Data Visualization and Retrieval based Convenience Store Location Model of Fresh Products

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ABSTRACT: *Convenience store location is always the primary factor, which is also an important factor. Suitable location can not only determine the number of store customers, but also determine the level of sales, which is the key to the success or failure of store operations. In order to set up the location of the commercial convenience store, we first discuss the importance of the convenience store location, and then analyze the influence factors of the convenience store location. There are many factors that determine the success of a convenience store, and the quality of the store address plays a key role in the success of the convenience store. Geospatial metadata has the characteristics of abstract, complex and multi dimension, while the traditional metadata expression is abstract, the form of expression is single, the expression dimension is limited, and the cognitive efficiency is not high. In order to improve the effectiveness and efficiency of geospatial metadata services, we introduce information visualization technology and information retrieval technology based on the analysis of the technology of information visualization and geographic spatial metadata on the characteristics, influence of geospatial metadata visualization factors, single factor and multi factor metadata visualization technology with the core application process of metadata visualization. Experimental results prove that the proposed model can obtain the better performance compared with the other models.*

Subject Categories and Descriptors
[H.2 Database Managment]; E.2 [Data Storage Representations]; [H.3 Information Storate and Retrieval]

General Terms
Data Store, Information Visulaization, Metadata

Keywords: Information Retrieval, Data Visualization, Location, Fresh Products, Technical Framework

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1. Introduction

Convenience stores appeared in the middle of 1990s, which has been accepted by many large and medium cities. With the improvement of people's income level and the acceleration of the pace of life, people's time is becoming more and more valuable, but also makes consumers more convenient and fast when shopping. People on the convenience, fast, efficient demand, through the convenience store this format to be met to facilitate the rapid development of convenience stores[1]. The operation of the convenience store has its own unique features, including the choice of target customers, store location, commodity structure and service function is the key to the success of the convenience stores. This paper analyzes the basis of the successful operation of convenience stores from the store location[2-4]. Convenience store location is the core of the traffic flow within the shopping district. Shopping district refers to the store to attract customers to shop in the effective distance.

Site selection is a large, long-term investment, the relationship between the future developments of the enterprises. The convenience store shop either on loan, or buy, once established, will require substantial capital investment, the construction of the store, when the environment changes, it cannot be like people, finance and the material management elements can make corresponding adjustment, and has long-term, fixed characteristics[5-7]. Therefore, in-depth investigation and site selection and it is an important basis for determining the convenience store business objectives and develop business strategies. Different areas have different social environment, geographical environment, population, transportation, municipal planning etc[8]. they are different, restrict the local convenience store customer sources and characteristics and of convenience store merchandise, price, sales promotion activity choice.

The main factors affecting the flow are: the number of households in the business district, the number of enterprises and institutions, after the entrance of the shop, traffic flow, the shape of the road, the shape of the sidewalk, the opening around the shop[9-10]. There should be enough living population in the shopping district, under normal circumstances, the district should be guaranteed to have more than 3000 people living in this way can help facilitate the convenience of convenience stores. Shops in the road is not a simple traffic road, there should be a residential area around. Next to the station, the main station here refers to the subway station, or bus station.

Traffic condition is an important factor which affects the convenience store to choose the location, which determines the smooth operation of the enterprise and the smooth realization of the customer purchasing behavior as located in the commercial center of the shop, to analyze the distance and direction of the station, pier while the closer the general distance, more traffic, the more convenient for customers.

In recent years, thanks to the promotion of the Internet, geographic information systems and other technologies, people's increasing demand for geospatial information. For geospatial information description, usually using geospatial metadata, said most of the abstract knowledge of text or numbers, to the nonprofessionals to understand the rich information behind the hidden text or numbers, more unknown in terms of features and semantic content, the relationship between massive geospatial information[11-14].

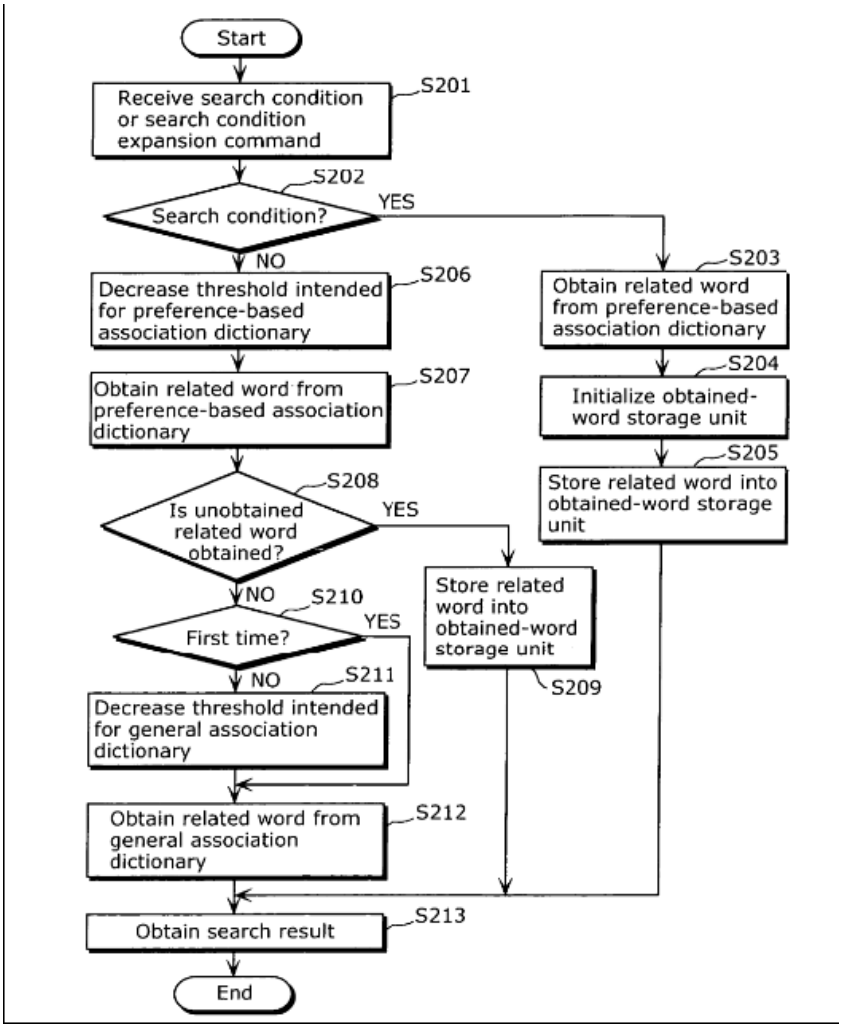

Figure 1. General Flowchart of the Information Retrieval Model

At present, the research of information retrieval based on information visualization has been widely carried out, and it has achieved rapid development in information retrieval, data mining, digital library and so on. In this paper, we introduce the method of parallel coordinates in the information visualization technology, and explore the method of visual retrieval of geospatial metadata based on parallel coordinates in order to then improve the efficiency of data retrieval and service. In the following figure 1, we show the general flowchart of the information retrieval model.

2. Data visualization overview

Typically, the data is automatically recorded and saved by the sensor and monitoring system, even in the daily life of simple transactions, such as credit card spending or phone calls, are recorded by the computer. A large number of parameters are recorded, which leads to the generation of the high-dimensional data[15]. In order to effectively mine data, it is very important to let people participate in the process of the data retrieval, and the flexibility, creativity and some common sense with the computer's strong storage capacity and computing power[16-18]. Visual data retrieval aims to integrate the process of the people's participation in the process of data retrieval, so that the ability to observe in a large number of available data sets in the computer system. The basic idea of visual data retrieval is to show the data in a visible form, so that people can learn more about the data, draw conclusions, achieve human-computer interaction. Facts have proved that, in exploratory data analysis, visualization of data retrieval technology has very high value, but also has great potential in the retrieval of the large databases, especially in data retrieval is poorly understood or uncertain target and visual data check rope useful. Because the user is directly involved in the process of information mining, and the computer can automatically adjust the search target.

2.1 Geospatial Metadata

Geospatial metadata is used to describe geospatial data sets related information data, it can be for geospatial data sets in space, time and attribute information and data acquisition, processing and use of the information are described in detail[19]. Based on geospatial metadata, users can understand the data set of the name, quality and organization of detailed information, in order to achieve the sharing of geospatial data to provide the basic data support and the related services[20-21].

Geospatial metadata has two major characteristics: abstraction and multi dimension. How to carry out efficient data retrieval services based on the abstract, multidimensional geospatial metadata has been a problem to be solved. The figure 2 shows the sample.

2.2 Multidimensional information visualization

Information visualization is to express abstract information in visual form, which can be used to reveal the relationship between abstract information and hidden features. Combined with the theories and methods of many disciplines, information visualization can obtain the most complex relations between abstract information with non-geometric attributes[22-24]. Data exploration is the core of information visualization, the purpose is to visualize the expression of information, the discovery of new knowledge, identification of information in the structure, patterns, rules, trends and other aspects of the law[25-27]. At present, the research of information visualization

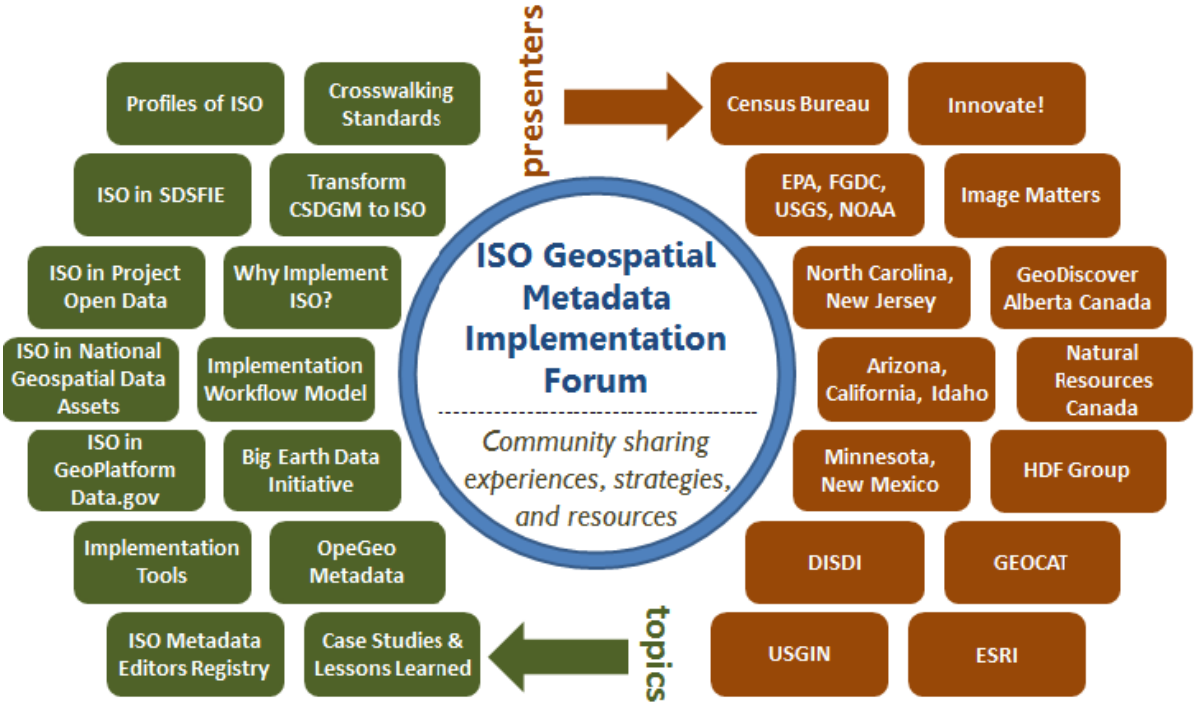

Figure 2. Sample of the geospatial metadata

is mainly focused on the visualization of hierarchical information, visualization of general multidimensional information, visualization of text information and Web visualization.

Most of the abstract information in the information visualization is multidimensional information. How to express the information of multi dimension and multi attributes in the visual form is the basic task of general multidimensional information visualization (MIV). Multidimensional information visualization can be used in parallel coordinates, scatter matrix, star graph and face map[28-30]. Among them, the parallel coordinates has become one of the main methods used in the field of the multidimensional information visualization, which can solve the problem of increasing dimension, meet the basic requirements of the multidimensional information visualization has been widely used in the field. The figure 3 presents the visualization sample.

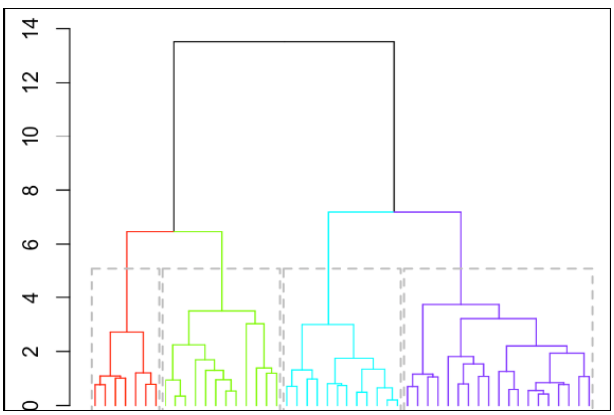

Figure 3. Sample of visualization

2.3 Parallel coordinates

Parallel coordinates is a kind of visualization method which can represent the multi dimension space in the two-dimensional space, which is represented by the multi parallel and equal axes. The expression of data relations in parallel coordinates are very intuitive that is easy to understand, and rich in information, which is helpful to find the complex relationship between the multi attributes in the large scale data[31]. Parallel coordinates can be used for visualization of the high-dimensional and multivariate data, such as geospatial metadata.

In the geospatial metadata retrieval, the parallel coordinates map the metadata attributes of the users to the parallel coordinate axes. The search results are displayed on the values of the values on each axis. The user can interactively add or delete the coordinate axes of the metadata attribute items and filter the search results.

When the search results in a large amount of data, the connection between the axis may be more intense, relations between the elements will be blurred, and the connection of translucent processing, line color depth can reflect the trend characteristics of metadata[32-34]. When the amount of data is small, the parallel coordinate is helpful for the user to find the data quickly as follows.

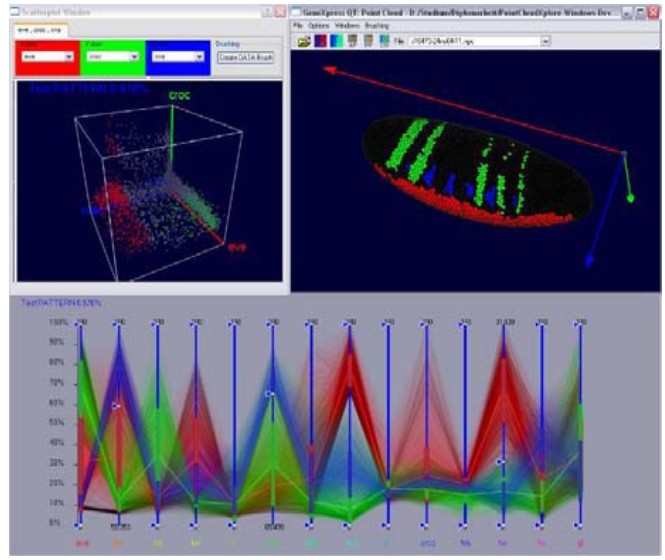

Figure 4. Parallel coordinate drawing principle

2.4 Realization of visualization method

Parallel coordinate is a kind of geometric transformation technology, it is an extension of the traditional coordinate system[35]. The principle of this method is to map the attributes of multidimensional data sets into a form that can be expressed in 2D or 3D space.

In a two-dimensional plane, we place the n vertical axis (Y axis), denoted as follows:

$$x_1, x_2, ..., x_n \tag{1}$$

One dimensional attribute item is placed on each Y axis. The value range of each Y axis is corresponding to the minimum value of the property to the maximum value, and the value of each attribute is evenly distributed in the corresponding Y axis.

Assume a geospatial metadata record has n attribute items, and attribute value are denoted as:

$$C_1, C_2, ..., C_n \tag{2}$$

Polyline can be expressed as:

$$P(C_1, C_2, ..., C_n) \tag{3}$$

and n vertices are located on the X axis.

The basic idea of parallel coordinates is the multidimensional information is mapped to the twodimensional plane, solve the problem of multidimensional information display, interactive way to reasonable design, users can easily according to the needs of the retrieval results based on more information mining. The main technologies used in the parallel coordinates are brush technology, dimension control, dimension scaling, coordinate axis exchange, etc.

In parallel coordinates, we can control the number of data attributes, namely the control dimension of parallel coordinates, will only show the user's attention attribute, which can reduce the complexity of parallel coordinates, and can reduce the interference of important data display results make it easier for users to analyze data.

For the expression of massive data, hierarchical visualization technology is an effective tool to display different levels and large scale data. Hierarchical visualization technology can provide the overall overview of the relevant information for the elements of a theme, and assign more visual space to the user's attention.

Visualization technology of hierarchical structure based on spatial tree and when the user clicks on the corresponding branch, as the next level of the branch information, the color and shape can be used to mark the focus and the path between the root nodes. If the user enters the name of the region of interest or selects a particular location or range on the map. In the search results, the user can select the key metadata elements on the interface to determine the priority options. Users can interactively refresh and select metadata views, or can open or close different visual views as needed, until they find the right data set, and study their geographic content on the map. Compared with the traditional methods of geospatial metadata visualization, parallel coordinates have obvious advantages shown as follows.

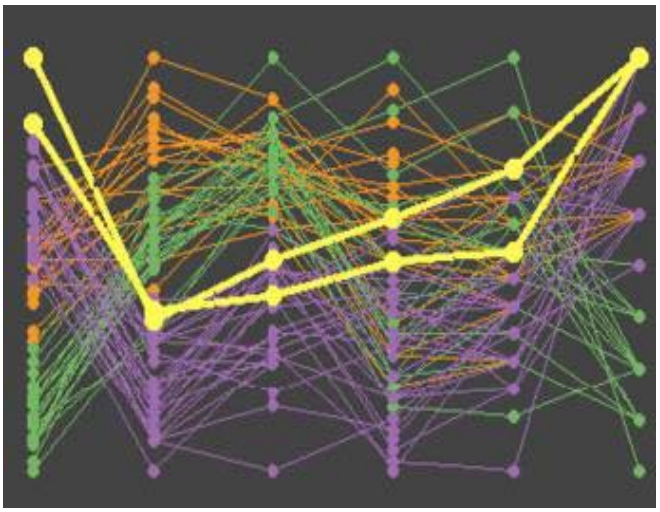

Figure 5. The effect of parallel coordinates when retrieving more records

Compared with the traditional Cartesian coordinates, the biggest advantage of the parallel coordinates is the unlimited dimension. In the traditional visualization method, when the data dimension is massive, there will be visual confusion and the visual effects will be greatly reduced. Parallel coordinates are very intuitive and will not be displayed because of the increase in the data dimension.

Parallel coordinates have a good mathematical basis. The symmetry of the coordinate axis can ensure the uniform distribution of each data dimension, and the unique mapping from multi dimension to twodimensional can make the data of each user's attention fully displayed, which is suitable for the visualization of data analysis.

Visual graphics are simple, easy to understand. Each data record is displayed in the form of a broken line, and the intersection point between the broken line and the coordinate axis is the attribute value of the data item on the axis.

When the user pays attention to the data dimension (attribute items), it is easy to lead to the distance between the vertical axis, and it is difficult to identify the structure and relationship of the data item, in addition, when the query retrieval records are more, and there will be overlapping graphics, the situation is not clear, the user is difficult to identify.

3. Information retrieval model

In twenty-first Century, people have more strict requirements and expectations for information retrieval is complete, accurate and fast, keep pace with the times, constantly improve the information retrieval technology will get more and more extensive application, retrieval and access of information will undoubtedly undergo profound changes.

Information retrieval mainly refers to the information representation, storage, organization and access, which is based on the user's query requirements, from the information database to retrieve the relevant information. The purpose of information retrieval is to obtain the needed information, which is based on the better retrieval technology. The technology of the information retrieval is information retrieval. In fact, it mainly refers to a series of the information retrieval algorithms and software design.

3.1 The development of information retrieval

The information retrieval has been developed by the combination of the first group index search, the punched card retrieval and the microfilm retrieval. Computer information retrieval can be divided into offline retrieval, online retrieval, international online retrieval, optical disk retrieval and hypertext web search.

In 60s, the offline batch retrieval magnetic tape was used as the storage medium, and with the help of controlled vocabularies, manual indexing and manual retrieval strategy were used to retrieve information. Computer technology, database technology, remote terminal and communication network technology for online retrieval provides the possibility of the development of the core space technology and the implementation of the general information, computer, communication and health development of international online retrieval. Optical disk retrieval is a kind of online retrieval, which is developed on the basis of computer, laser, high-density storage and precision servo motor.

At present, the literature description of the unit structure for the traditional literature foundation, manual retrieval methods led to the development of the information retrieval has organized unit structure, the Internet browsing information query information retrieval. Computer information retrieval presents the pattern of the online retrieval, optical disk retrieval and network retrieval, facing the user groups, competing with each other, and merging with each other to seek common development on the basis of individuality.

With the continuous progress and the computer information technology have multiplied, demands for retrieval technology are increasingly high, especially network technology and multimedia technology, hardware and software environment of information retrieval technology greatly improved information retrieval techniques from linear to nonlinear detection of traditional cable support hypertext retrieval development, traditional Boolean has the dominant logic retrieval model in information retrieval, text information is one of the various types of information, even in the text information retrieval model, probabilistic reasoning model and the vector space model is to occupy an increasingly important position.

	Traditional retrieval technology	**Online retrieval technology**
Conceptual model	Boolean logic	Probabilistic reasoning, spatial vector
Preprocessing	Automatic word extraction	Hypertext markup language
Document structure	Cis / inverted file	Hyperlink
Access mode	One-way search	Bidirectional interactive retrieval
Post processing	Text editing	Output results in output mode

Table 1. Comparison of traditional retrieval technology and online retrieval technology

3.2 Network information retrieval and network information retrieval technology

Through the computer network, people can easily obtain information, especially information on the internet. Internet is the world's largest treasure trove of information resources. According to the actual situation of the development of Internet, the online information resources are various information resources through the Internet can use the Internet as a whole, its fundamental value is that it can provide more perfect more and more and information services.

In order to quickly and effectively obtain the information on the Internet, people pay more attention to the research of online retrieval tools and related technologies. Now, the famous search engines on the Internet are Yahoo, Alto vista, Infoseek and Lycos, etc..

Chinese search engine has Sohoo, Robot, etc.. Search engine is a Internet search service on the Web website, it is a new generation of information retrieval tools. The key technologies of the search engine are automatic tracking technology and guidance database.

The search engine is a special automatic tracking indexing software, specifically the indexing and retrieval of net words mainly depends on the robot, only to improve the indexing mechanism of the robot, in order to improve the efficiency of search engine.

With the gradual improvement of automatic indexing, automatic abstraction, automatic tracking and automatic roaming technology, there will be more information resources and professional guidance library, which is convenient for users to retrieve information.

At present, the tool forward multilingualism and integrated and professional development has appeared online retrieval, element retrieval tools, selection and evaluation of renewal plays an irreplaceable role in retrieval tools, multiple search engines (integrated search engine) has to function, evaluation of unified retrieval results, can the optimal combination of the search engine, by e-mail to the user at any time to provide information on the internet. The retrieval interface is simple, easy to learn and easy to use, and the retrieval results are clear, informative and timely.

The key technologies of online information retrieval system include: information collection and storage technology, divided into two ways: manual and automatic. Information pre-processing, including information format support, conversion and information filtering, information filtering is a key technology. Index of information technology, information relating to word segmentation and word grammar analysis, POS tagging and natural language processing, a search index and search results processing technology, the retrieval result processing technology is the key technology, its core is based on the degree of correlation calculation results and query ranking.

According to the form of information retrieval, information retrieval can be divided into text retrieval and multimedia retrieval. Text retrieval is now a more practical technique for full-text retrieval and natural language retrieval. Full text retrieval method is used to set up the index information of the whole text. Natural language retrieval refers to the use of authors and writers use the original abstract language, automatic indexing and automatic document retrieval method using the computer, including text retrieval, keyword search, such as natural language.

The traditional information retrieval technology and

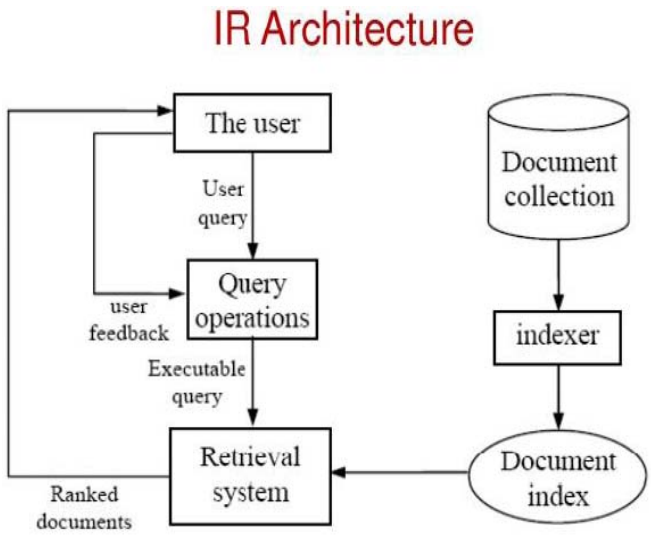

Figure 6. The IR system architecture

database technology can effectively solve the problem of document management and retrieval, but it is not suitable for the management and retrieval of multimedia data. Multimedia information including text, image, audio, video, animation and so on, the data has a large amount of data, the semantic expression of the image, the complexity of semantic clues and so on. The so-called multimedia information retrieval is the process of identifying and acquiring the information needed by the multimedia information such as image, text, sound, animation and so on. Compared with traditional information retrieval, multimedia information retrieval has the characteristics of complex information, interactive, synchronous, real-time, friendly interface, simple operation and so on. The multimedia information retrieval system is not simply on a variety of media retrieval, it must be able to retrieve the text information is represented by discrete media, also on the image and the sound represented by the continuous media content retrieval. Content retrieval uses some methods of image processing, pattern recognition, computer vision and image understanding in the field as part of the basic technology, feature extraction, and then calculate the similarity. A multimedia document is different from the text document only a single linear structure relationship, included a multimedia document, first to analyze the content and structure of the visual, semantic and the structural feature extraction of multimedia documents, as the basis for user browsing and retrieval, and provide basis for self-adaptation of the network transmission, interactive operation. At present, the immaturity of the computer recognition technology, as well as the existence of universal and efficient algorithm has become an obstacle to the development of multimedia contentbased retrieval technology.

In order to solve the problem of multimedia data retrieval, in addition to the use of keywords and content based on the search method, respectively, the advantages of their own, but also through the relevant feedback technology, semantic communication technology and interactive learning technology to combine these two methods organically, Thereby greatly improving the retrieval efficiency of the retrieval system. Compression coding technology is more effective. Compression coding technology refers to some way to reduce the coding rate of digital information technology, the core work is to remove the information in the redundancy, that is, to retain the uncertainty of information to remove the identified information. The goal of the next generation of multimedia technology research is to create new multimedia processing technology that enables multimedia information to automatically adapt to the network environment and has interactive operational capabilities that enable users to quickly retrieve the information they need.

Data mining technology is widely used in Internet retrieval, the impact to the field of information retrieval, it refers to the use of statistical analysis and modeling technique of complex from a large amount of data or information is extracted or unknown, interesting or useful and ultimately understandable knowledge model. Data mining is the core technology of knowledge discovery, knowledge discovery technology refers to the data processed by using database technology, using machine learning method to extract useful knowledge from the data, that is found in advanced treatment of useful knowledge from large amounts of data. With the development of knowledge discovery technology, it will be helpful for people to make full use of information resources.

The development of intelligent Internet information retrieval, intelligent retrieval is based on the form of natural language, the machine according to the user to provide natural language expression retrieval requirement analysis, and then form a search strategy to search. Intelligent information retrieval is a high degree of integration of artificial intelligence technology and retrieval technology.

The key point of the existing intelligent retrieval technology is to let the user get the information source research, that are, the user's query plan, intention, interest, etc..

4. Suggestions on the convenience store location model

Convenience store location conditions are the core of the business district traffic. Business district is the store to attract customers to shop an effective distance shopping. Another key factor in the success of the convenience store is the size of the traffic, passenger flow, including existing passenger and potential passenger flow, shop selection site is always trying to place in the most frequent passenger, the most concentrated location, so that most people near the purchase of goods; Scale, does not always bring the appropriate advantages with specific issues need specific analysis. (1) Analysis of passenger flow type. Passenger flow type is dedicated to the purchase of a product to the store customers to form their own passenger; or buy a certain kind of main goods, will be

attached to the adjacent store to buy and the formation of the sharing can be flow; or those who entered the store into the store Derived passenger flow for their different types of passenger to determine their own goods, prices, promotional strategies. (2) analysis of passenger purpose, speed and retention time. Different areas of passenger flow may be the same, but its purpose, speed, retention time is different, to do specific analysis, and then for the best address choice. Such as in some public places near the vehicle traffic trunk, passenger flow is very large. Although the way or temporary purchase of some goods, but the purpose of passenger is not to shop, while passenger speeds, stay short time. (3) Analysis of the size of the passenger on both sides of the street. The same street, on both sides of the passenger scale in many cases, due to lighting conditions, public places, traffic conditions and other facilities, and the difference and in addition, people riding, walking or driving cars are on the right line, often used to patronize the direction of the right side of the shop. In view of this, the location should be selected as far as possible in the passenger side of the street. (4) Analyze streets features. Choose the location of the shop to analyze the characteristics of the street and the relationship between the sizes of the passenger.

Analysis of urban planning and the choice of location for shops to analyze urban construction includes both short-term planning and long-term planning. Some sites from the current analysis is best position, but with the reform and development of the market will appear new changes not fellow shop, on the other hand, some place from the current view is not ideal to open place, but look from the vision will be a promising new central business district. Convenience store operators must consider from long, therefore, in the understanding of the region's traffic, streets, municipal, landscaping, public facilities, residential and other construction or renovation projects under the premise of planning, make the choice of best places. For this, we give the listed suggestions.

• The business situation of the city, the external environment factors, including economic conditions, relevant policies and regulations, culture, etc. It should be considered as the consideration of the location. Economic development affects the level of consumption in a city as a whole, and regulations may affect certain business practices. There is also a factor in whether the region has a clustering effect and a selection of business circles.

• Convenient transportation, not only to provide customers with convenience, but also to ensure that the convenience store logistics and distribution of high-speed operation, so that the convenience of traffic is also an important factor affecting the choice of the site. Due to the traffic management situation caused by favorable and unfavorable conditions, such as one-way street, to prohibit the passage of vehicles, etc. will cause passenger traffic to a certain extent. We often find the same side of the street, because the road on both sides of the facilities, sunshine conditions, traffic conditions, etc. will make the passenger on both sides of the road there is a big difference.

• Depending on the type and size of the store, the size of the parking lot varies depending on the type of store. The parking lot is too small to meet customers' demand for parking, reducing the number of customers who would otherwise want a shopping. Too large a parking lot can cause waste of resources and cause consumers to question the quality of the store.

• The number and type of people in a place is the most important factor in measuring the location and location of a store. When other conditions are at the same time, the most concentrated position is the best.

5. Simulation

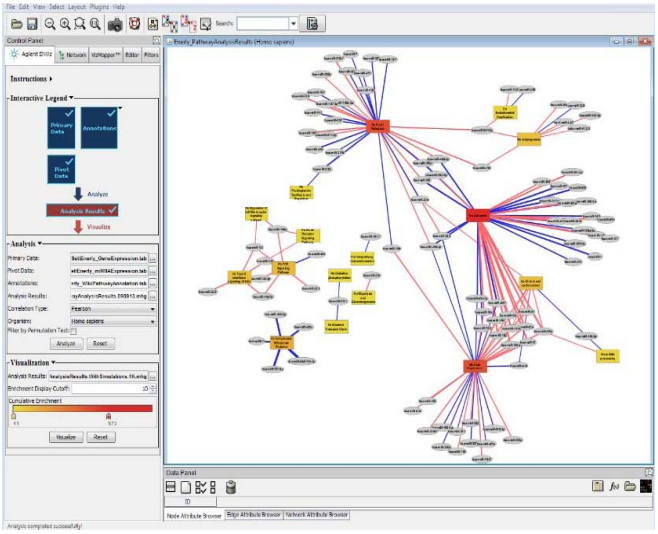

Figure 7. Simulation results of the proposed model with computer implementation

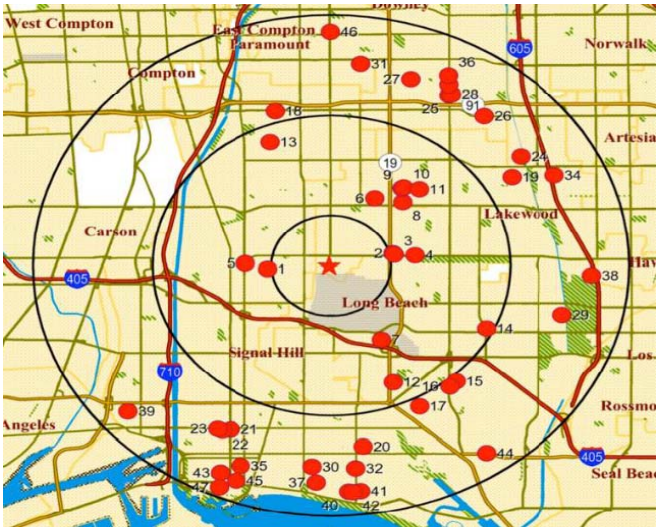

Figure 8. Simulation results of the proposed model from topology perspective

6. Conclusion

Convenience store is a new type of commercial retail formats, with the main purpose of self-sales, in order to meet customer demand for convenience. Whether the location is correct or not is the foundation of its operation. In a word, the convenience store site selection, is to adapt to the human flow, population distribution, the convenience of customers shopping for the principle. Under the promotion of sales, we should choose the city downtown as purchase area. Due to the large convenience store location, there will be a considerable number of large and medium-sized convenience stores, these convenience stores will be cross even overlap, resulting in competition. Therefore, in the traditional business district analysis, we need to consider the situation of competitors.

References

[1] Dumais, S., Cutrell, E., Cadiz, J.J., Jancke, G., Sarin, R. and Robbins, D.C. (2016). January. Stuff I've seen: a system for personal information retrieval and re-use. *ACM SIGIR Forum* 49 (2) 28-35. ACM.

[2] Lewis, D.D., 2014, June. Learning in intelligent information retrieval. *In*: Machine Learning: Proceedings of the Eighth International Workshop p. 235-239.

[3] Hao, Tong, et al (2017). A unified framework for crossmodality 3D model retrieval. *Multimedia Tools and Applications* 1-14.

[4] Bogdanov, D., Wack, N., Gómez, E., Gulati, S., Herrera, P., Mayor, O., Roma, G., Salamon, J., Zapata, J.R.,Serra, X. (2013). November. Essentia: An Audio Analysis Library for Music Information Retrieval. *In: ISMIR* (p. 493-498).

[5] Liu, J., Belkin, N.J. (2015). Personalizing information retrieval for multisession tasks: Examining the roles of task stage, task type, and topic knowledge on the interpretation of dwell time as an indicator of document usefulness. *Journal of the Association for Information Science and Technology*, 66 (1) 58-81.

[6] Wang, H.,Wang, J., 2014, November. An effective image representation method using kernel classification. *In:* Tools with Artificial Intelligence (ICTAI), 2014 IEEE 26th International Conference on (853-858). IEEE.

[7] Zuccon, G., Koopman, B., Bruza, P., Azzopardi, L. (2015). December. Integrating and evaluating neural word embeddings in information retrieval. *In:* Proceedings of the 20th Australasian Document Computing Symposium (p. 12). ACM.

[8] Amigó, E., Gonzalo, J., Mizzaro, S. (2015). March. A Formal Approach to Effectiveness Metrics for Information Access: Retrieval, Filtering, and Clustering. In *European Conference on Information Retrieval* (p. 817-821). Springer International Publishing.

[9] Gultekin, Tunc, et al. (2015). Two-tier tissue decomposition for histopathological image representation and classification. *IEEE Transactions on Medical Imaging* 34 (1) 275-283.

[10] Liang, R.Z., Shi, L., Wang, H., Meng, J., Wang, J.J.Y., Sun, Q., Gu, Y. (2016). Optimizing top precision performance measure of content-based image retrieval by learning similarity function. *arXiv preprint arXiv:1604.06620*.

[11] Zhang, S., Wang, H., Huang, W. (2017). Twostage plant species recognition by local mean clustering and Weighted sparse representation classification. *Cluster Computing*, p.1-9.

[12] Liu, T., Vaikuntanathan, V. (2016). January. On basing private information retrieval on np-hardness. *In: Theory of Cryptography Conference* (p. 372-386). Springer Berlin Heidelberg.

[13] Santos, R.L., Macdonald, C., Ounis, I. (2013). Learning to rank query suggestions for adhoc and diversity search. *Information Retrieval*, 16 (4) 429-451.

[14] Dai, L., Zhang, Y., Li, Y., Wang, H., 2014, April. MMW and THz images denoising based on adaptive CBM3D. *In*: *Sixth International Conference on Digital Image Processing* (p. 915906-915906). International Society for Optics and Photonics.

[15] Yang, Gelan, et al. (2016). Automated classification of brain images using wavelet-energy and biogeography-based optimization. *Multimedia Tools and Applications* 75 (23)15601-15617.

[16] Wu, Shulei, et al. (2016). A remote sensing image classification method based on sparse representation. *Multimedia Tools and Applications* 75 (19) 12137-12154.

[17] Asteriadis, Stylianos., Petros Daras. (2016). Landmarkbased multimodal human action recognition. *Multimedia Tools and Applications* 1-17.

[18] Bouchrika, Tahani, et al. (2017). Rapid and efficient hand gestures recognizer based on classes discriminator wavelet networks. *Multimedia Tools and Applications* : 1-22.

[19] Akmal, S., Shih, L.H., Batres, R., 2014. Ontology-based similarity for product information retrieval. *Computers in Industry*, 65 (1) 91-107.

[20] Wang, J., Wang, H., Zhou, Y., McDonald, N. (2015). October. Multiple kernel multivariate performance learning using cutting plane algorithm. *In:* Systems, man, and cybernetics (SMC), 2015 IEEE int*ernational conference on* (p. 1870-1875). IEEE.

[21] Song, W., Wu, D., Wong, R., Fong, S., Cho, K. (2015). A real-time interactive data mining and visualization system using parallel computing. *In:* Digital Information Management (ICDIM), 2015 Tenth International Conference on (p. 10-13). IEEE.

[22] Wu, E., Battle, L.,Madden, S.R. (2014). The case for data visualization management systems: vision paper. *Proceedings of the VLDB Endowment*, 7 (10) p. 903-906.

[23] Gisbrecht, A., Hammer, B. (2015). Data visualization by nonlinear dimensionality reduction. *Wiley Interdisciplinary Reviews: Data Mining and Knowledge Discovery*, 5 (2) 51-73.

[24] Ebert, D., Gaither, K., Jang, Y., Lasher-Trapp, S., (2014). Cross-scale, multi-scale, and multi-source data visualization and analysis issues and opportunities. *In*: *Scientific Visualization* (p. 353-360). Springer London.

[25] Dubin, Ran, et al. (2016). Real Time Video Quality Representation Classification of Encrypted HTTP Adaptive Video Streaming-the Case of Safari." *arXiv preprint arXiv:1602.00489*.

[26] Shen, Yiran, et al. (2014). Face recognition on smartphones via optimised sparse representation classification, *In*: Information Processing in Sensor Networks, IPSN-14 Proceedings of the 13th International Symposium on. IEEE, 2014.

[27] Zhao, Xinyue, et al. (2015). Robust pedestrian detection inthermal infrared imagery using a shape distribution histogram feature and modified sparse representation classification. *Pattern Recognition* 48 (6) 1947-1960.

[28] Gupta, Ravi Kumar, et al. (2017). Generic Classification and Representation of Shape Features in Sheet-Metal Parts. *In*: *AI Applications in Sheet Metal Forming*. Springer Singapore, 2017. 15-39.

[29] Brigham, T.J. (2016). Feast for the eyes: an introduction to data visualization. *Medical reference services quarterly*, 35 (2) 215-223.

[30] Sun, Q., Zhu, B., Li, Q., Yang, T. (2016). Data Mining Analysis and High-dimensional Visualization Based on Electric Big Data. *DEStech Transactions on Engineering and Technology Research*, (iceta).

[31] Chen, L.F. and Tsai, C.T. (2016). Data mining framework based on rough set theory to improve location selection decisions: A case study of a restaurant chain. *Tourism Management*, *53*, p.197-206.

[32] Shearer, C., Rainham, D., Blanchard, C., Dummer, T., Lyons, R., Kirk, S. (2015). Measuring food availability and accessibility among adolescents: Moving beyond the neighbourhood boundary. *Social Science & Medicine*, *133*, p.322-330.

[33] Wang, F.F., Chen, L.F., Su, C.T. (2015). Location selection using fuzzy-connective-based aggregation networks: a case study of the food and beverage chain industry in Taiwan. *Neural Computing and Applications*, 26 (1) 161-170.

[34] Battersby, J., Peyton, S. (2014). The geography of supermarkets in Cape Town: Supermarket expansion and food access. *In: Urban Forum* 25 (2) 153-164. Springer Netherlands.

[35] Andreti, J., Zhafira, N.H., Akmal, S.S., Kumar, S. (2013). The analysis of product, price, place, promotion and service quality on customers' buying decision of convenience store: A survey of young adult in Bekasi, West Java, Indonesia. *International Journal of Advances in Management and Economics*, 2 (6) p. 72-78.