



Research on Military Intelligence Value Evaluation Method Based on Big Data Analysis

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Abstract. The conventional methods of military intelligence assessment could not comprehensively analyze the value of military intelligence. To this end, a military intelligence value assessment method based on big data analysis was proposed. Big data analysis technology was introduced to determine data value density k ; overall system architecture was established; operation mode was optimized, relevant analysis technology was formulated; military intelligence value evaluation was achieved. Experimental data showed that the application of big data analysis technology could comprehensively analyze the value of military intelligence.

Keywords: Big data · Military intelligence analysis · System structure

1 Introduction

As the development of human society has entered the wave of the information age, data has become an important strategic resource for promoting economic and social development, scientific and technological progress and new military changes. Big Data, or massive data, is a collection of data with large-scale, diverse types, time-sensitive processing, and low reliability of data sources. Big data has penetrated into all areas of human social life, and it has brought unprecedented changes and challenges to the analysis and research work of military intelligence. On the one hand, with the rapid development of military informationization, a large amount of intelligence data can be easily obtained, and data overload phenomenon occurs; On the other hand, the data obtained is all-encompassing, the content is complicated, the reality is mixed, the authenticity is difficult to distinguish, and there is a shortage of effective intelligence information [1]. How to mine and extract accurate and high-value intelligence information from these overloaded data has become an urgent problem to be solved. Literature [2] proposes the construction method of patent value evaluation system based on big data analysis. Starting from the big data analysis of evaluation indicators, the evaluation model of “total sub sub sub sub sub” three-tier structure is constructed, That is to say, “law, technology and economy” as the first level indicators, “patent protection scope, patent stability, patent technology quality, patent technology applicability, market, competition, applicant factor” as the second level indicators, and the quantifiable 81 subdivision indicators as the third level indicator

system, and the calculation method of patent value degree based on this system is described. However, the data density of the technique is low, and the time required to intercept the same data is longer.

In view of the above problems, in order to comprehensively evaluate the value of military intelligence, we need to use big data analysis technology to calculate the data density k . Then the overall system architecture is established, the operation mode is optimized, and finally relevant analysis techniques are developed.

2 Design of Military Intelligence Value Evaluation Method Based on Big Data Analysis

The use of big data analytics to assess the value of events is primarily determined by the data value density k .

Data value density k :

$$k = \frac{\sum U_j Q_i}{\sum U_j} \tag{1}$$

i is the size of a single data, and U is the size of the total amount of data in the unit interval. The large amount of data often means extremely high value, but because of the large scale and variety, the value density of data is very low, which also increases the difficulty of value mining. At present, big data processing related technologies and tools have made great progress, forming a relatively complete big data processing ecosystem. It includes large-scale distributed computing technology, in-memory computing technology, stream processing technology, etc. Corresponding software products such as Big Data Batch Computing Framework Hadoop, Rapid Analysis Framework Spark, Stream Processing Framework Storm, etc. As shown in Fig. 1

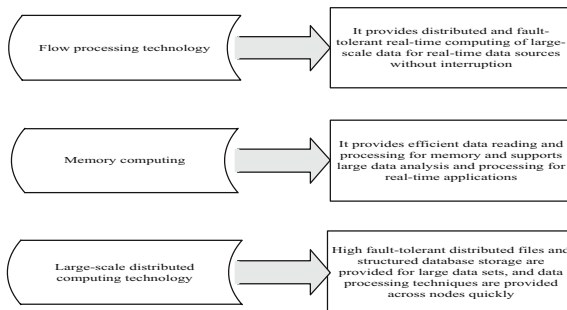


Fig. 1. Big data processing related technology

In the early big data analysis, people didn't know the value of the data, so most people took the statistical analysis method. As people's understanding of the value of

data continues to deepen, the methods of data analysis are gradually moving toward predictive and normative directions. Big data technology on the one hand makes people’s data sources more efficient and diversified; On the other hand, while the data source is growing rapidly, it also makes people more efficient and efficient in data processing. Together with the application of visual data analysis technology, enterprise decision making is more justified.

2.1 Establish Overall System Architecture Based on Big Data Analysis

The overall architecture design of the system first needs to meet the analysis and application requirements of massive heterogeneous military intelligence data, and adopts big data processing technology to provide business applications such as collection, reorganization analysis, comprehensive processing, and intelligence services for military intelligence data. This provides intelligence data and service support for strategic decision-making and operational command; Secondly, in order to solve the problem of resource sharing and collaborative application among multiple nodes in the intelligence system, the openness and flexibility of the system architecture should be fully considered to achieve loose coupling between data and platform, platform and application [3]. Finally, it is necessary to fully comply with or refer to relevant military system standards and technical specifications to achieve seamless connection with existing intelligence systems and improve the utilization efficiency of existing equipment. The overall structure of military intelligence analysis and service system based on big data can be divided into three aspects, including application layer, service layer and resource layer as shown in Fig. 2.

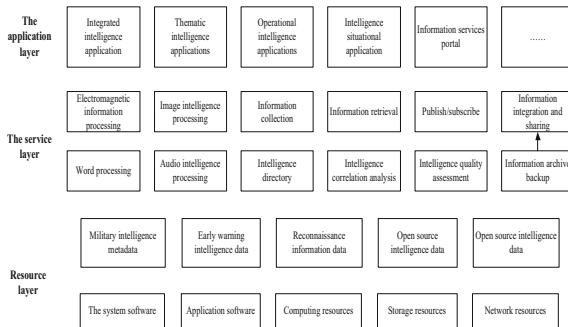


Fig. 2. Overall architecture of military intelligence analysis based on big data

The application layer is based on the related business services running on the service layer. It is an implementation layer for specific business applications, and is mainly used to support human-computer interaction operations. The application layer includes software modules such as integrated intelligence applications, thematic intelligence applications, combat intelligence applications, intelligence situation applications, and intelligence service portals.

The service layer relies on the information sharing and collaborative environment provided by the application layer to provide information services for each service domain while implementing specific service processing functions. The service layer includes services such as electromagnetic information processing, image information processing, text information processing, audio information processing, information collection, information catalog, information retrieval, intelligence correlation analysis, intelligence release/subscription, intelligence quality assessment, intelligence integration sharing, and information archive backup provide shared service support for military intelligence analysis business applications [4].

The resource layer is the lowest level of the overall architecture, providing a physical support environment for system operation, including infrastructure and data resources. The infrastructure part provides the necessary hardware resources such as computing, storage, and network, as well as basic software resources such as operating system and application software, for system construction and operation, and provides resource scheduling management, configuration management and status monitoring and other functions; The data resource part of the system integrates various data resources into one, providing unified data resource collection, integration and logical description capabilities, mainly composed of military intelligence meta data and various business intelligence data.

The overall architecture design of the system adopts layered and service-oriented thinking. By providing standardized service interfaces, service components and service access methods, the system architecture is open and flexible, and the service components are reused in various business applications. The mature big data processing technology framework is used to build distributed platform support, and natural language understanding, graphic image analysis, data mining and other technologies are used to build a business support environment to meet the needs of various military intelligence analysis services; By implementing the process and componentization of various types of intelligence analysis services, and complying with relevant system interface specifications, the integration capability with existing equipment is fully guaranteed.

2.2 Develop Relevant Analytical Techniques

The key technologies of military intelligence analysis and service system based on big data mainly include information big data computing analysis framework, multiple source heterogeneous intelligence data processing, distributed wide-area intelligence application services, etc. [5].

Intelligence big data calculation and analysis framework technology. Facing the storage, management and analysis requirements of massive heterogeneous intelligence big data, it provides a massive data processing platform that is easy to develop and use, and provides support for real-time, dynamic and accurate analysis and processing of intelligence big data. Through the use of distributed networked architecture, the load balancing and anti-destruction between computing nodes are realized, and the dynamic allocation of intelligence analysis tasks and dynamic resource management are guaranteed. Hadoop + Spark + Storm provides a typical framework for intelligence big data analytics processing, using high-cost, inexpensive machines to build HDFS

distributed file systems to provide high-throughput intelligence data storage and access. It uses the MapReduce parallel programming model to provide parallel computing of large-scale intelligence data. Based on Spark and Storm big data processing engine, the real-time intelligence data stream is processed quickly and interactively to support the high-real-time and large-capacity processing requirements of battlefield intelligence.

Multiple source heterogeneous intelligence data processing technology. Due to the existence of many sources of information resources, large differences in types, and mixed content, there is a great deal of uncertainty in intelligence analysis. How to extract and refine the truth from the big data of intelligence is a key challenge for intelligence big data analysis. The multiple source heterogeneous intelligence information comprehensive processing analyzes multiple intelligence such as images, texts, videos, audio, and electromagnetics according to different sources and formats, and extracts time, space, goals, and themes of intelligence big data. Furthermore, through the distribution characteristics of elements, the intelligence information from different sources are correlated and verified, and a multiple level and all-round unified intelligence situation is formed [6]. Ensure the accuracy and effectiveness of intelligence analysis results. In the intelligence processing mode, the cloud computing layered service model concept is adopted, and the computing and storage resources of each node in the system and various general intelligence analysis processing services are uniformly operated and managed. The distributed deployment, combination and use of loosely coupled intelligence service components through the network improves the real-time performance of intelligence processing.

Distributed wide-area intelligence application service technology. For wide-area distributed battlefield space and diverse sensor and operational target types [7]. For the information security needs of different combat missions, the service analysis technology is used to flexibly define the intelligence analysis and processing flow. The organization analyzes the intelligence analysis services deployed on each node to work together, provides a unified interface for intelligence data management and service application, and realizes the sharing of systematic intelligence analysis capabilities to ensure the overall processing capacity is maximized. Promote the transformation of intelligence processing and service models from the traditional “Task, Process, Use, and Distribute” (TPED) model to the modern “Task, Release, Process, and Use” (TPPU) model. It provides on-demand access and on-demand shared intelligence application services for various types of sensors and strike weapons distributed in a wide area, meeting the real-time processing of massive data and the operational requirements of sensitive operations and rapid strikes [8].

2.3 A Comprehensive Evaluation of the Method of Military Intelligence Value

Modern military warfare is an information-led war. The ability to acquire information and intelligence is the key to influencing the war process and winning and losing. Improving the ability to acquire information is especially important for accurately releasing and enhancing the combat capability of the military system. With the application of big data technology in the military field, the ability of commanding agencies to obtain information and intelligence has been greatly improved, mainly in

the following two aspects: On the one hand, the efficiency of the military in handling information intelligence has greatly improved. In modern military warfare, the amount of information on battlefield information is extremely large, and most of them are unstructured data. If this information is processed in a conventional manner, it will not only take a long time, but also be extremely inefficient. However, with the help of big data technology, the military's processing speed of information and intelligence will exponentially jump, and its ability to acquire and process intelligence information in a unit of time has been greatly improved. On the other hand, more valuable information and intelligence. Under the constraints of information and intelligence, such as investigative methods and the battlefield environment, big data technology can quickly sort and sort information, and then analyze and feedback. The application of big data technology helps to mine more high-value military intelligence information about target objects in the war, thus making up for the lack of intelligence in reconnaissance and surveillance systems.

Military intelligence value assessment method based on big data analysis technology. First, we must understand the value density k of the data introduced, and determine its intelligence value according to the size of k . Then establish a system overall architecture, fully consider the openness and flexibility of the system architecture, to achieve the connection between data and platform, platform and application. Finally, we need to optimize the operation mode and develop relevant analysis techniques. The technology includes information big data computing and analysis framework technology, multiple source heterogeneous intelligence data comprehensive processing technology, and distributed wide-area intelligence application service technology. Through the above introduction, the military intelligence value assessment is finally achieved.

3 Experiment Analysis

In order to explore whether big data technology is comprehensive in assessing the value of military intelligence, a research experiment will be established here to compare the assessment of the value of military intelligence with literature [2] technology and the assessment of the value of military intelligence by big data technology. Comparing the curves and dense points of the data value density k , the abstract evaluation value is reflected in the form of data.

3.1 Comparison of the Value of Data Intercepted at the Same Time

Data value density means the value of data intelligence in a unit area. On the other hand, k is the speed of intercepting high-value intelligence, and comparing the value of data intercepted in the same time can compare the excellence of literature [2] technology with big data technology. Here, valuable information is recorded as Q_I , and the information acquired in the same period of time is recorded as U_I . The picture below shows the comparison (Fig. 3).

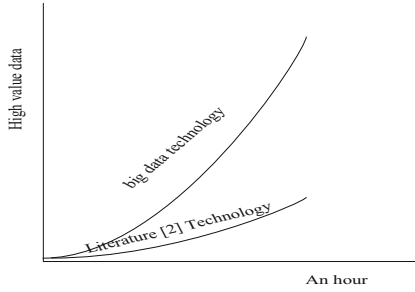


Fig. 3. Data value comparison

It is clear that the amount of high-value data acquired by big data technology is much larger than that of literature [2] technology in an hour.

$$k = \frac{\sum U_i Q_i}{\sum U_i} \tag{2}$$

According to the data and substituted into the formula, calculate the k value, it can still be concluded that the k value of big data is larger than the literature [2] technology (Table 1).

Table 1. Data value density comparison

Amount of intelligence	Literature [2] technology k value	Big data analysis technique k value
20	0.3151	0.9846
40	0.3521	0.9765
60	0.3269	0.9854
80	0.3752	0.9903
100	0.3656	0.9712

3.2 The Time Required to Intercept the Same Value Data

Similarly, according to the results of the previous experiment, and based on this experiment, the same value data is intercepted. We compare the time required for big data technology and literature [2] technology, and the resulting data is plotted in Fig. 4, as shown below.

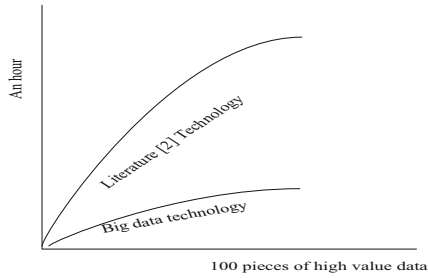


Fig. 4. Data time comparison

From the above picture, we can clearly see the time taken to obtain the same hundred high-value data. Obviously, big data technology is much faster than literature [2] technology, so that the excellent and advanced of big data technology can be compared.

$$U = \frac{\sum_{i=1}^m K_i Q_i}{\sum_{i=1}^m K_i} \quad (3)$$

4 Conclusion

This paper is based on the analysis of military intelligence value based on big data analysis. Big data analysis technology is to obtain some valuable information from a large amount of data, which has been applied in all aspects of production and life, and to improve the economic and social benefits of various industries. At present, the research on big data technology is also deepening, and relevant personnel can apply big data extensively and deeply in the military field to improve military management level and military decision-making level. Big data plays a very important role in the military field and has a very broad development prospect in the future. It needs to be highly valued.

The information age is a relatively long period of time relative to the industrial age and the agricultural era. There are significant differences in production factors and social drivers in different eras. The symbol of the information age is the widespread use of computers, the use of optical fiber communications, the Internet, and the use of integrated circuits. The emergence of big data analysis technology marks that the information age has entered a new stage, that is, the era of big data. Big data technology has been widely used in various industries of production and life. This paper mainly discusses the application of big data analysis technology in the military field. Big data technology will profoundly affect the military field and bring about changes in military thinking and thinking.

The arrival of the era of big data has changed the face of traditional military intelligence analysis. Based on advanced big data processing technology and tools, building a modern military intelligence analysis and service system has become a new solution. This paper conducts preliminary research and design on the military intelligence analysis architecture based on big data, and analyzes some of the key technologies. In the exploration of new military revolution, based on big data processing technology to solve the slow and complicated dilemma of modern military intelligence analysis, it is of great significance for improving information warfare intelligence analysis and operational command and decision. It is also the development direction of the current military intelligence revolution. However, this method does not consider the security of military intelligence data storage, and will focus on the military intelligence data storage to provide security protection for high-security data.

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