing, streaming computing, graph computing, iterative computing, query analysis, memory computing and other computing modes
Big data storage layer	Distributed database	Distributed database storage system (NoSQL databases such as HBase, Cassandra, NewSQL databases, distributed SQL databases)
	Distributed file system	Distributed file storage system (HDFS, Alluxio, etc.)

Big data processing resource layer	System architecture and hardware resources	Distributed cluster, multi-core, many-core, hybrid heterogeneous platform (such as cluster + many core, cluster + GPU) cloud computing resources and support platform

B. Application Advantages of Computer Big Data in Internet Learning

With the continuous innovation and optimization of computer big data, as far as learning is concerned, the application of big data in network and online platform is mainly reflected in the following aspects: first, course check-in, second, knowledge points, third, students' participation in study time combing, fourth, classification and supervision of student information, fifth, study information searching and sixth, study information uploading. For the fourth point, it can also be subdivided into five parts: basic information, test results, study time, summary of study points, and consolidation review. The application of computer big data to Internet learning not only has a certain degree of procedural nature, but is also very comprehensive, which can help students obtain good learning results. Combing the master data relationship and establishing the data relationship model, the business of higher education mainly focuses on the staff, students, teaching, scientific research, finance and assets, which are the main data objects through research, information system, business process and data flow. The data model consists of three parts from top to bottom: unified view, subject field and data standard. The hierarchical relationship of the data model is shown in Figure 2.

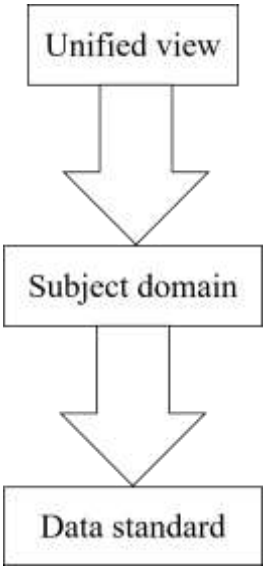

Fig.2 Hierarchical Diagram of Data Model

By applying computer big data to internet learning, students can obtain massive learning resources in a short time with the help of big data platform, and meet the diversified and personalized learning needs of students. At the same time, under the action of computer big data, learners can use technology to mine related information resources and data information, and through accurate search of learning resources, they can filter some information data for learners and provide learning information that learners need, thus promoting students to develop a good Internet learning model.

In addition, the use of computer big data in Internet learning, the Internet has the ability to remember, summarize the big data information of students in the Internet learning process, including the progress of self-learning, learning content, learning frequency, etc., according to the students' online acquisition of learning and knowledge Information, push relevant information resources, learning software, etc. to students in real time, and then realize

the targeted learning mode of students. With the help of computer big data and through the Internet learning platform, teachers can obtain students' online learning information, including learning content information, software application information, schoolwork completion information, etc., integrate and analyze these learning information, accurate students' specific learning situation, and then strengthen students' education guidance according to the actual situation of students, Promote students to better carry out Internet learning. The application of computer big data to internet learning can provide students with diversified online learning methodology, diversify the channels and methods for students to obtain learning information, enable students to better absorb learning nutrients and improve their learning quality.

Ⅲ. Application of Structure-Based Computer Big Data in Internet Learning

A. Application of Network Data Learning in Behavior Recognition

With the increasing maturity of multimedia search engines, it has become possible to obtain low-cost annotation data from the Internet, which has also promoted the development of learning theories and methods based on network data into a very important field in the field of machine learning research and computer vision research. Active direction. At present, the focus of network data learning research mainly includes two aspects: how to eliminate the domain difference between the network data domain and the target domain. How to eliminate noise and deviation in network data. The network data collected on the network contains a lot of noise data. Although the quality of Google Image search has improved significantly in recent years, the retrieved images still contain outliers and irrelevant images due to the inaccuracy and polysemy of the query text. Therefore, the elimination of noise data in network data is an important problem in network data learning.

Method based on random walk Sultani et al. adopted unsupervised strategy, taking the collected images as vertices to compose pictures, and using random walk of pictures to measure the correlation of images, thus eliminating irrelevant data. The main advantage of using random walk is that it can find not only small isolated clusters, but also images far away from all other images. The specific implementation is as follows: First, a fully connected graph Z(N,E) is defined, where N is the set of all images, and E is the set of edges between them. The weight between any two nodes i and j on the image is determined by the Euclidean distance between their features φ(I) and φ(J), where φ represents the calculation of the deep learning feature of the entire image. Here, the transition probability between nodes i and j is:

$$p(i,j)=\frac{e^{-r\left\|\varphi(i)-\varphi(j)\right\|_2^2}}{\sum_{m=1}^{k} e^{-r\left\|\varphi(i)-\varphi(m)\right\|_2^2}} \quad (1)$$

After randomly traversing the graph, it can be expressed as follows:

$$r_k(j)=\beta\sum_i r_{k-1}(i)\,p_{ij}+(1-\beta)v_j \quad (2)$$

Where $r_k(j)$ represents the correlation degree of image j during k^{th} iteration, v_j is its initial probability value, and β controls the weight of these two items to the final score. All images are assigned the same initial probability score. The association score $r_k(j)$ updates all nodes iteratively until a fixed number of iterations is reached. Images with low relevance scores can be considered as outliers and then deleted. In this way, noisy data can be eliminated.

Transfer-based learning

Liiu et al. proposed a method of migrating hidden support vector machines. In order to adapt to the heterogeneous features of images and videos, a special structural transformation is introduced to map the image feature space to the video feature space. Specific research ideas are as follows. Let $RF^V = \{T_r^V\}_{r=1:N_T}$ and $RF^I = \{T_r^I\}_{r=1:N_T}$ be random cluster forests of video and image respectively, where T_r represents R trees in the forest and N_T is the number of trees. First, using the correspondence between low-level descriptors, a set of mapping matrix $\{L_r^y\}_{y\in Y} \in R^{Nl_r^V \times Nl_r^V}$ is learned between the leaf nodes of T_r^I and T_r^V, where Nl_r^V is the number of leaf nodes in the tree T_r^V, and Nl_r^I is the number of leaf nodes in the tree. Each element $L_r^y(p,q)$ in the matrix L_r^y is obtained by calculating the sample number k of each behavior y, where the dense trajectory features reach the leaf node P of the tree T_r^V and the hog features reach the leaf node Q of the tree T_r^I. Then, each column of I_r^y is normalized, where H_r^I is the histogram of image with Y behavior label generated by tree T_r^I, and $Hl_r^I \in R^{Nl_r^I \times 1}$ is the sub-histogram of H_r^I corresponding to leaf node. To get the migrated sub-histogram $Hl_r^V \in R^{Nl_r^V \times 1}$, each element in Hl_r^I is defined as:

$$Hl_r^V(p) \sum_{q=1:NI}^{I_r} L_r^y(p,q) Hl_r^I(q) \quad (3)$$

Among them, Hl_r^V represents the transformed sub-histogram of the leaf node. Finally, according to the method in Liiu, the transformed histogram H_r^V of all nodes is created, and the histograms $\{H_r^V\}_{r=1:N_T}$ of all the transformed trees are connected to form the middle-level representation of the transformed Web image. Use matrix A to represent the linear transformation from the image feature space to the video feature space.

B. Network Structure in Internet Learning

In the era of big data, people have been used to getting answers through search engines when they encounter some problems, which can be applied to online learning. When students encounter any problems in the learning process, they can search online through search engines, so that students can solve problems in time without teachers, and the learning progress will not be affected.

Cognitive psychology believes that learning is a process of information processing. Especially in the network learning environment, a large amount of learning information makes the learning of learners inseparable from the operation of various learning information. Therefore, it is particularly necessary and practical to analyze online learning behavior from the perspective of information processing. As shown in Figure 3.

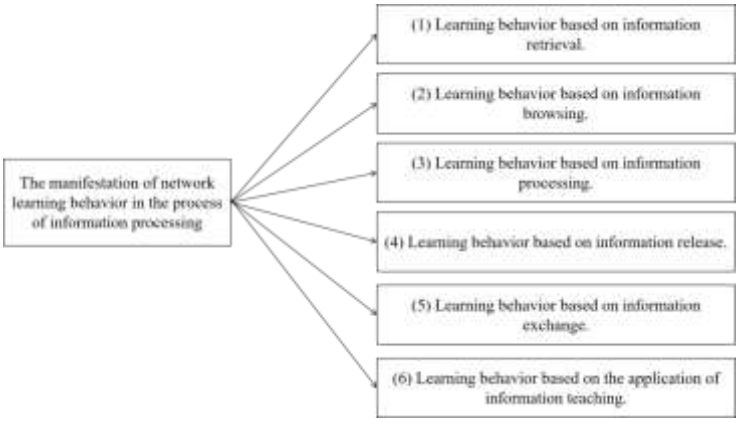

Fig.3 Network Learning Behavior Performance in the Process of Information Processing

Ding Xu classified online learning behavior in his article Analysis and Research on Online Learning Behavior. In this paper, the classification results and related research are summarized as shown in Table 2:

Table 2 Summary of Online Learning Behavior and Related Factors

Learning behavior	Exploratory learning	Engaged learning	Experiential learning	Motivational learning	Extended learning	Effective learning
Learning agent	Individual learner	Individual or group of learners	Learner group	Learner group	Individual learner	Individual or group of learners
Learning behavior effect	Solve specific learning problems, so as to carry out innovative and practical learning research.	Continue to solve learning problems, participate in learning practice activities, and correctly evaluate learning results.	Improve the ability to acquire knowledge and process information, as well as the ability to collaborate and innovate.	Form a collaborative team to stimulate learning enthusiasm and improve learning efficiency.	Based on learning feedback, reflect on your own knowledge structure.	Carry out learning assessments in time and adjust learning methods.
Learning behavior object (learning environment, resources)	Various media and their combinations that carry teaching content information, including graphics, images, pictures, text, audio, video, and animation.					

With the increasing of network data, the study and understanding of complex network structure is helpful for people to explore the essential law behind the network, so this research becomes more and more important. Everything is a double-edged sword, which has both advantages and disadvantages, and Internet big data is no exception. Students face a computer with no emotion for human-computer interaction learning, and lack the cordial

communication between teachers and students in face-to-face teaching and the emotional communication between students. The network transmits only simple information. Facing such an inhuman machine for a long time, it is likely to form a wrong worldview and mechanical way of thinking. All electronic media without emotion is only one of the elements in educational communication and cannot replace teachers and schools.

Ⅳ. Conclusions

With the rapid development and improvement of big data technology, it can mine and retrieve valuable knowledge from massive network platform. With the rapid development of the Internet, it is an opportunity and a new breakthrough for the education industry to actively use big data to upgrade their professional fields. Especially with the application of big data in the education industry, the online learning system supported by it is becoming more and more intelligent and humanized. Although the application of big data to online learning on the Internet has many advantages and positive effects. However, the application of big data in the education industry is the result of learning in a broad sense and storing information resources by classification. The learning methods and institutions acquired by learning are one of the key points that can open up students' learning motivation and improve the latest learning mode of students. At present, network structure learning is a research field with broad application prospects, and it is also a field with a large number of unsolved problems. In summary, under the condition of computer big data, the use of the Internet in the teaching field has become more and more important, and the software that supports students' learning is gradually increasing. Students can improve the quality of learning through online learning and deepen the impression of textbook knowledge. More comprehensive development.

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