Design and implementation of financial data statistics and risk early warning analysis system in the era of big data

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Abstract. In the era of big data, the financial field is facing more and more data statistical risk, in order to ensure the continuous improvement of the financial economic development level, Chinese scholars put forward the transformation of the traditional non-empirical analysis method and artificial subjective evaluation method, reasonable use of experts system and information technology as the core management mode. From the perspective of overall development, traditional assessment methods still play an important role in financial data statistics and risk early warning analysis, while the application level of relevant information systems and expert systems is not high. Therefore, in the future innovation and development of the financial field, it is necessary to continue to discuss the design and implementation of financial data statistics and risk early warning analysis system in the era of big data. After understanding the statistical characteristics of financial data and the design principles of risk early warning system in the era of big data, this paper mainly studies the design structure and implementation of financial data statistics and risk early warning analysis system, which will play a positive role in enhancing the competitiveness of financial institutions in the new era.

Keywords: Big data; Financial data; Data statistics; Risk early warning; Network topology.

1. Introducion

In the rapid development of social economy and science and technology, the pace of innovation of Internet finance is becoming faster and faster, but the content of practice research is mainly reflected in the economic field, and the relevant regulatory measures have not followed up in a timely manner, resulting in more and more significant macro and micro risks of Internet finance. In order to effectively control the security risks of Internet finance, guest scholars proposed to build a network financial risk early warning system based on big data. Only in this way can the safe and stable development of Internet finance be guaranteed. In the innovation and development of network finance, big data technology will be integrated in different stages, among which the data sources applied in financial risk control are mainly reflected in the following aspects: First, e-commerce big data. Taobao, Tencent, Jingdong and other e-commerce companies have stable and abundant data sources. Enterprises can provide credit services for the society by establishing a rich data system and comprehensively evaluate the credit degree of the system. Such information can help Internet financial enterprises judge the repayment ability of users and provide more appropriate financial and economic services for users. Second, credit card big data. [1-3]The big data of credit card websites are also of great value to the risk control of Internet finance, and also the main subject of Chinese financial field in recent years, which belongs to the reference basis of individual credit rating; Third, big data on social networking sites. Big data of social networking sites is to use the relationship data of social networks and mutual trust between friends to determine personal credit rating. Fourth, small loan website big data. The big data of small loan websites is the credit data accumulated by various website platforms for a long time, including the basic information of lenders, credit lines, default records, etc. Fifth, big data of third-party payment. Third-party payment data is credit analysis based on users' consumption data. Monthly payment limit, direction of payment, brand of purchased products, etc., can be used as reference for personal credit rating. Sixth, life service big data. Big data of life service includes water, electricity, gas, cable TV, telephone, network fee, property fee payment, etc. These data information directly shows the living status of individual families, and is an important data in credit rating.

From the perspective of long-term development of network finance, although it can meet people's economic service needs to some extent, there are also many security risks, which are reflected in the following points: First, information technology is not safe. In the era of big data, although financial institutions have been reformed and developed under the guidance of Internet technology, the openness and diversity of the network itself lead to many uncertain factors in the operation of financial institutions, which will not only cause the system operation to be attacked by hackers, but also cause information leakage and other problems due to technical defects. Secondly, the technical level of credit is too low. From the current legal provisions and regulatory perspective, the network financial platform in the selection of users is not standard, the user registration cannot guarantee the scientific and perfect information, and does not establish a perfect financial account deposit insurance system, which will undoubtedly cause a great economic risk for investors; Finally, the level of self-discipline in the industry is low. Although there is a community of interests between investors and Internet financial institutions, they exist independently of each other. Therefore, in addition to effective constraints by legal provisions, a high degree of industry self-discipline should be achieved based on ideological ethics and industry credit. However, from the perspective of current development, the level of industry self-discipline is not high. Therefore, on the basis of understanding the current situation of financial data statistics and risk early warning analysis in the era of big data, this paper mainly explores how to use advanced technologies to build financial data statistics and risk early warning analysis system, and then plays an important role in the financial field.[4-6]

2. Method

2.1 Design Principles

In the era of big data, the financial data statistics and risk early warning analysis system should conform to the following principles: First, systematic. Financial data statistics and risk early warning analysis system is a complex system built for Internet financial risks, which covers all aspects of the development of the financial field. Therefore, the basic interests of each participant should be considered in the construction and application. Second, timeliness. Because the data information of the financial industry must be processed in time, the timeliness of the application technology should be emphasized in the establishment of the data statistics and early warning analysis system, so as to ensure that the staff have enough time for prevention and treatment, so as to avoid unnecessary security risks during the work of the system. Finally, accuracy. In the construction of financial data statistics and risk early warning analysis system, it is necessary to ensure the accuracy of the data information mastered, so as to avoid the wrong results of risk analysis in the financial field.[7-9]

2.2 Core Technology

In the era of big data, the analysis system of financial data statistics and risk warning usually uses the following core technologies: First, the use of Microsoft.NET development framework, COM/COM+ components to develop the B/S part of the system, to ensure that the system interface and background can be interactive application; Second, build an early warning analysis platform with C#.NET rich runtime library and integrated test environment; Third, the use of officePIA to achieve the technical integration of VB components, ASP.net and Excel templates, so that the system staff can complete the mapping of data combination, formula definition, rule verification, information display and other operations in accordance with the requirements; Fourthly, using the idea of data warehouse or data mining, providing a complete technical solution, rapidly extracting data information from multiple data sources, transforming and using expert judgment method to realize early warning analysis; Fifth, encapsulate complex SQL statements, use program syntax to establish SQL editor, truly realize the application of dynamic SQL technology, convenient for Excel symbol definition rules formula, truly meet the basic needs of users at will customization.[10-12]

2.3 System Requirements

First, the user interface approach. The financial data statistics and risk early warning analysis system will share user information, and the service functions provided by the system, such as user authority allocation and user information maintenance, are fully utilized by business management personnel. Secondly, the mechanism interface way. The financial data statistical information platform shall carry out various operations in accordance with the expected functions and services, including the hierarchical relationship of administrative institutions, basic information of administrative institutions, summary relationship of statistical institutions, etc. Third, the system operation mode. The system will be effectively connected with the integrated business system by means of data extraction and loading, and run relatively independent of other systems in the LAN. Finally, system operation and maintenance. In order to ensure the operation, maintenance personnel effectively process the operation of financial data statistics and early warning analysis system, comprehensively supervise the backup status of data files, and provide users with the running status of various remote services in the background within the scope of the overall platform, so as to ensure the safe and stable operation of the system.

2.4 Functional Architecture

The overall system design should have such basic functions as data summary, data verification, data modification and online filling, so as to truly meet the fundamental requirements of user data processing and finally form XML data files in line with the interface of the Banking and Insurance Regulatory Commission. The data access interface should be obtained from other systems using DTS technology and loaded into the target database after cleaning and conversion. Financial data statistics should be utilized and realized by technology. Specific modules include data query, file generation, data filling, work tasks and other basic contents; Risk early warning analysis shall use technology to provide basic modules such as rule definition, data acquisition, analysis and display. The overall design is shown in Figure 1 below:
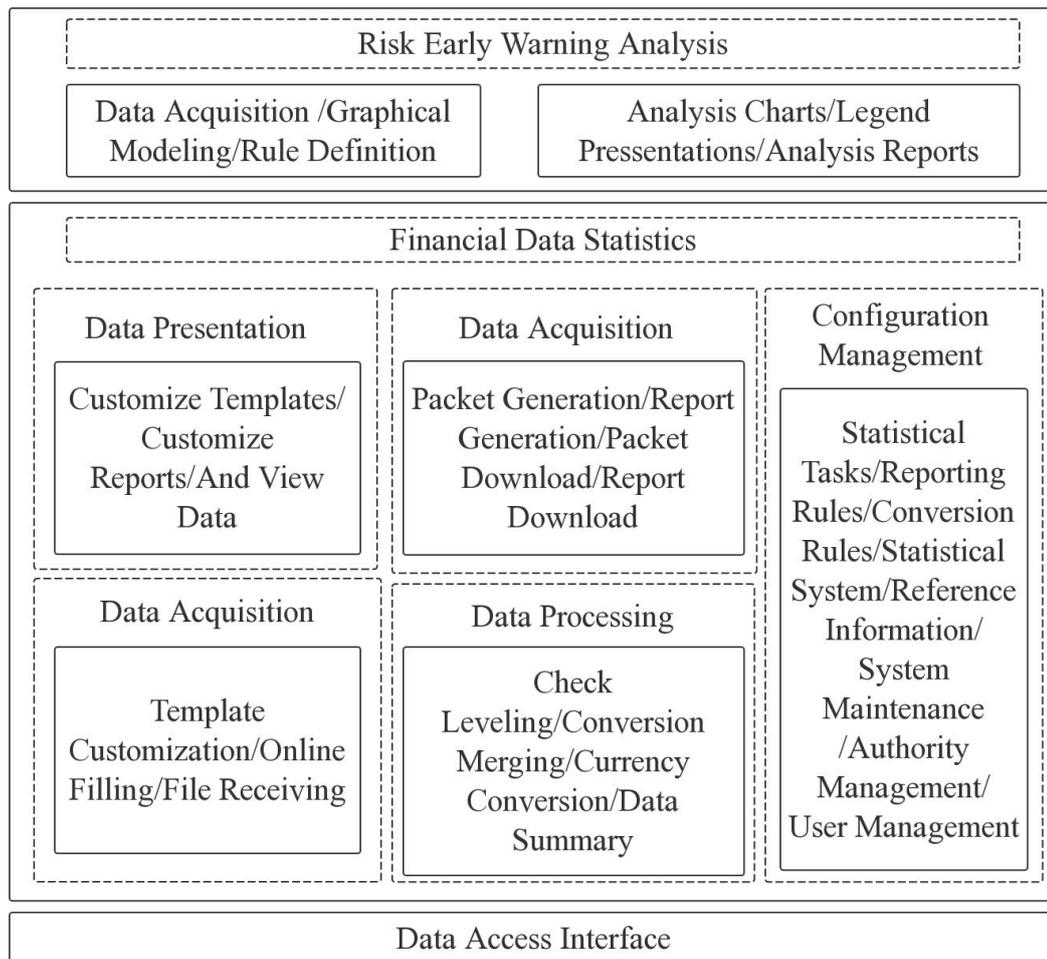
Figure 1 Design structure diagram of system functions

The system network architecture is mainly divided into three parts: first, end users include security department, supervision department, asset management department, financial accounting department, etc. Secondly, the database server and the application fortune belong to the same machine, sharing the internal storage of data information, the use of backup data; Finally, the business departments of the head office will work on the same floor of the office building, and the internal LAN will be connected to each other. The specific design is shown in Figure 2 below:
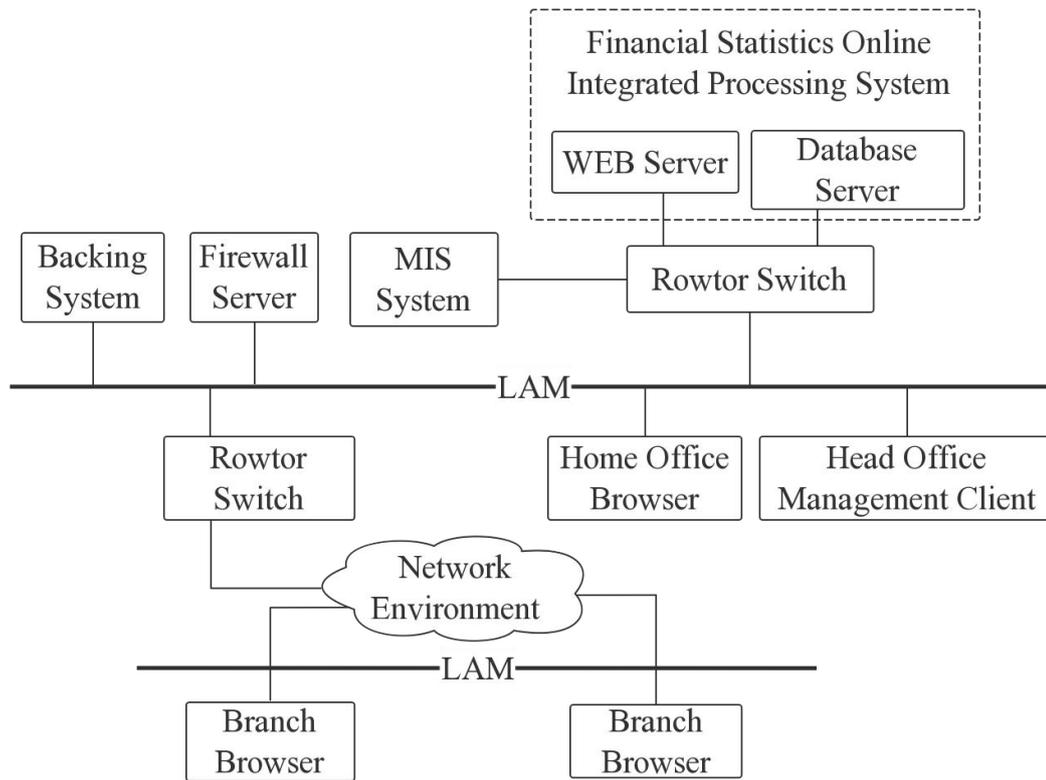
Figure 2. Topology diagram of system network

Taking the online filing system as an example, it mainly operates in accordance with the logical structure shown in Figure 3, where the presentation layer is mainly used to display the user interface. The business layer is used to access the data layer, obtain data, modify data, delete data in the data layer, and feedback the results to the presentation layer; The data layer acts as a database or data source. The actual functional relationship is shown in Figure 4 below. The user will define the application behavior or user action mapping model update or select the corresponding view after the request to the controller. After selecting the corresponding view, the controller will send the controller input from the user and allow the controller to change the state of the controller, and provide it to the user.[13-15]
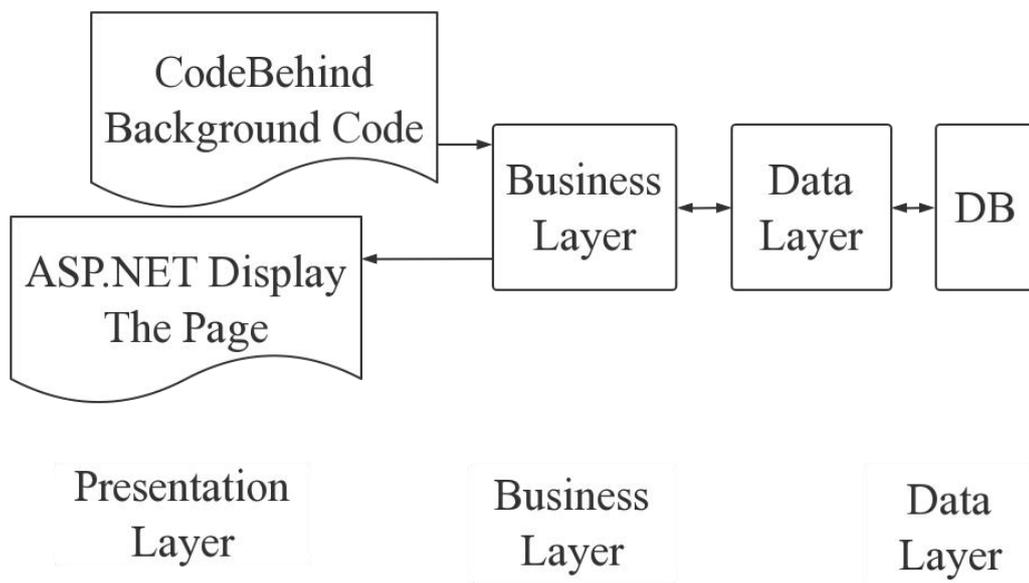
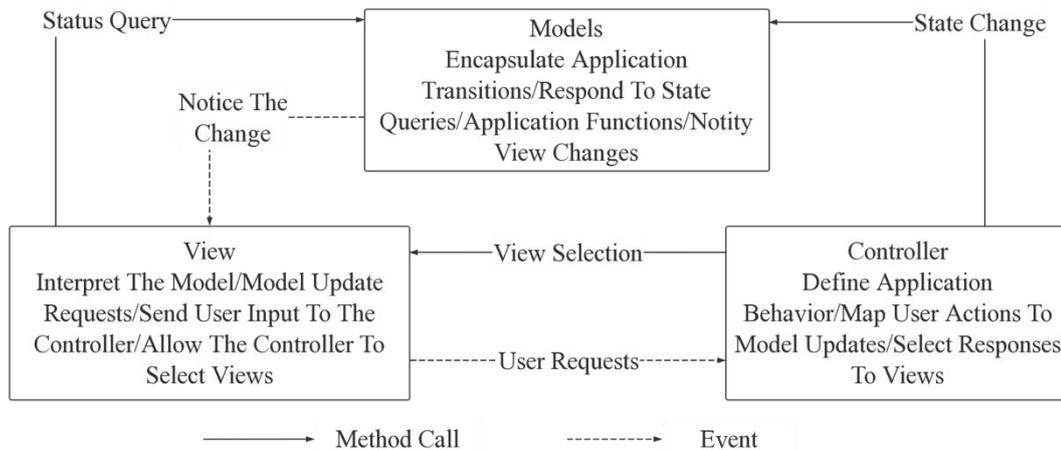Figure 3. Logical structure diagram of online filling system

Figure 4 Relationship diagram between model view and controller

3. Result analysis

According to the test analysis of the research system in this paper, the black box test method can be selected for processing. The test cases filled in online are shown in Table 1 below:

Table 1 Experimental cases

test function	test item	Test points	Expected result	result
Agency matters	Task query	Can you query tasks according to the entered query criteria?	The returned result is correct.	normal
	Modify task status	Can I change the task status to complete and save it?	It can be modified and saved normally.	normal
Online reporting	Data reporting	Can I fill in and save it normally?	Yes, fill in and save normally.	normal
		When the task status is set to completed, can I fill it in and is there a prompt?	Can't fill in, and there are hints.	normal
	Data viewing	Whether the saved report data can be displayed correctly?	Can be displayed correctly	normal
File submission	Excel File submission	Can it be reported and saved normally?	Yes, report it normally and save it.	normal
		When the task status is set to completed, can it be reported? Is there a prompt?	Can't report with a prompt.	normal
	Data viewing	Whether the saved report data can be displayed correctly?	Can be displayed correctly	normal
data check	data check	Whether the selected report data can be checked normally or not, and prompt the data that does not conform to the check relationship.	Can check out the wrong data and prompt	normal
File generation and	File generation	Whether the file can be generated normally, and whether the data and submission area are	Report files can be generated correctly.	normal

download		prompted.		
		When the task status is Start, can it be generated? Is there a prompt?	Cannot generate, and there is a prompt.	normal
	File download	Can I download the generated file normally?	Can be downloaded correctly.	normal
query	System query function	Can you query all the system existence information and business data according to customer's requirements?	You can query normally	normal
Rule setting	Calculation rule setting	Whether the calculation relationship can be defined normally, saved and effective?	It can be defined normally, saved and effective.	normal
		Whether the permission display is valid, and whether the user without permission can't perform any operation on this function.	Users without permission cannot perform any operation on this function.	normal
		Can I delete the calculation relationship normally?	Can be deleted normally.	normal
		Can the calculation priority be set effectively?	Can be effectively set	normal
		Whether calculation rules can be set only for statistical reports?	Only statistical reports can be set.	normal
	Check rule	Whether the verification relationship can be defined normally, saved and effective?	It can be defined normally, saved and effective.	normal
		Whether the permission display is valid, and whether the user without permission can't perform any operation on this function.	Users without permission cannot perform any operation on this function.	normal
	Authority management	Whether the permission display is valid, and whether the user without permission can't perform any operation on this function.	Users without permission cannot perform any operation on this function.	normal
		Can I delete the calculation relationship normally?	Can be deleted normally.	normal
		Whether calculation rules can be set only for statistical reports?	Only statistical reports can be set.	normal

The final experimental results show that characteristic reports, basic reports and Excel forms can be used as basic data. According to the definition of technical indicators and relevant formulas proposed by China Banking and Insurance Regulatory Commission, the early warning analysis operation after mastering the expert system can not only obtain the early warning system meeting the pre-work requirements, but also complete the dimensional modeling and program processing according to the principle of data warehouse design. Truly achieve the basic goal of dimensional presentation. From the perspective of practical application, the advantage of the financial data statistics and risk early warning analysis system studied in this paper is that DTS technology is used to realize the ETL process, which simplifies the traditional too complicated and tedious data

extraction procedures, and the staff can directly process and analyze according to the system functions. At the same time, the user can flexibly define the decision tree model in the system according to the expert judgment, and according to the value range and warning rules of the self-defined indicators, truly realize the multidimensional analysis and display of indicators.

4. Conclusion

To sum up, in the era of big data, it is very important to build an applied financial data statistics and risk early warning analysis system, which can not only grasp more valuable customer information, but also provide appropriate service functions after the establishment of risk early warning system to scientifically deal with information risks faced by the traditional financial field. Therefore, with the continuous improvement of our social economy and science and technology, the future data analysis and risk warning system in the financial field should continue to develop new service functions, pay attention to improve the system application performance from convenient operation, report generation and other aspects, increase the training of professional and technical personnel, learn from domestic and foreign excellent technical theory and experimental results. Only in this way can we give full play to the important role of financial data statistics and risk early warning analysis.

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