Intelligent business cloud service platform based on SpringBoot framework

Mengli Zhang
College of Finance & Information
Ningbo University of Finance & Economics
Ningbo, China
467620339@qq.com

Jiacheng Lv
College of Finance & Information
Ningbo University of Finance & Economics
Ningbo, China

Yaobian Jiang
College of Finance & Information
Ningbo University of Finance & Economics
Ningbo, China

Jialian Shen
College of Finance & Information
Ningbo University of Finance & Economics
Ningbo, China

Jian Li
College of Finance & Information
Ningbo University of Finance & Economics
Ningbo, China

Yufen Hu
College of Finance & Information
Ningbo University of Finance & Economics
Ningbo, China

Tiejun Pan*
College of Finance & Information
Ningbo University of Finance & Economics
Ningbo, China
467620339@qq.com

Abstract—**This article is based on the SpringBoot platform, which displays real-time news and information on various economies and policies in countries and regions along the "Belt and Road", and solves the problem of difficult data processing of the "Belt and Road" complex data. In order to improve the readability of the data, this platform analyzes the cluttered data to generate statistical charts, and obtains key information in real time and intuitively. This system uses Spring, SpringBoot, Mybatis as the background framework scheme, and the front end uses the more popular Vue with strong performance and good performance. Finally, the intelligent cloud service platform system based on B / S architecture is designed, which has practical application value.**

Keywords—Belt and Road, Big Data, cloud service, business platform

I. INTRODUCTION

A. Research Background

In the course of the "Belt and Road" strategy, various types of massive data will inevitably be generated. How to discover and release hidden and decision-making information from massive, multi-source, and heterogeneous data is particularly important. The role of information mining is mainly to use big data analysis and next-generation artificial intelligence technology to timely and accurately track the progress of the Belt and Road cooperation between China and countries along the route, establish an information resource interconnection mechanism, and provide real-time and predictive information for governments and enterprises Data support and consulting services to make relevant supporting measures and investment cooperation behavior more targeted and scientific.

B. Purpose

In order to solve the problems of the large number of data resources in the "Belt and Road", such as the fragmentation of the structure, the alienation of the structure, and the difficulty in obtaining knowledge, this paper proposes advanced distributed data collection technologies and distributed search solutions to improve the timeliness and accuracy of early warning of the massive information processing of the "Belt and Road" Based on deep learning to build a knowledge map of the Belt and Road risks and opportunities. Distributed web crawlers have established a multi-source heterogeneous "Belt and Road" information hub, and made breakthroughs in information mining theory and methods.

In view of the diversity of partners in the countries along the Belt and Road, the scope of cooperation, the complexity of data processing, the long-term potential risks and the diversity of risk factors, this project is based on distributed crawler technology and distributed search technology Build a big data center for the "Belt and Road"; build a cloud service for the "Belt and Road" -based information mining based on deep learning and knowledge maps.

C. Research work

Information is the basis of decision-making. How to quickly find the investment opportunities of the "Belt and Road" among the numerous information resources is the most important issue to be solved urgently. Facing such huge and disorderly amounts of information in the countries along the route, and users' requirements for the correctness, accuracy, and timeliness of search results, such as the risk assessment of the Sino-US trade war and the historical opportunities of reform and opening up in North Korea, the efficiency and efficiency of information retrieval The rapid response capability of research reports has become an urgent issue. Due to the specific needs of the traditional universal search engines (Google, Baidu, etc.) for the "Belt and Road" theme, there are certain limitations. For example, the results returned by the universal search engine contain a large number of Web pages that "Belt and Road" investors do not care about. Secondly, different data such as pictures, databases, audio, video and multimedia related to the "Belt

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and Road" appeared in large numbers, and general search engines were often unable to find and obtain these information-intensive and structured data. In addition, most general search engines provide keyword-based retrieval, which is difficult to support queries based on semantic information. Therefore, it is difficult to meet the needs of the "Belt and Road" information retrieval through traditional search tools alone. The use of big data analysis and artificial intelligence technology has become the key to solving the above problems.

This project is based on the big data analysis needs of the "Belt and Road" and leverages the existing big data resources of the "Maritime Silk Road Research Institute" to complete the investment opportunities and risks of the "Belt and Road" cooperation countries through distributed collection and retrieval solutions. Information collection, sorting, storage and integration, based on deep capture and accurate analysis of data resources to create a "Belt and Road" information hub, providing information consulting services and intelligent decision support for Zhejiang enterprises to "go global".

II. KEY TECHNOLOGY

A. System architecture

C / S mode (Client / Server) and B / S mode (Browser / Server) are a mode that work together in current Internet applications. Due to the rise of Web browsers, B / S gradually replaced C / S and was more widely used. With the maturity and popularization of computer network technology, especially the development of local area networks and the emergence of PCs, more and more users and enterprises have begun to use computers to manage some transactions. B / S maintenance and upgrade are simple. As long as the server is operated, the client does not need to be changed. [1].

Users only need to access the browser to access and operate, which simplifies the development, maintenance and use of the system. In the Belt and Road Business Cloud Service Platform system, the system uses the B / S structure for development. This system is the development of dynamic applications. It interacts with databases and caches. Fig. 1. is the architecture of the system. After the system goes online, it needs to consider the large-scale concurrent interaction of users in countries along the Belt and Road. Multiple users log in to the system for use. Have a reliable, secure, and easy-to-maintain application.
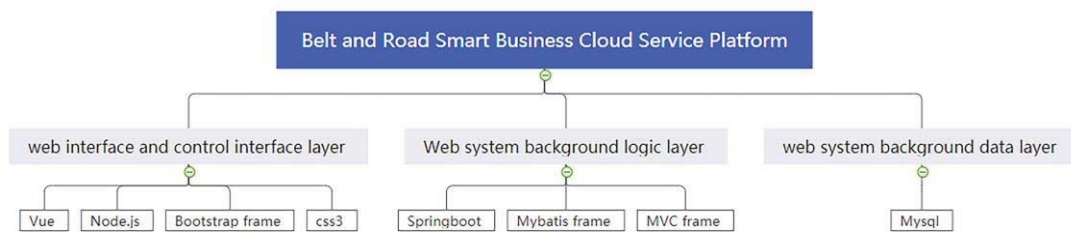

Fig. 1. System architecture

B. Web Services Technology

There are many server software released using WEB sites. Commonly used are Nginx, Sun, Jetty, Apache, etc. Most of the software can be used across platforms. However, it should be noted that due to the different architectures and operating principles of various software, various software may show different performance on different platforms. Functionality and operational performance are two key points to consider simultaneously for Web servers. This project is based on Tomcat server and Nodejs server for front-end separation.

Tomcat is an open source, small, lightweight application backend server. It is widely used in small and medium-sized systems and where there are not many concurrent users. Compared with the Apache server, Tomcat can dynamically generate resources and return them to the client. The dynamic resource is the opposite. The content accessed by different clients at different times is different, for example: a page containing the current time and a page showing the current IP address. Similar servers such as Apache and Nginx do not support generating dynamic pages, they must be supported by other modules.

Node.js is currently the fastest JavaScript engine with non-blocking, event-driven I / O and other features. It is more efficient than PHP and has a lower learning curve. The most important feature of Node.js is event-driven, which

means that the server responds only when the user has an event. Node.js acts as a server for the browser to forward data to the back-end server and control the logic of page jumps with methods designed for routing.

C. Server technology

The Spring open source framework is a research and development software product based on the JEE framework with the highest market share. The Spring MVC framework (MVC is the Model View Controller Organize code in a method that separates business logic, data, and interface display) launched by it is widely used in the research and development of various web products. Spring has released multiple versions, but the biggest difference between each version is that the tedious configuration work is gradually reduced as the version is updated, that is, the Spring framework has been committed to solving the tedious configuration work problem. The SpringBoot project is a new Spring framework developed by the Pivotal team. The purpose of its development is to solve the complex configuration operations in the Spring development process and ultimately achieve zero configuration. Its simplified application development and construction process frees developers from cumbersome configuration files and devotes a lot of energy to project logic research and development. It is committed to becoming a leader in rapid application development.[2]

D. Database technology

In the database management system (DBMS), there are many database products such as NoSql, Oracle, DB2, Mysql, etc. We choose to use the Mysql database according to the application support of interactive languages, database performance analysis, portability and other aspects.

Mysql is a highly extensible database language that supports compilation on different compilers and works on different platforms. Provides C, Python, Java, PHP and other interfaces. Many large and small enterprises, websites and databases now use Mysql as the back-end database. Mysql will automatically balance and normalize to optimize performance. The database is responsible for ensuring the internal and external security of the database content. Mysql can configure authorized users to protect data to only be accessed by authorized users.

E. Crawler technology

Web crawlers are also called web spiders, and their function is to download and analyze different web pages. Search engines such as Baidu and Google rely on a large number of web crawlers to search and analyze on the Internet, establish links to keywords in web pages, store them, calculate relevance, and sort them before displaying keywords to users.

At present, there are many mature and mature crawler frameworks that can be called through Python, such as Mechanize, BeautifulSoup, pyquery, Scrapy, etc. These libraries or frameworks have their own advantages, and Scrapy is one of the most prominent frameworks. Scrapy is a Python-based crawler. The Scrapy framework was developed to complete some structured data acquisition and other functions. Scrapy can be applied to a variety of common areas in daily life. [3].

III. SYSTEM ANALYSIS

A. Business analysis

The Belt and Road Business Intelligence cloud service platform has distributed the large number of data resources of the "Belt and Road" and the difficulty of obtaining research and decision-making data. It adopts distributed data collection and search to mine and analyze big data, providing users with more efficient A lot of data for analysis and decision-making. This project is based on the main data and situations of the countries along the "Belt and Road", and builds a "Belt and Road" business intelligence cloud service platform with a large amount of data resources and accurate analysis of the data. It also provides information research and decision support for the advocated "going out" strategy.

B. Role analysis

- Administrator: The administrator is responsible for crawling various information of the Belt and Road, such as product analysis related to the Belt and Road, investor contact information, the latest policies of countries along the Belt and Road, various types of information, and the management of their status and equipment. Lease.

- Renter: The person who rents the equipment can hand over the idle equipment to the platform and let the platform rent to the people who need it for the purpose of mutual benefit and win-win.

- Users: People who use the device can use the cloud service platform to understand news information that is difficult to understand by searching websites. Accurate and fast research and decision-making related to the Belt and Road Initiative.

C. Functional requirements analysis

The first is to analyze the problem, investigate the project, summarize the project information, classify and analyze, understand the general situation of the existing project, improve the function, list the problem points, and analyze one by one; the second is to combine the project based on the results of the problem analysis stage To define functional requirements and interface requirements. Functional requirements are the functional parts that users can directly use. Interface requirements are design-friendly platform interfaces and project background structure layout. Let the Belt and Road Business Intelligence Cloud Service Platform complete the basic function requirements while further optimizing functions and improving performance.

The project uses Scrapy, an open source web crawler framework. It is a powerful data collection framework developed and packaged using the python language. It provides a series of efficient and powerful components, and contains various plug-in or middleware interfaces. Build web crawlers quickly. The purpose is to crawl news information related to the "Belt and Road" on the Internet and extract structured data. Through accurate and precise data to stand out from the cloud service platform, strengthen data analysis and mining, and give users a better experience.

D. Functional requirements analysis

The main process of the experiment (Fig. 2.) includes demand feedback, business research, data preparation, data mining and analysis, and results display. As shown in the figure below, the big data risk control model programming uses Python language, the deep learning software library uses TensorFlow or SKLearn, and the result display adopts Echart implementation, data collection and processing are based on Alibaba Cloud services.[4]

IV. SYSTEM DESIGN

A. Authors and Affiliations

This system is a WEB management system. The front-end display uses CSS, Vue and other technologies to optimize the interface. The back-end uses python language to crawl the data and process the page data. The database uses MYSQL technology to store the data. The project contains seven functions. The first is the display of basic data. This block function can display the data of the database through charts and other forms, so that users can view and analyze the data as soon as they enter the system. The function of the investment management agency can Investment management personnel or institutions to perform related operations, or get in touch; etc. . The advisory function will display the crawled real-time latest information to users, making it easy for users to understand the latest global information. The detailed data module provides more detailed data references. At the same time, users can query the data, and can find out the trade data of multiple countries by macro, region, and time. Planning

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solutions help users plan data processing solutions. International business policies and regulations show international business policies and regulations.
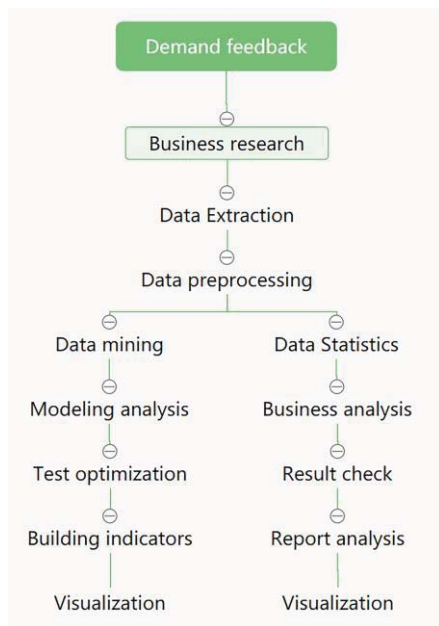

Fig. 2. Technical process

B. Research on equipment sharing module design

The rapid development of information technology and network technology has provided a strong supporting environment for remote sharing of valuable instruments and equipment. The sharing of resources and equipment between different enterprise teams through the network can not only improve the use level and utilization of resources, but also improve the education and scientific research capabilities in backward areas, and strengthen cooperation and exchanges between enterprises or teams. To this end, the system has opened a research equipment sharing module. The module homepage displays the shared equipment resources. The user selects the equipment he wants to use, and uses the online application to share the equipment, and then selects the shared usage mode according to different equipment.

In the sharing process of network-based instruments, the main technologies involved are: management of various devices in the network; dynamic scheduling of resources, resource reservation, and reserved services; adaptive and self-processing of network congestion; data Real-time storage and retrieval services; instruments and equipment, execution systems and remote access, reliable transmission services between systems; support for dynamic visualization, etc.

The main methods of device sharing implementation are:

- Realize command remote control, instrument local control, data local or remote analysis, processing and display. In this method, the local full-time personnel control the instrument, which reduces the remote user's operating skills and experience requirements; effectively avoids virus infection, and can also transfer the experimental data analysis and processing to the remote user in real time.

- Remotely operate instruments and equipment directly through the network. On the basis of the first layer, remote users have the knowledge and skills requirements for large and valuable instruments and equipment, and have established a good cooperation and trust relationship with the instrument and equipment side. The networked instrument and equipment sharing system has also accumulated anti-virus experience.

C. News module design

The innovation of interconnected technologies and the mature development of the Internet have made the collection and arrangement of news resources a necessity for data analysis. At the same time, the collection and collation of a large number of news resources requires stronger professionalism and higher human and material capital. Making full use of the finished news resources can better process and analyze the Belt and Road data obtained by this system, and can promote the full use of limited resources. At the same time, it can also solve the problem of time and space constraints and the inability to obtain full-time news in real time.

In the design and development of the Belt and Road business intelligence cloud service platform system, a news information module is specially designed. The main function of this module is to crawl all news information about the Belt and Road module on the network in real time, and then through the relevant processing of the system, the module will process After the news content is displayed, users can view the real-time news information through this module, better help themselves to obtain the information of the Belt and Road construction, and make their own decisions and judgments.

D. Database Design

In the design and development of the Belt and Road business intelligence cloud service platform system, because the front end performs logic processing through JavaScript and jQuery, the display data is called by calling the interface provided by the back end, and the back end directly uses functions to operate the database. Layer calls, add, delete, check and modify the database, and finally present the database data to complete the database management. This system is designed with MYSQL database.

E. Mobile platform design

With the rapid development of the Internet, the mobile Internet has gradually become the main driving force of information technology. Compared with the traditional Internet, the mobile Internet emphasizes that it can be connected to the Internet and use application services at any time and place: Terminals, access networks, and unique applications due to the characteristics of terminals and mobile communication networks.

Therefore, the business intelligence cloud service platform designed for the Belt and Road Initiative has realized a mobile platform for device sharing. This mobile platform refines device sharing, and enables users to complete the query and search of shared devices through this module, detect the device status in real time, and check the device Management operations. The device can be detected and managed at any time by the user carrying the terminal and using the terminal at any time, which provides more convenient and simple operation and use for the user's device

management and use.

V. SYSTEM IMPLEMENTATION

From the above requirements analysis and requirements design to the related design of the database, we can start to implement the specific details of the business intelligence cloud service platform of the Belt and Road Initiative. The system is geared towards personnel from various countries who are concerned about the "Belt and Road" information. According to the questionnaire of appeal, the interface needs to be concise and easy to operate, taking into account the stability of the system, using the current popular development framework and methods.

A. System operation development environment

- Belt and Road business intelligence cloud service platform based on WEB architecture.

- Front and back processing based on B / S architecture.

- Adopt ajax, Vue for front and back interaction.[5]

- Database-based physical modeling.

- Database access uses MYSQL technology.

- Use JS, CSS, etc. for interface drawing.

Configure the Apache Tomcat server, use the idea tool for development and create a folder "img" as the project root directory, the related image resources, Js or jQuery JAR packages, etc., and create subfolders according to functions.

B. System core function interface display

Through each function design flow chart obtained during the system design phase and the system menu of each function group, the business intelligence cloud service platform for the Belt and Road has a preliminary prototype, including: system catalog, basic data , Investment management agency information, research equipment data, information, detailed data, planning schemes, international business policies and regulations, equipment inquiry, equipment rental and other functions.

The system login module is mainly divided into three types of user roles, administrator, ordinary user, and super user administrator. User roles have different operation rights based on different levels. The super user administrator can have the operation rights of all users, and can perform operations such as adding, deleting, and modifying.

When the user logs in successfully, they will enter the main page of the business intelligence cloud service platform for the Belt and Road Initiative (Fig. 3.). The main page shows the basic functions of the platform. The data chart visually shows the information the user wants to get.
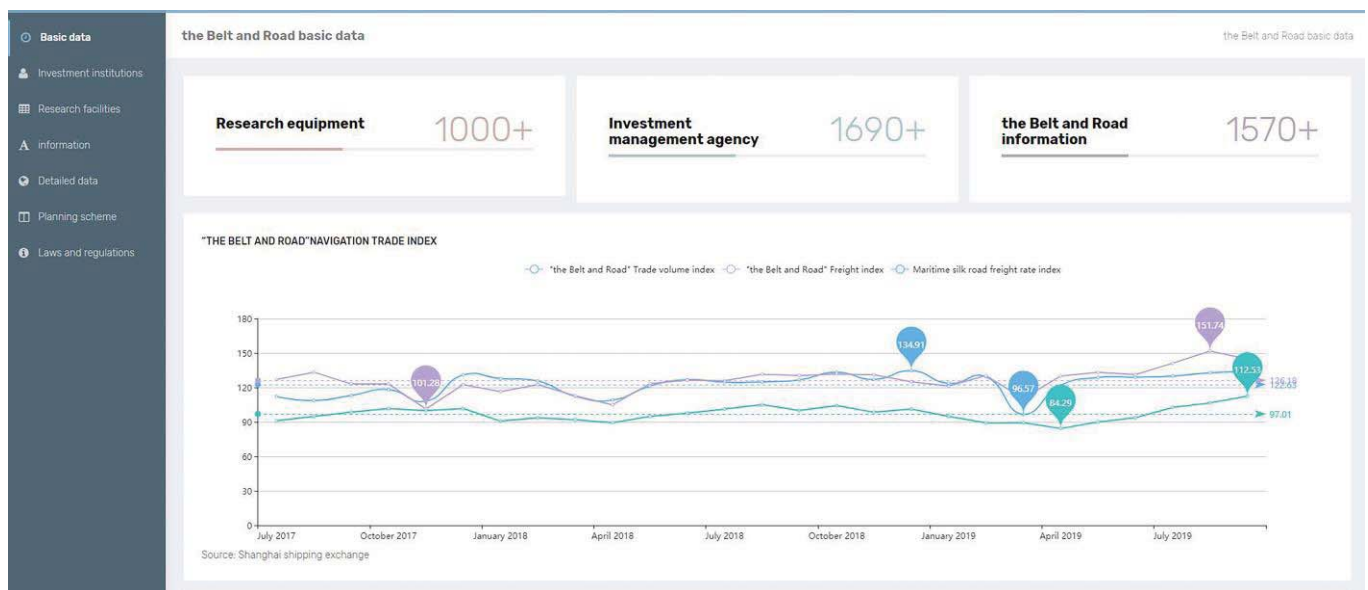

Fig. 3.   Platform main interface

The business intelligence cloud service platform for the Belt and Road provides a service for sharing scientific research equipment along the Belt and Road. Users can use the equipment to complete scientific research or business activities through time uploading, booking and other functions.

Use a large number of web crawlers to search and analyze on the Internet, establish links to keywords in web pages, store them, calculate relevance, and sort them before displaying keywords to users. Through pyQuery, Scrapy and other libraries or crawler frameworks, detailed information

about the Belt and Road Initiative on the network will be collected, classified, optimized, and displayed to platform users.

Through the analysis, aggregation, and analysis of data from the Belt and Road network, big data analysis and data mining are performed. Data sources are needed for analysis. This project is obtained from the Internet, from the literature or internal materials, to find these data from the Internet, to automatically obtain investment management agency information from the Internet, and to obtain the content of these data (Fig. 4.).

Fig. 4. Investment Management Agency Information List

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In the context of the rapid development of the Internet era, the information technology as the main driving force in the mobile Internet era is promoting the continuous and wide development of social productivity. Mobile Internet is gradually infiltrating into all areas of people's life and work, and mobile Internet applications are developing rapidly. The mobile Internet inherits the open and interactive features of the PC Internet, and at the same time has the characteristics of real-time, privacy protection, portability, accuracy, and positioning. So the biggest feature that a mobile terminal website needs to have is simplicity and ease of use. So this project also developed a device sharing mobile platform.

Users can rent equipment or perform other operations according to the usage of the equipment and the introduction of the equipment. When a user wants to find a characteristic device, he can enter the device query module to find it. All device information can be found in the device information list.

VI. CONCLUSION

In this dissertation, the Belt and Road business intelligence cloud service platform is finally presented through a series of work including literature analysis and actual user requirements for the project, as well as project requirements definition, design, development, and testing.

This system cannot be said to cover all the needs that all users may have in use, but it also realizes most of the user needs and can optimize the user experience. This project first searched domestic and foreign business data service platforms, such as Data View, Data Hall, China Business Data Platform, Flushing and other business data service platforms, used and learned, and extracted ideas for better implementation, and merged into this project. At the same time, a questionnaire is conducted on a certain data commerce service platform that can obtain the requirements, and the specific process of the data commerce platform is studied to implement and improve the function and design of

this system one by one.

The system technically uses relatively advanced front-back separation management technology. The front-end uses a Node.js server and develops web pages in Vue language. The back-end uses SpringBoot technology with MyBatis technology and MVC framework. The combination of technologies to develop the system is important to be efficient, not stuck, and the interface is simple and beautiful. Users pay attention to simple and clear information display, similar to diagrams, graphics and text.[6]

Compared with other business intelligence cloud service platforms, this system has more advantages:

- Use the learned technology to establish a project management system that is suitable for the front-end management system of the business intelligence cloud service platform. It will crawl real-time news information about various types of economies and policies along the Belt and Road countries. Categorize them and then display them to users on the web in the form of graphic text to improve user experience.

- Use the technology learned in project management in combination with the front-end system of the project to collect the factors and problems that affect the implementation of the project, and design a background management system suitable for the operation of the management staff during the life cycle of the project.

- In the past, other intelligent cloud service platforms could not monitor in real time, and could not dynamically understand the current problems encountered by the project. The management staff would also forget some issues to be followed because the project was more parallel. The system, the management staff can monitor the platform in real time, know the problem the first time, and start to solve the first time.

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