

Research on the Application of Artificial Intelligence in Image and Text Database Retrieval

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Abstract: In the graphic database, the difficulty of query processing lies in how to query the contents of various data, that is, content-based retrieval, which is an effective means and an important technology to realize multimedia data retrieval. In graphic database, the difficulty of query processing lies in how to query the content based on unformatted data, that is, content-based retrieval, which is an effective means and an important technology to realize multimedia data retrieval. Intelligent information retrieval (IR) system is an intelligent computer IR system, which simulates the thinking process and intelligent activities of human beings about information processing, realizes the storage, retrieval and reasoning of information knowledge, and provides intelligent assistance to users. This paper analyzes the problems of image and text database retrieval driven by big data, explores the application effect of artificial intelligence (AI) in IR driven by big data, promotes the innovation and transformation of modern science and technology, and realizes the sustainable development of our society.

Keywords: Big data; Artificial intelligence; Graphic database; Information retrieval.

1. Introduction

Most multimedia data have features that are difficult to describe with symbols, such as color distribution in images, motion in videos, tones in audio, etc. Because they belong to unformatted data, it is quite difficult to query and process them, that is, content-based retrieval [1]. In the graphic database, the difficulty of query processing lies in how to query the contents of various data, that is, content-based retrieval, which is an effective means and an important technology to realize multimedia data retrieval. Content-based retrieval breaks through the limitation of traditional keyword-based retrieval, and directly analyzes images, videos and audio to extract features, which makes the retrieval closer to media objects [2]. In the traditional database retrieval, the retrieval methods based on identifiers, attributes, keywords and other forms are generally adopted. These methods are only related to data types and data structures, and do not need any analysis of the content [3]. However, in its application, the graphic database is not satisfied with these simple retrieval methods, but needs to analyze the semantic content of the media to get a deeper retrieval level. The application of AI in IR has solved the problems of data information classification and natural language comprehension, and improved the retrieval technology from keyword level to knowledge level [4].

With the development of AI, it has been applied to various industries, including language recognition, virtual system and so on. With the continuous development of society, the widespread use of AI has obviously improved the living standard of modern people. The application of AI in IR will bring a new revolution in IR field. Graphic database technology is driven by the development and application of multimedia technology. It mainly studies the storage, management, maintenance and retrieval technology of multimedia data [5]. A concrete analysis of AI shows that AI can add human thoughts and actions to the operation of mechanical equipment and systems. The application of AI has brought about great changes in many industries and achieved good results [6]. In graphic database, the difficulty of query

processing lies in how to query the content based on unformatted data, that is, content-based retrieval, which is an effective means and an important technology to realize multimedia data retrieval [7]. This paper analyzes the problems of image and text database retrieval driven by big data, explores the application effect of AI in IR driven by big data, promotes the innovation and transformation of modern science and technology, and realizes the sustainable development of our society.

2. Problems in image and text database retrieval driven by big data

In AI, knowledge representation is to construct the objects, preconditions, algorithms and other knowledge needed in problem solving into a data structure that can be processed by a computer and some processes to explain this structure. In IR, the same piece of knowledge has different importance to different users. Therefore, in IR, the representation and utilization of knowledge is a big problem. The scattered IR information is refined and integrated into data resources in some way, and then the user-specified information is correctly found out from the data resources [8]. There are some problems in IR, such as it is difficult to set up IR expert database, and the ability of computer to recognize natural language is poor. Driven by big data, IR usually uses two technologies. The first technology is classification technology, which divides a large amount of data and information into different categories through certain concepts. The second technology is the whole retrieval technology, which is often applied to the search of documents in a certain website, so as to improve the IR efficiency of the website. However, the disadvantage is that manual classification is needed.

It is difficult for computers to locate users reasonably. Specialization in technology and knowledge specialization in various fields have seriously hindered the collation of systematic knowledge by computers. Every expert has a unique opinion on IR knowledge, and the deviation of computer's cognition of experts' experience makes it difficult to set up an IR expert database [9]. In many cases, it is

difficult to describe the required information with a few words during IR, which will increase the difficulty of IR and lead to problems such as wrong retrieval results. Due to various reasons, knowledge acquisition is still a rather difficult task. Although many AI scholars have been carrying out research work in this area, hoping to achieve automatic acquisition of knowledge, that is, the acquisition of knowledge by IR system automatically, and some achievements have been made, it is far from the goal of complete automatic acquisition of knowledge, and there is still a long way to go to solve many theoretical and technical problems.

3. Intelligent IR technology driven by big data

3.1. Multimedia data mode

At present, the popular concept of multimedia still mainly refers to a variety of information types that can be directly felt and understood by organs such as words, graphics, images and sounds, which has become a narrow understanding of multimedia. In the field of computer and communication, the text, graphics, sounds, images and animations of information we refer to can all be called media. Accordingly, multimedia data can be divided into character values, text data, sound data, graphic data, image data and video data. Human intelligence activity is mainly a process of acquiring and applying knowledge, and knowledge is the foundation of intelligence [10]. In order for a computer to be intelligent, it must have knowledge. However, knowledge needs to be expressed in an appropriate mode before it can be stored in the computer, so knowledge representation is an important issue in AI research for a long time, and knowledge representation becomes a core part in the design of intelligent IR system. The relational schema defines the structure of relationships, static characteristics such as access integrity restriction and referential integrity, and also defines relational operations such as selection, projection, connection and relational set operations, as well as operations such as updating and defining data.

Although the system based on relational data model does not capture the semantic and temporal-spatial relationship between multimedia objects, it is widely used because of its low development cost and good compatibility. Its purpose is to produce a super-large-scale multimedia information system, including all multimedia data types as much as possible, and to use relational model for storage and management. The data analysis structure of image-text database retrieval driven by big data is shown in Figure 1.

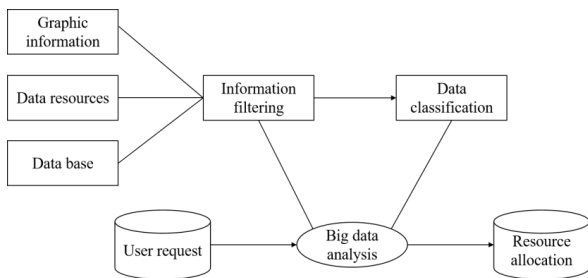


Figure 1. Data analysis structure of graphic database retrieval

Database is a new type of database, which is produced by the combination of multimedia technology and database technology. The so-called graphic database means that the information in the database involves not only various formatted expressions such as numbers and characters, but

also unformatted expressions of multimedia. Data management involves the processing of various complex objects. The basic elements that define hypertext structure are nodes and chains. Nodes describe the content of hypertext data objects, while chains define the structure of hypertext and provide the ability to browse nodes. Different hypertext systems allow different types of nodes and chains. The graphic database should not be the interface packaging of the existing database system to make it look like a graphic database, but should be based on the characteristics of multimedia data and information to find the corresponding solutions. The graphic database should support the integrated management and comprehensive description of various media such as words, texts, graphics, images, videos, sounds, etc., support various manifestations of the same media, support the representation and processing of complex media, and be able to query and retrieve various media data. Intelligent IR system is an intelligent computer IR system, which simulates the thinking process and intelligent activities of human beings about information processing, realizes the storage, retrieval and reasoning of information knowledge, and provides intelligent assistance to users.

3.2. Media storage and graphic IR

With the popularization of multimedia technology, people will contact and process a lot of multimedia information, but each kind of media data has some problems that are difficult to describe by symbolic methods, such as color in images, motion in videos, tones in audio, etc. When users need to use these information clues to retrieve data, the traditional database retrieval method using keywords can't be completed. In order to meet this deeper retrieval, that is, content-based retrieval, we must first understand its characteristics. When users query, they can limit the video retrieval to a smaller area by zooming in on a specific area, thus quickly realizing the retrieval and query of video clips. Traditional database queries only deal with precise concepts and queries. However, imprecise matching and similarity query will account for a considerable proportion in the graphic database. Because even if the same object is represented by different media, it will certainly be different to the computer. If it is expressed in the same medium, if there is an error, it will be different in the computer's view. The construction scheme of distributed information storage and retrieval is shown in Figure 2.

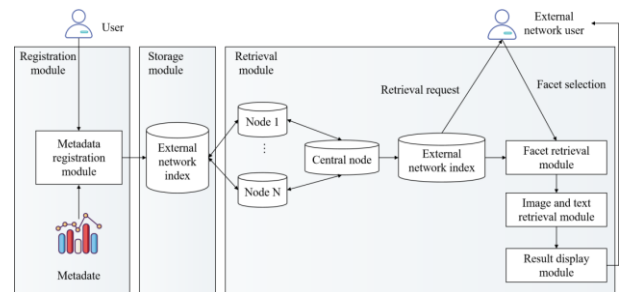


Figure 2. Construction scheme of distributed storage and retrieval of resource information

The trained artificial neural system will be applied to the aggregation and classification of video clips, and the video clips with similar feature vectors will be clustered in similar areas, and different clips will be distinguished by the distance of the areas. In the process of retrieval, the method of gradual refinement is adopted. The intermediate result of each layer is a set, and the range of the set is continuously reduced until the target is located. Content-based retrieval can use some

methods of image processing, pattern recognition, speech signal, computer vision and other disciplines as basic technologies, but it has important differences with these disciplines. The user interface of graphic database can't be described by a table. The public nature of media and the special nature of each media should be reflected in the user interface and in the process of query. Because the video clips have been classified and aggregated in the previous stage, users can query the required video clips only by zooming in and searching in the local area.

4. Conclusions

The rapid development of AI has had a great impact on the IR field, and the successful combination has made the retrieval more intelligent. In the current era of big data, a large number of digital information resources and data types have been intelligently integrated and managed, thus realizing the intelligent management of distributed information resources. With the increasing amount of information in various fields, people's demand for IR is also increasing, and the traditional IR method is gradually replaced by intelligent IR system. Intelligent IR can meet people's needs for information diversification, which is conducive to improving the efficiency of IR. Incorporating AI into IR system will make traditional IR system have better user interface, higher retrieval efficiency and richer retrieval means. At present, there are still many shortcomings in the application of AI in IR. We should constantly update and improve the current achievements, boldly innovate and actively practice, combine AI with IR, and make a better attempt in the practical application process, so that the IR work under AI can better meet the needs of the era of big data.

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