

Overview of the application of big data in consumer demand forecasting

Nanxin Wei

Chengdu Foreign Language School, Da Zhou, Si Chuan, 635000, China

ABSTRACT

Consumer demand forecasting has always been a hot issue for the research of major enterprises. It provides an important basis for enterprises to formulate production plans, inventory management and price strategies. Therefore, for the development of enterprises, accurate forecasting consumer demand is an issue that needs to be key. This study will elaborate on the development background and significance of big data analysis in consumer demand forecasting, the application status and advantages, and specific practice and case analysis, and deeply explore the important role of big data in consumer demand forecasting, in order to provide useful references for the development and competitiveness of Chinese enterprises.

KEYWORDS

Big data; data analysis; data interpretation

1 Introduction

In the present era, with the continuous development of social productive forces and the increasing level of people's material and cultural living standards, the needs of consumers have gradually moved from the simplest basic living needs of survival and labor reproduction at the beginning, such as clothing, food, housing, transportation, etc., to high-quality life and high-level Spiritual demand development, such as purchasing intentions in tourism, entertainment, education and learning. For enterprises, whether large enterprises or small enterprises, diversified and advanced consumer demand has brought many profit opportunities. Which enterprise can take the lead in grasping the future development trend and accurately, and obtain the important basis for the production plan, inventory management and price strategy of the correct direction, etc., can improve competitiveness and get great opportunities for rapid development.

However, at present, the development trend of consumer demand is diversified and non-directional, and the accuracy of its prediction is limited. What's more, now is the era of information explosion. In the face of data that has become larger in scale and more complex in structure, there are many difficulties in the prediction process, such as the lack of processing and analysis ability of massive complex data, and dependence on historical sales data and inventory data.

Until the past ten years, while the concept of big data is becoming more and more popular and widespread over the world and big data technology is developing rapidly, leading enterprises made full use of big data technology and shifted the core of how to improve the accuracy of consumers' future demand forecasting to how to use big data technology to screen out useful information from a large amount of data obtained, and select Only by dealing with, analyzing and explaining in a powerful way can this problem be gradually overcome.

For example, Google Trends, one of Google's most representative laboratory network products abroad, analyzes Google network search, calculates the number of times the words entered by users are searched, and searches them on Google over time. Compared with the total amount, if it is found that the news report citation of a specific word has a peak, it will be marked, and then a Google news report with a writing time close to the peak will be automatically selected, and its title will be displayed to capture the current hot spots and predict the future development direction.

For example, NetEase Cloud Music and QQ Music, which are famous song listening software in China, will classify, summarize, analyze and interpret the user's listening time and collected songs, etc., to help the software itself speculate on users' preferences, so as to make personalized song recommendations.

It can be seen that big data has long become a development goal that has attracted much attention around the world. In the future, it is expected that this technology will be used skillfully and efficiently to utilize and analyze huge and complex raw data, and transform it into knowledge and value that can be used.

2 The basic concept of big data

2.1 The proposal of the concept of big data

The attention to big data has been widely raised around the world. The concept of big data can be traced back to 2011, when the well-known company McKinsey released "Big data: The next frontier for innovation, compete The report of

"ition and productivity"^[1] put forward the concept of "big data" for the first time and pointed out in the report that "data has penetrated into every industry and business function and has gradually become an important production factor, and people's application of massive data will foreshadow new A wave of productivity growth and consumer surplus is coming.

2.2 Attention to big data

The U.S. government focuses on this and regards big data as the "new oil of the future". On March 29, 2012, it issued the "Big Data Research and Development Initiative"^[2], intends to invest 200 million US dollars in this research, and officially launch the "Big Data Research and Development Plan". In this plan, the National Science Foundation of the United States proposed to "form a unique discipline that includes mathematics, statistical foundations and computer algorithms".

In order to promote the domestic development of big data, China has invested a lot of human and financial resources in the past ten years to focus on research. In August 2012, the Chinese Academy of Sciences launched the strategic leading scientific and technological research project of "New Generation Information Technology Research for Perceiving China"; the Computer Research Institute of the Chinese Academy of Sciences immediately held With "Network Data Science and Engineering - an emerging interdisciplinary discipline?"^[3] The theme conference, together with well-known experts and scholars at home and abroad, made suggestions for China's big data development strategy; in 2013, the Ministry of Science and Technology officially launched the 863 project "Advanced Storage Structure and Key Technologies for Big Data"^[4], and launched 5 big data projects. The development of big data in lots of countries is threatening, and there is an increasing trend.

It can be fully seen that in the modern era of rapidly changing science and technology, big data has long become a key development target.

2.3 The significance of big data research

Vigorously develop big data. In the future, it is expected that this technology will be used to effectively use and analyze huge and complex raw data, and transform it into knowledge and value that can be used, so as to help enterprises more accurately predict the needs of consumers' diversification and non-targeted development, and formulate more suitable for enterprise development. Production plan, inventory management and price strategy to improve their own market competitiveness.

3 The core processing process of big data

3.1 Analysis of data

In the whole big data processing process, the analysis of data is the core step, creating the value of big data. In terms of data analysis, traditional analysis technologies which include data mining, machine learning, statistical analysis, etc. need to be adjusted and innovated in today's era, and their core is gradually shifting to cloud computing technology.

3.2 Interpretation of data

Data interpretation is the only key step in the whole process to directly face the results of the analysis to users. Users should not only be enterprises, but also consumers. The conclusions drawn by enterprises through data interpretation have won the current development boom and made the future development direction. At the same time, they should also report to the masses, whether it is a report in the form of words or a clear chart report, to grasp the psychology of consumers and effectively guide them to attract more consumers.

Therefore, how to make the results of data interpretation simple and easy to understand, so that everyone can easily understand, visualization technology is needed.

4 Key technologies of big data

4.1 Cloud computing technology

Cloud computing technology is not only the core technology of data analysis, but also the basic platform for big data analysis applications^[5]. This concept was first proposed by Google in 2006, and it is also due to its self-developed series of cloud computing technologies^[6] and tools, various big data applications within Google. Only then can it be supported.

Most cloud computing adopts the programming mode of MapReduce^[7], and MapReduce is also the earliest computing

model adopted by Google, and GFS^[8] (distributed file system) and BigTable^[9] (distributed number) also proposed by Google According to the library) and other technologies are collectively known as the three core technologies of Google search engine system, and also give rise to a series of cloud computing open source tools represented by Hadoop^[10]. Nevertheless, MapReduce and Hadoop are still not satisfactory in terms of performance, and they need to be continuously updated and developed more efficient and practical big data analysis technologies according to the actual application. And in the processing of graphs, if MapReduce is used, there will be a lot of unnecessary serialization and deserialization overhead, because graph calculation will involve continuous updates on the same data and a large number of message passing.

4.2 Visualization technology

For interpreting and displaying data appropriately and clearly to users, visualization technology which originated in 2005 and originally came from scientific computational visualization is one of the most effective means. While computer technology is developing, the concept of data visualization has been greatly expanded. Modern data visualization technology refers to the theory, method and technology of using computer graphics and image processing technology to convert data into graphics or images displayed on the screen and carry out interactive processing. Because the way of graphicalization is easier to be understood and accepted by users than text, data visualization is to express abstract data into visible graphics or images with the help of the visual thinking ability of the human brain, and help people discover the hidden internal laws in the data.^[11]

The most representative is Google Trends, a laboratory network product of Google. Through it, users can know the world's attention to their favorite topics and check the frequency of a topic being searched on Google over time. By analyzing Google network search, Google Trends calculates the frequency of the searched word entered by the users, and compares it with the overall amount of searches on Google over time, and then illustrates the results to users with a chart, that is, draws a search volume chart in a linear scale, and provides a news citation volume chart, showing The number of times the user's topic appears in Google news reports.

If a peak in the news report citation of a particular word is found, Google Trends will mark it on the chart, and then automatically select a Google news report whose writing time is close to the peak, and display its title. In addition to the search volume and news volume charts, Google Trends also shows the most popular cities, regions and languages of the first word entered by users.

The research on big data visualization is still continuing. For example, Alipay's electronic statement automatically generates this month's consumer product data chart specifically for this user through the user's usage information for a period of time, which can help users analyze their own consumption; for example, the famous song listening software NetEase Cloud Music And QQ Music will classify and summarize the user's listening time and favorite songs, etc., and finally derive data charts to help users analyze their own listening to songs, and also help the software itself to speculate on users' preferences, so as to make personalized song recommendations.

5 Conclusion

In today's era of information explosion, in the face of data that has become larger in scale and more complex in structure, it is both an opportunity and a challenge to use big data technology to predict consumer needs for enterprises to accurately formulate future development policies.

This article adopts China Knowledge Network and Web of Science databases to collect relevant literature from 2010 to 2023. Keywords include "big data", "big data technology", "consumer demand", "data analysis", "data interpretation", etc. The screening is limited. Journal articles with high sound factors and international conference papers comprehensively review and summarize them, introduce the basic concepts of big data, analyze the key technologies of big data in detail, and explain the status of cloud computing technology in data analysis and the importance of visualization technology to data interpretation.

This article also focuses on the importance of applying big data technology to predict consumer demand for enterprises. However, in big data technology, there are still many problems such as performance and flexibility, and how to make rules for the management of big data? Does such a large amount of data pose a threat to consumers' privacy? There is still a long way to go to solve the big data problem. It is expected that this article can provide some references for peer scholars in big data research.

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