Research on Visual Logistics Big Data Information Service System

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Abstract—Big data visualization is a new technology, from the core functions of data collection, storage, calculation, scheduling, advanced search, and other core functions, and based on cloud computing to scientifically manage data to ensure data security and stability. How to use big data visualization in logistics management is a problem that needs to be solved now. The paper introduces the main functional modules of the urban logistics big data platform and its system design and implementation. The platform is an information service platform with "big data" as the core and "data analysis" as the center, using cloud computing, significant data tooling, and other information technologies are used to establish an urban logistics big data platform to realize comprehensive functions such as credit evaluation of logistics and warehousing enterprises, display of warehousing space distribution and analysis of warehousing resource usage, and improve the public service capabilities of logistics institutes.

1. Introduction
Based on the analysis of the logistics industry's current situation, it is necessary to form a big data environment with a "unified code" covering the whole country through the Internet of Things and big data technology to solve the "small scattered chaos fundamentally." However, to create a big data environment for interconnection, it must be established in a networked operating system with a better infrastructure platform network, information platform network, standardized operation system, and standardized integrity system, and multiple central cities should be selected for networked layout, to create a complete network hub node [1]. Because of the current bottlenecks in the logistics industry in terms of visualization, networking, and informatization, to make full use of these data and make logistics big data a reality, a data-driven business model is needed to promote the intellectual development of the logistics warehousing industry, Improve the storage utilization rate of enterprises, and provide scientific decision-making services for enterprises and governments by mining valuable data. The urban logistics big data platform can integrate warehousing enterprises and warehousing data within the city to provide enterprises with warehousing map services, warehousing demand services, financial services, and warehousing data center services.
2. The impact of big data on logistics companies

Big data is a new social development trend, a new application, a new technology, and innovation, a breakthrough. Logistics enterprises are traditional industries. When a traditional industry meets new developments and new technologies, it is bound to impact the traditional industry. To improve the competitiveness of traditional logistics companies, they must face up to their industries' barriers and look for opportunities in new development. The specific impact is as follows:

2.1 Big data has changed the structure of logistics systems

In traditional logistics companies, the logistics structure has only input links but lacks output links. Such a logistics structure can only meet part of the company's needs but cannot meet customers' needs. It cannot let customers know the logistics details of the purchased goods [2]. To a certain extent, this hinders the development of enterprises. Under the background of the development of big data, a new logistics system structure has been established, which not only includes information input from low-end to high-end, which is convenient for leaders to manage but also includes information output from high-end to low-end, so that customers can timely understand logistics information.

2.2 Big data leads a new logistics model

With the development of the era of big data, logistics to companies have achieved significant changes. Transportation companies allow their logistics and logistics to share data resources and distribution information, which saves costs and makes full use of various resources. Under the guidance of big data, a new operation model of "business flow" can be established to enable the logistics industry and e-commerce industry to achieve cross-industry cooperation. In 2013, the rookie station platform built by Alibaba at a cost was a "combined business flow" for various e-commerce companies, logistics companies, warehousing companies, etc., using Internet of Things technology and big data platforms. Marketing model.

2.3 Big data promotes logistics technology to a new level

With the development of information technology, my country's logistics enterprises have developed rapidly. With the application of intelligence and the logistics industry's expanding demand, the emergence of QR codes is the general trend. The QR code is a big data product, which carries a large amount of information, has a small footprint, and has no database occupation limitations. People can use their smartphones to scan the QR code to learn about logistics information, product origin, information sources, etc. The use of the QR code improves the entire logistics industry's efficiency, reduces labor costs, and promotes logistics technology to a new era.

3. Features of Visual Management System

Smart logistics can use various sensors of the Internet of Things to produce various forms of business data at any time. Structured and unstructured data has become the primary data storage format, such as text, audio, image, digital, video, and other data. The platform-based visualization technology of management information system performs calculations based on big data analysis, and then visually displays the results, analyzes the image display results, and combines interactive dynamic display [3]. Enable managers to rely on more intuitive and straightforward multi-dimensional data to make scientific management decisions quickly.

4. System platform framework construction

4.1 Overall structure design

The logistics big data management platform can be seen as a combination of essential software and basic hardware systems. With the help of blockchain intelligent technology, the order flow process is easier and faster, and the status of goods can be tracked anytime and anywhere according to the Internet of Things. Set up the control of authority, ensure the security of information, and fully reflect
container orders' circulation process. To develop the logistics big data visualization platform's software and hardware infrastructure and enable the logistics industry to move forward at high speed, a logistics big data management platform is built based on blockchain technology. The visual logistics management system architecture can be divided into a perception layer, network layer, application layer, and display layer, as shown in Figure 1 below:

The perception layer is located at the bottom, including the logistics information collection and collaborative networking sub-layer. The information collection sub-layer includes the front-end QR code tags and readers, RFID tags and readers, cameras, GPS, sensors, M2M terminals, information collection equipment, and systems such as sensor gateways; the collaborative networking sub-layer is mainly tooling and media for standardized processing, calling, and transmission of collected data, including data transmission and middleware. The network layer is located in the second layer. It is a tool and medium for collecting, storing and managing sensory information. It mainly includes wireless networks, the Internet, industry private networks, and mobile communication networks. The application layer is located in the third layer, including the application platform and the IoT application sub-layer. The application platform sub-layer mainly provides functions such as information sharing, cloud computing, and service support. It is an information integration service that integrates distributed and heterogeneous applications. Through a unified access portal, information resource aggregation realizes an integrated environment of information access, collaboration, and computing and provides various information services for upper-level Internet of Things applications [4]. The display layer is located at the top level, which mainly puts application system information on different types of public terminals, including large-screen systems, information portals, mobile devices, PC terminals, etc. In short, all links of logistics are displayed to different platforms through three-dimensional virtual reality, graphics, images, charts, etc., to better share logistics information in real-time.

4.2 Main functional modules of the system

The urban logistics big data platform is divided into the front-end user access site and the back-end administrator management site. Here only the front desk users visit the site. The front-end user access site is divided into three main modules: city storage map, city storage demand service, and city storage data center. As shown in picture 2.
4.2.1 City warehouse map module
The city warehouse map mainly displays the warehouse information released by users on the map visually. The city storage map module can count the number of logistics enterprises and logistics storage facilities in the provinces and cities. The basic map module is used to display the base map data of the warehouse map and has the basic map's usual functions: map zoom in, zoom out, translation, distance measurement, etc. Storage geographic information editing functions include address editing, map display, and storage other information editing display. Geographical graphic labeling of warehousing: Mark storage-related facility information on the map, such as gas stations, logistics companies, logistics parks, and production and processing enterprises.

4.2.2 Urban warehousing demand service module
The primary function of the urban warehousing demand service module is for platform administrators and users to edit and publish warehousing business demand information. Demand information mainly includes warehouse sales and leasing, warehousing investment invitation, warehouse and distribution integrated business escrow, warehouse custody, warehouse financial services, etc. The service information query's primary function is to query related business demand information according to classification attributes. The classification attributes are demand-type, storage location, belonging area, time limit, area requirement, storage type, etc. The service information recommendation function is to provide users with relevant business information based on their search history.

4.2.3 Data Management
The data management module manages the storage targets visually and stored data of distributed file systems, distributed databases, distributed relational databases, and other data. It generally covers data service interface management, metadata management, and data management. See detailed functional structure image 3.
The data service interface completes the registration and management functions of the service interface. The platform supports the standardized input interface and output interface and stipulates the data input, output interface, and interface technical standards [6]. At the same time, it can monitor the interface operation status and error information at any time. Data management enables visual query and maintenance of stored data and changes how Hadoop initially needed to query and maintain data stored in tables.

4.3 System database design

Based on the system's main functional modules, the primary database design needs include the following data tables, logistics warehouse attribute structure description table, warehouse building attribute structure description table, logistics enterprise index attribute structure description table, logistics enterprise backup index attribute structure description table, etc. The specific design of some tables is shown in Table 1 to Table 4.

Table 1 Description of attribute structure of logistics warehouse

| Serial number | Field Name                   | Field Type | Field length | Decimal places |
|---------------|------------------------------|------------|--------------|----------------|
| 1             | service-name                 | Char       | 50           |                |
| 2             | basic type                   | Char       | 20           |                |
| 3             | Construction status          | Char       | 10           |                |
| 4             | Administrative District      | Char       | 10           |                |
| 5             | city                         | Char       | 10           |                |
| 6             | Development method           | Char       | 50           |                |
| 7             | Investment and construction subject | Char | 50 | |
| 8             | Source of construction funds | Char       | 20           |                |
| 9             | Construction level           | Char       | 20           |                |
| 10            | Service positioning and characteristics | Char | 20 | |

Table 2 Description of warehouse building property structure

| Serial number | Field Name                | Field Type | Field length | Decimal places |
|---------------|---------------------------|------------|--------------|----------------|
| 1             | Building name             | Char       | 20           |                |
| 2             | Owned logistics park      | Char       | 20           |                |
| 3             | Building ownership        | Char       | 50           |                |
| 4             | Building use              | Char       | 20           |                |
| 5             | Building floor number     | Int        | 3            |                |
| 6             | Area                      | Float      | 10           | 2              |
| 7             | construction area         | Float      | 10           | 2              |
| 8             | Completion time           | Int        | 4            |                |

Table 3 Description table of index attribute structure of logistics enterprises

| Serial number | Field Name                  | Field Type | Field length | Decimal places |
|---------------|----------------------------|------------|--------------|----------------|
| 1             | Cargo throughput           | Float      | 10           | 2              |
| 2             | Average inventory          | Float      | 10           | 2              |
| 3             | Circulation processing volume | Float | 10 | 2 |
| 6             | A-level logistics company  | Int        | 4            |                |
| 8             | Total business income      | Float      | 10           | 2              |
| 9             | Total tax                  | Float      | 10           | 2              |
| 11            | Number of employees        | Int        | 4            |                |
| 12            | Number of the logistics    | Int        | 4            |                |
division
| Serial number | Field Name       | Field Type | Field length |
|---------------|------------------|------------|--------------|
| 13            | Total imported goods | Float      | 10 2        |
| 14            | Total export goods | Float      | 10 2        |
| 15            | year              | Int        | 4           |

Table 4 Description of the attribute structure of the alternate indicators of logistics enterprises

5. Conclusion
In the era of big data, logistics companies must keep up with the times, take the initiative to understand customer needs and market changes and make timely adjustments to their work plans for the next year. For example, optimizing the location of storage locations according to different logistics routes and developing new markets. Only by perfecting the logistics network system, taking full account of logistics cost, transportation speed, transportation consistency, and matching degree with logistics nodes can we win in the era of big data.

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