Food Safety Management Research Based on Big Data Mining

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Abstract—Food is the most important thing for people. Food safety concerns thousands of families. Due to various types of food and different censoring standards, the whole food safety management system has miscellaneous food information, which is not convenient for food safety management. At any time, food safety problems may cause public panic and affect the stability of domestic food safety. And big data mining with its characteristics of diversity, hierarchy, relevance, can promote the deficiency of food safety management, the basic information of the various types of food to effectively improve the reliability of the food quality, systematic management and analysis of the security situation of monitoring and associated products, actively respond to a potential food safety issues, as the national food security escort.

Index Terms—big data mining, food safety management, research

I. INTRODUCTION

Our country is a big country with a population of 1.4 billion. Since the ancient time, on the question of "the tip of the tongue" links the matter of national people's livelihood. And now with the development of the national individual health consciousness, people are not only to care about what we eat, but also to require more about the quality of food. Therefore, food safety is one of hot issues that People pay much attention on in their daily life. However, in recent years, food safety incidents such as the Sichuan Pig Plague from Africa and the "zombie meat" incident happened that have challenged the bottom line of

China's food safety management again and again, making people losing the trust from domestic food management. The phenomenon is shocking. Food safety is not only related to the national physical fitness, but also affects the future development trend of the country. With the society development, the leap development of

Internet information and technology, all kinds of information increased rapidly. It is difficult to deal with food safety management with only traditional measures. To solve this problem, it is an irresistible trend to put big data mining technology into practice to meet the needs of current and future social development [1]. With its

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characteristics of diversity, hierarchy and relevance, it can connect the valuable and related parts hidden in massive data, and perform highly automated data analysis comprehensively with artificial intelligence technology, and then provide more comprehensive data support for decision makers, and finally conduct corresponding countermeasures. Therefore, starting from the research on food safety management based on big data mining, this paper will illuminate food safety management with big data mining, and explore the new trend of food safety management in China.

II. BIG DATA OF FOOD SAFETY

Food supply system is a complex system involving material suppliers, production and processing enterprises, trading companies, operating agencies, testing institutions, regulatory agencies, consumers and many other participants. It covers a wide range and has a long industrial chain. In food formula design, food safety testing, food safety risk factor screening, food safety traceability, food supply and other links, it is inseparable from the support of big data, and also become an important data source of food safety big data. Food safety big data has the typical characteristics of big data, such as large data volume, various data types, low data value density and fast processing speed. (see Fig. 1)



Figure 1. Food supply system [2]

A large number of institutions and researchers focused on food safety big data, carried out in-depth research on high-throughput screening of food safety risk factors, food safety traceability and supervision, and made positive progress. For example, Cargill, Wal Mart and other multinational companies carry out food safety monitoring and traceability based on big data based on the developed food trade logistics system. Food safety regulatory agencies in the United States, the European Union, Japan and other countries have provided reference cases in the classification management of food safety big data and government data disclosure. China's Guizhou province actively promotes the development of big data industry, initially building the "food safety cloud" (food safety data platform), and building a food safety intelligent supervision system for the social subjects of government enterprises, food safety inspection and testing institutions, Internet plus inspection and testing system, traceability certification system and big data platform, providing food safety supervision, product traceability, and nutrition information query and other forms of information services promote food safety big data sharing.

III. OVERVIEW OF BIG DATA MINING

Big data mining is an emerging technology in recent years. It is an interdisciplinary subject including multiple technologies and disciplines such as database, machine learning, statistics and artificial intelligence. The key of the technology is "big" and "mining". The technology embodies its huge number of data and ample content, and also manifests how to eliminate noise and interference in the voluminous data to extract useful information [3]. And then it can make the information what we obtained before integrated into a complete module. And then build the relationships of information between the different parts together to finish a higher accuracy of macro trend analysis skills, in order to provide a good technical support for food safety management with high efficiency and accuracy.

Food safety management and processing method based on big data mining.

The source of information about food safety is diverse with different standards. Therefore, analysis to the information of food safety is supposed to be comprehensive multilevel and cross-domain. According to the challenges of food safety, we are going to collect information what we need from regulatory data from national food and medicine management administration, national food safety standard data and food safety management data, and then form a corresponding report about food safety management. And then we can understand in time the processing of the work of food safety management through analyzing and censoring the report. And finally we are able to enact corresponding regulations and provisions to advance the risk assessment system of food safety management system [4].

In view of the heterogeneous characteristics of food safety information sources, it is a feasible solution to integrate, manage and reasonably use the data in these heterogeneous information sources to meet the needs of food safety management. It is a feasible solution to establish a technology system with resource warehouse as the core. (see Fig. 2)



Figure 2. Technology framework with warehouse as the core

In addition, the technology "big data mining "makes food safety management more convenient through translating artificial management into artificial intelligence, and at the same time, the technology will lessen the burden of management administration and cost. Moreover, the approach of food safety management will reduce practicing frauds for personal gains of officials during the process of censoring and makes the practice more transparent through inviting more citizens. All these endeavors finished, food safety management at home will find out a feasible and refreshing way to go.

IV. METHODS OF FOOD SAFETY MANAGEMENT BASED ON BIG DATA MINING TECHNOLOGY

How to administrate food safety has attracted extensive attention after big data mining technology was put in, because people would like to understand how to manage to practice predictions and detection effectively on food safety management with big data mining technology. At the follow article we will explain the practice of big data mining technology on food safety to make the public understand it with parallel processing, clustering methods as well as the approach of parallel clustering approach [5].

A. Parallel Processing

Parallel processing is a computational approach in computer systems to deal with two or three even more tasks at the same time. The approach is able to deal with one producer indifferent parts at the same time as well. The forte of the approach is to save time for figuring out problems and reducing the difficulties of the handling complex problems. The approach escalates the efficiency of handling food safety management while provides more measures for solving problems to figure out trivia that appears in the process of dealing with problem. The main modes for dealing with the problems are batch processing, stream management as well as processing graph.

In the first place, the computational mode often used is MAPReduce among batch processing. Compared with traditional computational measures, it is more convenient, extensive as well as effective. With these fortes above, it is able to collect a good deal of information rapidly, finish evaluation tasks more quickly as well as make the result of evaluation more accurate. In the second half place, its computational approach is similar to stream management. It is able to figure out useful information from food safety management rapidly while classify the information appropriately. In addition, it is skilled in dealing with data directly while avoiding side effects from data stream. In the third place, it will form an informational frame to control the time of system respond effectively. In the fourth place, the mode of processing measures including synchronization and a synchronization. Dealing with problems with the mode of synchronization requires dividing the problem into several parts and handles them together to reduce the conflicts and contest among data in the process of handling problems, which is good at figuring out problems more accurately. In the mode of a synchronization, APRAM mode separates the procedure firstly. And then the mode of a synchronization analyzes comprehensively complex is information from food safety management with SM computational technology. Dealing with the modes parallel is able to integrate big data while because of defects of its processed structure and nature, it is unable to extend data and keep load balance [6]. (see Fig. 3-Fig. 4)





part 1 part 2

part 1

part 1---partition 1 part 2---partition 2 part a---partition a

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B. Clustering Methods

The method of cluster is also called cluster analysis which is based on similarity including several modes and vector quantity. The approach is an important way used to classify problems and big data mining. The approach is capable of classifying the same kind of food based on the nature of food. Traditional cluster methods always includes subtraction cluster and K-means. With the development of big data mining, cluster analysis we often use include nucleus cluster analysis and spectrum cluster analysis. Nucleus cluster analysis always takes into practice with nucleus methods. Firstly, we hypothesize the eats is $Xk \in \mathbb{R}^N$, K=1,2...1, When we log data ,and then reflect the data with mender, we can get $\Phi(x1)$, $\Phi(x2)$,..., $\Phi(x1)$, a dot product frame .If the hypothesis is right, then the data could be nucleus of the method. Cluster analysis only aims at classifying, thus it is unable to generalize the whole food safety information while only meet cluster in a specific scope [7].

Compared with cluster analysis, spectrum analysis boasts fortes including prevalence, computing easily as well as smaller number to compute. Therefore, its effect is more significant. The most traditional algorithm among spectrum analysis is NJW multi-spectrum analysis from Jordanhe Weiss. It divides traits K into several parts, and then obtain matrix W, matrix D and matrix I with Guassian Kernel function, and then figure out matrix I and get matrixV. Finally, we will figure out cluster of trait K with K-means or other traditional cluster algorithm. Spectrum analysis is able to assemble food all-round while collect and organize initial data from food cluster to preserve and employ the initial cluster data.

C. Approaches of Parallel Clustering

Different approaches have unique fortes, while have visible disadvantages. Because of that, it is difficult to obtain perfect results only with one approach. Therefore, it requires us to integrate the two methods to advance the tasks of food safety management. On the one hand, cluster analysis speed up data processing and reduce the time of parallel computing, on the other hand, parallel processing will remedy data weakness in the cluster processing and makes results more authentic and extensive. Integrating two methods will promote the tasks of food safety management.

V. CONCLUSION AND OUTLOOK

In conclusion, the technology of big data mining has been used in all-round of food safety management. Because of its nature of accuracy and efficiency, the technology has accepted many praise from relate sectors and the public. All these endeavors are promoting the advance of food censor and administration at home. Although the technology of data processing and censorship are not perfect, we do believe that people will enjoy food with high quality with the development of administration technology and systems in the future.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

In this paper, Xiaoyan Yang was responsible for the method of food safety management based on big data mining and wrote the paper. Hongyou He was responsible for big data of food safety and food safety management. All authors had approved the final version.

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