The Application of Big Data Technology in the Research of Ancient Chinese Silk Road

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Abstract. The wide application of information technology has caused the rapid increase in the amount of data generated in people's work and life, which has spawned big data technology. Modern information technology such as GIS has played a vital role in the geographical research of the ancient Chinese Silk Road, and it can be used as an important way for the multidisciplinary development of Silk Road research. The data analysis technology represented by the word frequency analysis method also provides an efficient means for the historical research of the Silk Road.

Keywords: Big Data, China, Silk Road, Analysis

1. Introduction
In the mobile Internet era, the scale and total amount of data in the world is rapidly expanding. According to IDC’s monitoring statistics, in 2011, the global data reached 1.8ZB. This scale will continue to grow at a rate of doubling every two years. It is expected that by 2020, the total global data will reach 35ZB, an increase of about 20 Times. The rapid growth of data volume has spawned the concept of "big data"[1].

The "big data" refers to data sets whose size exceeds the data collection, storage, management, and analysis capabilities of typical database software. The big data is not only related to traditional data, but also has major differences. On the one hand, both are tools used by humans to express their feelings and record history, and they are both carriers of information transmission. On the other hand, big data is usually electronic data[2]. It has a high degree of flexibility under the influence of the Internet. It has a large volume, quick and easy storage and transmission, and a high degree of intelligence.

The popularity of big data has promoted the pace of human development and utilization of big data technology. The international community and governments of various countries have formulated strategies and plans to promote the development of big data-related industries. This technology also provides new development opportunities for historical research in China and the world.

2. The significance of information technology in the study of the ancient Silk Road
In 1933, GIS was born as geographic information technology. In the 1940s and 1950s, geographic information systems, as an independent discipline, and land information systems. With the increasing
frequency of computer use and the increase of digital spatial data, GIS was widely used in many disciplines at the end of the last century.

The Silk Road, as the largest trade channel in Eurasia in ancient times, is lined with post stations, post roads, ruins, and trading ports. Traditional historiography has basically restored the road transportation network of the Silk Road in the historical period through mining and dissecting literature. Traditional historiography research methods are usually based on textual narratives and historical documents. The core purpose is to prove the existence of the Silk Road trade and its ruins and relics. In the field of historical geography research, with the prosperity of the Silk Road research, the historical development of the Silk Road, especially the scientific basic research results and archaeological research results of the transportation route are endless, but due to the historical events spanning a long time, along the route Frequent changes, changes in the military pattern, numerous place names, and complicated historical roads, etc. The research in traditional history-related fields is dominated by narrative research[3].

According to the description of historical documents, the traditional historical research and historical geographic research have compared the maps of different historical periods and described the route of the ancient Silk Road. The map of the Silk Road described by the comprehensive historical data information cannot achieve the precise location of the Silk Road traffic road, historical sites and major city points in the historical period, so it can only be called a rough schematic diagram, not a standard traffic diagram. From the analysis of the overall research status of the Silk Road, the research at this stage is still mainly based on thematic research, breaking through the split between multiple disciplines, and achieving continuity, long-term and comprehensive research still has limitations. It can be said that the traditional historical research methods are difficult to achieve the precise positioning of the overall Silk Road transportation routes across time periods, regions, and disciplines.

From the existing GIS Silk Road research results, it can be seen that the application of GIS in the historical field is based on a wealth of unearthed documents and research results. It is not only a pure technical means, but can be obtained Spatial information in the historical period, linking and sharing the historical document database, supporting and researching multiple historical materials, realizing the dynamic presentation of historical disciplines and the effective way of multi-disciplinary comprehensive development of Silk Road research[4].

![Figure 1](image_url)

**Figure 1.** The statistical graph of big data technology usage, in 2004-2010, in China

3. **Application of big data technology in research of the Silk Road**

Governments around the world have fully realized the importance of big data for historical research, and actively promote the collection of digital historical materials and the construction of digital libraries. For now, worldwide historical research is at the stage of building a basic historical data
The construction of the thematic database of the Silk Road

The purpose of the thematic database construction is to create a unique and unique document database in the region to adapt the personalized. In the planning and preparation stage of the regional library, we need to fully understand the needs of users for scientific research and discipline development. Through extensive research and analysis, it is demonstrated whether all kinds of literature resources have practical value, and the integration is in line with local reality. Cultural construction is a valuable literature resource to better reflect its own service efficiency. Regarding the construction of thematic databases, it is important to expand the scope of document collection, improve the quality of
information resource construction, and ensure that it cannot only adapt the needs of users, but also reflect the needs of subject research.

Regarding the collection of regional document resources, each library should establish a dedicated document construction coordination agency according to the needs, clarify its respective responsibilities through consultation and cooperation between different libraries, and adopt multiple methods such as joint procurement and online cataloguing to ensure document collection. Efficiency, to avoid repeated collection and waste of funds. Due to the decentralization of local document resources, it is necessary for regional libraries to expand collection channels, master the distribution, distribution and collection of characteristic documents, and cooperate with local chronicle offices, universities and archives to gain multi-faceted support. Regarding the integration of document resources, in accordance with the construction standards of thematic libraries, using digital processing technology, in-depth mining of local document resources, through indexing, classification, evaluation and other operations, form a data format that can be shared and shared. Then enter all kinds of resources into the database and present them to users with a unified publishing platform.

![Figure 2. The process of database resource consolidation](image)

5. Conclusion
The application of big data technology in the historical research of the Silk Road has broadened the research perspectives and fields of related topics. The big data technology, including database construction and GIS technology application, is not widely used in the historical research of the Silk Road. And the construction of the grand Silk Road database that can fully cover multilingual, multi-ethnic, cross-regional and ethnic countries exists is quite difficult. But modern technologies represented by GIS applications, database creation, and data processing technologies have been used in the historical study of the Silk Road. Its application in the historical research of the Silk Road is a concrete manifestation of the identification of history. Also, it is an inevitable trend of the history discipline adapting to the Internet era.

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