

# System of Mining and Analysis of Business Administration Data Based on POS Intelligent Algorithm

Peixian Wu

{38562401@qq.com}

Lyceum of the Philippines University, Claro Reto Institute for Advanced Study, Manila, the Philippines

**Abstract:** The blockchain consensus algorithm ensures that blocks in the blockchain are generated in an orderly manner according to timestamps, and the algorithm ensures that blocks are automatically and quickly generated by the main node. In order to better utilize internet platforms, more and more enterprises choose to use the internet as their operating platform to expand their sales channels. This article analyzes the actual needs of enterprises and combines their own characteristics to design a business management data mining and analysis system. This paper analyzes the sales data of a company's retail department through POS intelligent algorithm, gives the results of Analysis of algorithms, and applies them to the business management data mining and analysis system. This article summarizes and analyzes business management data and makes predictions, providing a basis for further optimization of the system, and to some extent improving the efficiency of data processing for small and medium-sized enterprises.

**Keywords:** Business administration data, data mining, POS intelligent algorithm

## 1. Introduction

The rapid development of the information age is marked by the collection and intelligent application of information data. With the deepening development of informatization, data has become a strategic resource, and being able to master enough data is a symbol of enterprise development and growth. In the era of big data, how to use data mining technology to improve data collection speed and data quality is an important research direction for all industries to break through development bottlenecks [1]. Through the development of data mining technology, data is collected and analyzed from multiple channels to provide intelligent information services for the development of the industry, transforming a large amount of diverse data into valuable information resources, and expanding the industry's development space. With the continuous deepening application of data mining technology in the field of

big data analysis, it has promoted the development of the information age, and also urged all industries to devote themselves to the precision services brought about by big data analysis, which has become the guide for seeking industry development. It cannot be ignored that in order to fully utilize the benefits brought by data mining technology, it is necessary to face some inevitable industry shocks and technical problems, and to improve information management mechanisms and enhance information service capabilities in a scientific and reasonable manner. In management information systems, data mining technology can be divided into five parts: data collection layer, integration layer, storage layer, analysis layer, and service layer. It is the execution standard for data mining algorithms to ensure the standardized operation of management systems [2]. The management information system needs to handle multiple business aspects, allocate the application direction of data mining technology according to management requirements, and improve the utilization efficiency of data mining technology. Data mining technology can only maximize its advantages by penetrating into various levels of the system, comprehensively allocating the scope of data mining, standardizing the operation process of the management system, and promoting the management system to maximize work efficiency in a standardized operating environment [1].

## 2. POS Intelligent Algorithm

### 2.1 POW Intelligent Algorithm

Typical public chains that use POW as a consensus mechanism include Bitcoin, Ethereum, etc. In the Bitcoin system, by continuously retrying the value of n Nonce, the range of n Nonce is 0 to 232. If inequality (1) is met, that is, the condition for generating blocks is met. If the node that meets the condition for n Nonce is found, the transaction record can be packaged and assembled into the block, and then the block can be sent to other nodes for verification through a P2P network [2].

$$\text{SHA256}(\text{version}+\text{prev\_hash}+\text{merkle\_root}+\text{n time}+\text{n bits}+\text{n nonce}+\text{x}) < \text{TARGET} \quad (1)$$

Among them, SHA256 is the hash algorithm that generates a 256 bit message digest, version is the version number, and prev\_ Hash is the hash value of the previous block, merkle\_Root is the current block transaction tree root hash value, ntime is the timestamp, nbits is the current difficulty value, x is the block filling information, and TARGET is the target value. The Bitcoin system calculates a new TARGET based on the generation time of the first 2016 blocks and the difficulty of a single block, to ensure that the system dynamically maintains a block generation time of 10 minutes.

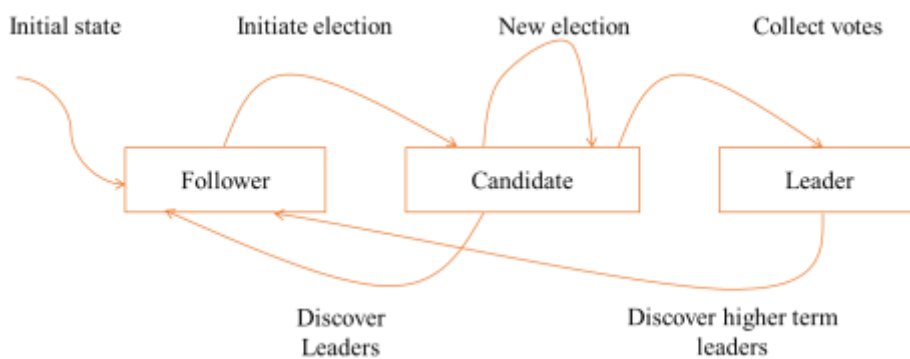
### 2.2 POS Intelligent Algorithm

To avoid wasting a large amount of computing resources caused by the POW algorithm, the POS algorithm represents the rights based on the number and time of tokens held by nodes. The larger the rights, the easier it is to obtain the conditions for generating blocks.

$$\text{Hash}(\text{n Stack Modifier}+\text{tx Prev. block. n Time}+\text{tx Prev. offset}+\text{tx Prev. n Time}+\text{tx Prev. vout. n+n Time}) < \text{bn Target} * \text{bn Coin Day Weight} \quad (2)$$

Among them, Hash is the hash algorithm, n Stack Modifier is the weight correction factor, tx Prev. block. n Time, tx Prev. offset, tx Prev. n Time, tx Prev. voice. n is the Unspent Transaction Outputs (UTXO) attribute, n Time is the timestamp, bnTarget is the target value, and bn Coin Day Weight is the currency age. Nodes can continuously retry their UTXO holdings, and if inequality (2) is met, they can package transaction records and assemble them into blocks, which are then sent to other nodes for verification through P2P networks [3].

The overall principle framework of the Raft consensus algorithm is a state machine based on the Log replication mechanism. All nodes have three states: Leader, Follower, and Candidate, as shown in Fig. 1.



**Fig. 1.** Node Status Conversion

Starting state: The node automatically enters the Follower state when it is first started. Initiate elections: After the election timer expires, the node switches to the Candidate state to initiate elections. New election: If there is no leader before the expiration of an election, keep it in the Candidate state to start a new election. Collect Votes: Received more than half of the node votes and switched to a new leader. Discovering a leader: If you receive a message from a leader or higher, switch back to the Follower state. Discovering leaders with higher tenure: If you receive a message of a higher tenure, switch back to the Follower state. The current term is saved in each node state, and the node will carry its current term number when communicating. If a node in the candidate or leader state finds that its current tenure number is already smaller than other nodes, it will switch to the follower state [4].

### 3. Design of Business Administration Data Mining and Analysis System

#### 3.1 Design Principles

The original data obtained in this paper comes from the daily business database of company A. After several years of data accumulation, the company has tens of thousands of customer data records and hundreds of thousands of product transaction data, which are relatively rich in data [5]. However, these data have a high repetition

rate, and the types of best-selling products in different regions are also different. Before data mining, this paper integrates the original data, that is, the original data is changed from application oriented to subject oriented. The subject of processing is commodity association analysis, and the output conclusion is association rules. The data processed is mainly from the commodity sales table and the sales data in a certain period of time in the commodity table for association analysis.

(1) Friendly interactive interface: While implementing system functions, the level of computer operation varies due to different audiences [6]. From product development and design, production processes to warehousing, different personnel need to have different computer usage technical requirements, which need to be integrated into a unified network platform and comply with industry standards, making it more convenient for operators to directly use the platform. It is very important for a system to make its operation as simple and understandable as possible.

(2) Comprehensive practicality design principle: In the entire business management data mining and analysis system, targeted, economical, and practical considerations should be taken into account. The system design should fully highlight the characteristics of operability, friendliness, and ease of use, so that users at different levels can operate and use it smoothly in a relatively short period of time [7].

(3) Ease of use and upgradability principle: Due to the widespread implementation of online sales management systems in many small and medium-sized enterprises and units, and the increasing number of application functions in the system, we still need to continuously update and upgrade in the later stage, so the system needs to be easy to upgrade.

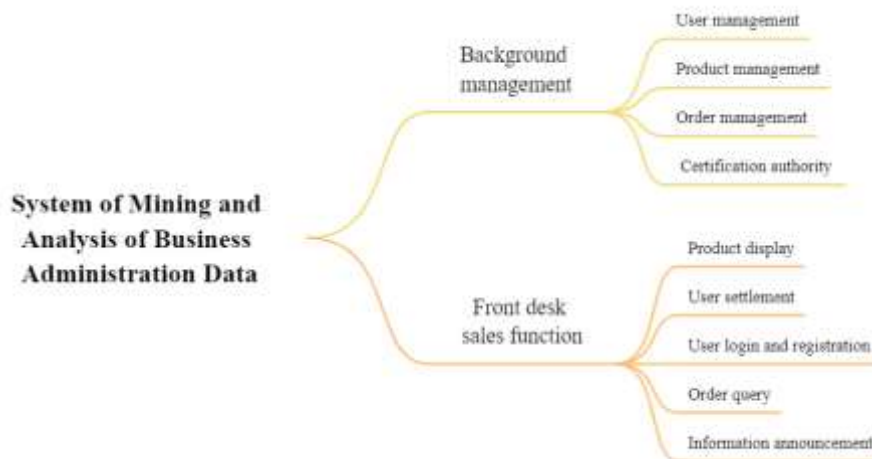
(4) System security protection principle: Business management data mining and analysis system applications are mainly deployed in the network, so we need to focus on analyzing and considering their security, adopt effective protective measures, and reduce the security risks caused by malicious attacks or accidental operations [8].

(5) Progressiveness principle: In the process of design and development, the system uses POS intelligent algorithm as the system development tool and database. In order to achieve automatic data calculation, minimize manual interference, and utilize mature technology to ensure normal and reliable operation of the system, this design also has good feasibility to a certain extent.

### **3.2 System Structure**

The general functional structure diagram of the business management data mining and analysis system is mainly composed of the administrator and various functional modules of the system. The main module includes two parts: foreground sales and background management. After using analysis of algorithms, the product is automatically updated and displayed on the product display page [9]. The authentication and authorization module, including super administrators, administrators, and other personnel, mainly functions to authenticate and set permissions for personnel using the system, ensuring that users can safely use the system and standardizing the scope of responsibilities of administrators. Background management: including user management, product management, order management, etc., among which product management includes product types and characteristics. To ensure more efficient and accurate human-computer interaction, efforts should be made to ensure the accuracy and readability of information. The operation of the

system cannot be separated from the information flow of the front-end page information. It is necessary to avoid visual and action interference, try to reject promotional strategies such as accompanying advertising delivery services, and avoid the impact of pop-up windows on the user browsing interface. It is also necessary to reduce the occurrence of subsequent problems caused by accidental actions of browser scripts caused by user movement of the mouse. The structure of the business management data mining and analysis system is shown in Fig. 2.



**Fig. 2.** Structure of System Mining and Analysis of Business Administration Data

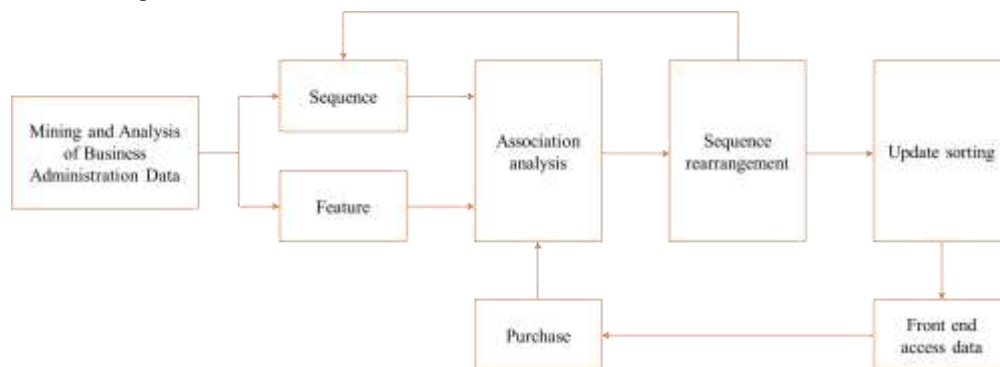
### 3.3 Database Design

Due to the characteristics of too much repetitive data, large data volume, cumbersome manual operations, and unclear data correlation, various data calls and assignments are completed by the database. The database is related to the smoothness of the entire system, whether it will cause more problems when maintaining, changing functions, and expanding functions in the later stage, and coordinates the data calls and assignments of the entire system. Therefore, the database is an indispensable part of the system design process. In this article, a MySQL database is used, and POS algorithm and clustering analysis are used to extract product data information between the system function module and the database. According to the system design requirements and the division of each module, the general data structure table is given first, including user groups, commodity type data table, commodity information data table, commodity display page and other data tables, and user permission data table. For different users with different permissions, enterprise Superuser give corresponding user permissions, so that the scope of actual operation rights can be realized in the system is the same as in reality. Auth\_ User represents the system user table, including attributes such as username (ID), password, last login, whether it is a super administrator, email, job title, status, and registration time. The Carousel

product display page data table mainly displays the best-selling products after optimizing the system based on association rule mining results [10].

### 3.4 Module Design

The login interface of this article is mainly designed for administrators and users of the system, so the user interface design mainly considers efficiency, security, simplicity, and practicality. At the same time, the main application function of this module is to manage users after logging in to the system. As the login design involves the same user permissions, different users need to register first when logging in to the system. After obtaining the account and password, the backend retrieves information based on the strings entered by different users [11]. Once the login user's permissions are confirmed, they are assigned values based on the pre given user permission type. If the permission type assigned by the administrator cannot be matched during the period, login will be denied. We will provide a brief explanation of the preliminary screening process after the product is imported into the system. The filtering idea is that product data analysis is based on the relevant data of the company in May. According to the needs of data analysis, corresponding data items are filtered, the relationship parameters between data items are set, and a dataset is determined according to certain filtering principles. Then, the data is preprocessed and POS algorithm is used for association mining to obtain the results of product information on the display page. First, the original data is imported to obtain the default sorting and commodity characteristics, such as the length, width, and height of the commodity. Then, the association analysis is carried out according to the two main contents to update the commodity sorting, and the updated information is fed back to the system. Secondly, the front-end accesses data, such as the duration of time spent on a certain product, the quantity and frequency of purchases, to form customer purchasing behavior, which then affects the system and uses correlation algorithms to analyze customer behavior, and so on. The process of displaying page updates is shown in Fig. 3.



**Fig. 3.** Display Page Update Process

The steps of data mining are as follows:

- 1) Identify application areas: including basic knowledge and objectives in this field.

- 2) Establish target dataset: Select a dataset or focus on subsets of multiple datasets.
- 3) Data preprocessing: In big datasets, based on demand, data purification and integration techniques are utilized to select task related data and reduce the amount of data processed without reducing its accuracy.
- 4) Data conversion: Find the features of the data for encoding, reducing the number of valid variables.
- 5) Data mining: Determine the corresponding mining algorithm based on the data and the type of knowledge to be discovered.
- 6) Data evaluation: Display the mined knowledge and data in various visual ways, and store them in a library in graphical, textual, and other forms for further mining until satisfactory.
- 7) Implementation and application: The application of models established using data mining technology in practical projects, including database construction, personalized user services, knowledge-based enterprise information management (MIS), enterprise goal management, decision support, and so on.

## 4. System Implementation and Testing

### 4.1. Design Principles

The system development environment is shown in the table below:

**Table 1.** System Development Environment

CPU	Inter (R) Core (TM) 2DuoT6750
Internal storage	12GB
Hard disk	1T
Operating system	Windows 10
System Design Environment	anaconda+ pycharm
Database type	MySQL

In the retail industry, especially the e-commerce industry, product ranking is a very important factor. Taking Taobao as an example, the factors that affect product ranking generally include correlation, window recommendations, transaction volume, transaction conversion rate, product weight, and store weight. The correlation of products mainly includes quantity correlation, attribute correlation, and title correlation, which are closely related. In this system, we have selected the ranking of products in the same type of goods and the ranking in all types of cases as the basis for optimization. Firstly, during the initial import of product data, due to the pre-set attributes such as product title, type, and text introduction, we do not know the ranking of a certain product among the same type and all products. Therefore, we use a random setting method to rank these two attribute values. After adding or importing this part of data, save it, and perform POS intelligent Analysis of algorithms on the product display page. After many times of verification and optimization analysis, it

can be concluded that the POS intelligent algorithm can achieve the Order of precedence of goods on the display page of goods in this system, and can be better applied to this system. It can provide better services and decision support for the placement and arrangement of goods in the retail process. At the same time, the algorithm can also affect other modules of the system. After adding and deleting relevant content, we use POS intelligent algorithm validation to update and optimize product display pages [12].

#### **4.2. System Testing**

The operation and testing of the system are the last step and one of the important means for us to ensure the normal operation of the system equipment. We operate various operating modules of the system under fully controlled working conditions and evaluate the results after each operation. System testing is usually the process of automatically executing an application program to detect errors. It is not only an organic component of various stages of enterprise software development, but also occupies a considerable proportion in the entire enterprise development project. Before being launched, players are recruited for internal and public testing, and enterprise systems need to be tested at each stage of development. System evaluation refers to the review or evaluation of a system's functionality, technology, and economy after a period of formal operation. The system functions and technology, based on the goals formulated before the development of this system, have been tested multiple times after the application system development is completed, and have basically achieved the actual goals reserved by users. In the actual use process, they can meet the actual needs of users. This system has achieved the design goals and requirements within the specified time frame, and after being put into use, it has saved a lot of manpower, material resources, and financial resources for enterprise users. The management level of warehousing has also been improved to a certain extent. Through comprehensive testing of the system, all test items have been passed and the basic requirements have been met, and the system can operate normally. This chapter explains the development environment and related development technologies for implementing a business management data mining and analysis system. Provide a concise explanation of all modules implemented in the business management data mining and analysis system. Use the POS intelligent algorithm one clicks analysis function to automatically perform correlation analysis on hot selling products after updating the backend database of product data, and update and display them on the product display interface. Finally, summarize and test the system in this article, and the system runs normally.

### **5. Conclusions**

This article focuses on the current application trend of data mining technology in business management data mining and analysis systems, analyzes the development needs of the system, studies how to use classic algorithms in data mining technology to analyze and verify sales data, and finally selects POS intelligent algorithms for comprehensive research. Through analyzing and researching the same set of data using POS intelligent algorithms, it was found that POS intelligent algorithms mainly affect the problem of product ranking, and can adjust the position of high-frequency



products within a certain time period based on the relevant characteristics of the products. We use association rules to explore the potential relationships of products and optimize their ranking in business management data mining and analysis systems.

## References

- [1] Jamal M T, Anwar I, Khan N A, et al. Work during COVID-19: assessing the influence of job demands and resources on practical and psychological outcomes for employees[J]. *Asia-Pacific Journal of Business Administration*, 2021, 13(3): 293-319.
- [2] Abbasi S G, Tahir M S, Abbas M, et al. Examining the relationship between recruitment & selection practices and business growth: An exploratory study[J]. *Journal of Public Affairs*, 2022, 22(2): 24-38.
- [3] N. Kayondo, B., & Kibukamusoke, M. (2020). Effect of Monitoring and Evaluation Processes on Student Course Completion in Universities. *International Journal of Technology and Management*, 5(1): 15-17.
- [4] Roetzel P G. Information overload in the information age: a review of the literature from business administration, business psychology, and related disciplines with a bibliometric approach and framework development[J]. *Business research*. 2019. 12(2):479-522
- [5] Xie B, Zhang F. Design and Implementation of Data Mining in Information Management System[C]//2022 International Conference on Knowledge Engineering and Communication Systems (ICKES). IEEE, 2022: 1-5.
- [6] Sivarajah U, Irani Z, Gupta S, et al. Role of big data and social media analytics for business to business sustainability: A participatory web context[J]. *Industrial Marketing Management*, 2020, 86(1): 163-179.
- [7] Mio C, Panfilo S, Blundo B. Sustainable development goals and the strategic role of business: A systematic literature review[J]. *Business Strategy and the Environment*, 2020, 29(8): 3220-3245.
- [8] Gil-Gomez H, Guerola-Navarro V, Oltra-Badenes R, et al. Customer relationship management: digital transformation and sustainable business model innovation[J]. *Economic research-Ekonomska istraživanja*, 2020, 33(1): 2733-2750.
- [9] Khademizadeh S, Nematollahi Z, Danesh F. Analysis of book circulation data and a book recommendation system in academic libraries using data mining techniques[J]. *Library & Information Science Research*, 2022, 44(4): 101191.
- [10] Zhou L, Zhu Z, Xie X, et al. Coupled thermal-hydraulic-mechanical model for an enhanced geothermal system and numerical analysis of its heat mining performance[J]. *Renewable Energy*, 2022, 181(2): 1440-1458.
- [11] Xie J, Ge F, Cui T, et al. A virtual test and evaluation method for fully mechanized mining production system with different smart levels[J]. *International Journal of Coal Science & Technology*, 2022, 9(1): 41-42.
- [12] Liu S Q, Lin Z, Li D, et al. Recent research agendas in mining equipment management: A review[J]. *Mining*, 2022, 2(4): 769-790.