Big Data Analysis in Consumer Behavior

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Abstract. As a matter of fact, big data is an increasingly prevalent tool in contemporary society and has been shown to benefit numerous industries. Given the importance of consumer behavior as a market indicator, big data analysis of such behavior is of great significance in modern life as well as decision makings. With this in mind, based on these examples, this study will gain insight into the methods by which big data can be used to analyze consumer behavior. To be specific, this research will analyze and expound upon three examples of previous research that employ big data to study consumer behavior. On this basis, this paper will discuss the limitations and future developments of big data applications in this field. According to the analysis, this paper emphasizes the potential of big data in consumption to stimulate economic growth. Overall, these results shed light on guiding further exploration of consumer behavior analysis.

Keywords: Big data; consumer behavior; machine learning.

1. Introduction

Consumer behavior has long been a focal point of research and analysis. To improve the accuracy of this study, various methods have been employed. One such method is the use of past consumer behavior data to predict future behavior. The process of forming consumer buying behavior is primarily intricate, as it's influenced by factors closely linked to individual-environment interactions. The SOR model proposes that external stimuli can affect a user's internal cognition, which then elicits the user's behavior or response [1]. These stimuli are frequently environmental factors, such as the user's work environment. In consumer behavior research that utilizes SOR theory, the environment typically pertains to the user's consumption setting.

Big data analytics is the process of studying large amounts of data to reveal hidden patterns and connections. Objective evaluations are prioritized in reporting the results of this type of analysis. This practice involves massive datasets characterized by diversity, complex structure, and challenges in storage. Big data analytics begins with analyzing and visualizing the data for further processing or outcomes. It can help companies and organizations gain a competitive edge by obtaining richer information and more meaningful insights. Therefore, it is crucial to precisely analyze and implement large-scale data projects. With the accumulation of Big Data and the emergence of innovative technologies, conventional marketing strategies are evolving into digital, intelligent methodologies. Big data is already being utilized by individuals for various purposes, including analyzing consumer behavior. People utilize data collection and analysis to determine consumer preferences, purchasing power, and concerns, which inform the creation of new products and marketing techniques that align with public tastes. Avoiding subjective evaluations, this approach seeks to objectively identify trends and respond with targeted strategies. Clear and concise communication as well as logical structure are key to ensure comprehension of the data.

In the era of big data, the collection of personalized consumer data can unearth valuable insights, combining consumer characteristics to analyze the needs of different segments and inform precision marketing [2]. Big data has transformed thinking and lifestyles, while data processing challenges have only increased. The utilization of big data analysis to study consumer behavior has the potential to enhance the relevance of marketed products and align them more effectively with consumer demand. Given the current market landscape, products across various sectors are becoming increasingly competitive, resulting in different product types for similar goods. In addition, big data is a technology and internet platform used to analyze consumer behavior through scientific data analysis. This creates

a chart that rationalizes consumption tendencies. In turn, companies can customize products according to consumer needs and promote them to specific groups of people. This can not only increase product sales, but also expand the market influence of companies, thereby gaining a competitive advantage in the intense market competition [3].

With the growing social homogeneity, individuals feel an increased urgency to differentiate themselves from others. This psychological phenomenon becomes evident in the consumer buying process, with the new generation paying close attention to personal experiences. Brand dependency and loyalty in consumers are gradually declining, with individuals opting to experiment with trendy products and services [4]. These changes brought about by big data require immediate analysis of the factors that influence consumer decision-making behavior in the big data environment [5]. In an era of supply-demand imbalances, a consumer-oriented approach is essential. Big data is instrumental in researching consumer behavior. This article will introduce three models and their use cases to illustrate the role of big data in consumer behavior research. Later, this study will discuss the limitations and future potential of big data in this field. Finally, the significance of our findings will be summarized and explained.

2. Basic Descriptions of Big data Analysis

Traditionally, data analysis revolves around relational database management systems that prompted the emergence of related data analysis tools such as SPSS Modeler, Matlab Spider, SQL Server Analysis Services, weka, and R [6]. These tools utilize relational databases as their fundamental data engine and offer computational frameworks and algorithm libraries. Unfortunately, this conventional approach to data analysis falls short in addressing the complexity of high-dimensional data, which is a characteristic of scientific big data. The emergence of the Internet-based cloud computing model and the distributed high-performance data processing model have resolved issues with database-centered data analysis systems. The distributed file system GFS and the MapReduce framework, proposed by Google, offer valuable insights into massively parallel data computation and analysis [6]. Big data analysis employs methods such as data visualization, big data aggregation, correlation analysis, and the application of big data correlations. Data visualization converts digital data into visual charts, graphs, three-dimensional patterns, and other intuitively presented visuals. The aggregation of big data currently utilizes two technologies: the MapReduce algorithm and the K-means algorithm [7]. These algorithms have demonstrated practical application effectiveness. The Apriori algorithm is widely applied for big data correlation analysis and mining calculations [6]. After performing the big data correlation calculation, the correlated data resulting from the data analysis is inputted into a database. It is then introduced into the data platform through parallelized algorithmic processing.

3. Applications

The sharing economy has arisen due to the progress of IT technologies, e.g., social networks and mobile payments, as well as shifts in the social and economic surroundings. Thus, research explores how consumers' perceived value, based on online reviews, impacts their intention to purchase again. The P2P lodging industry recognized an unaddressed requirement in the traditional lodging sector [8]. It also offers a forum to unite dispersed customers and distribute unsold property resources among them. The integration of such resources demands the application of big data analytics.

The ability to provide customers with services that stimulate repeat purchases has long been acknowledged as a competitive edge in diverse service sectors, such as hospitality. Repeat customers are indispensable to P2P lodging [8]. Through comprehensive research on the factors influencing repeat purchase intentions in the P2P accommodation sector, service providers can attract and retain more customers, thus fostering industry growth. Utilizing big data analytics to analyze repeat purchase patterns is essential [8]. The combination of social media and e-commerce provides

consumers with platforms to express their opinions about goods or services, which plays an important role in their decision-making process. This paper employs the text mining method to generate the repurchase intention variable in online reviews, based on the perceived value theory, and examines the impact of perceived value on behavioral intentions in the P2P accommodation industry. Taking the example of the sharing economy platform Airbnb, this paper presents a dimensional framework for the perceived value of consumers, encompassing functional, hedonic, cognitive, and social relationship values. It utilizes big data technology to capture online reviews of P2P accommodation platforms and then analyzes the impact of these reviews on repeat purchase intentions through sentiment analysis, LDA topic modeling, text mining, and SVM algorithms [8].

According to research, consumers' repeat purchasing behavior is influenced by functional, hedonic, cognitive, and social relationship values.[8] Additionally, the study found that consumers' behavioral intentions are influenced by three dimensions of perceived value: functional, hedonic, and cognitive. [8]. Furthermore, the study confirmed that perceived value has an impact on consumers' willingness to repurchase. This research contributes to the development of peer-to-peer accommodations within the tourism and hospitality industry. A typical sketch is shown in Fig. 1.

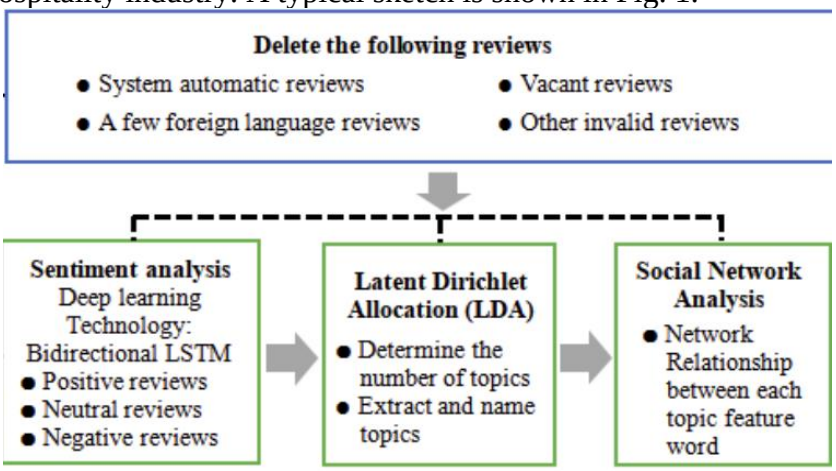

Fig. 1 A sketch of peer-to-peer accommodations within the tourism and hospitality industry.

Because electronic word of mouth (e-WOM) carries significant value to both marketers and customers, researchers often explore e-WOM within the context of social networking sites (SNS). Due to the real-name nature of e-WOM, customers widely consider social e-WOM to be the most trustworthy source of information. Marketers can utilize e-WOM to communicate with customers directly on social media [9]. Collecting and analyzing this type of information requires the implementation of big data techniques. From this study, an examination of ePWOM purchase intent links in Facebook brand fan pages is conducted. The language is clear, objective, value-neutral, and free from biased, emotional, figurative, or ornamental language. High-level standard language is used, with consistent technical terms and common sentence structure. A clear structure with logical progression and causal connections between statements is maintained, while avoiding bias.

Based on smartphone brand fan pages on Facebook, the study integrates aspects of rational action theory (TRA), value co-creation theory, and attribution theory to assess a comprehensive ePWOM purchase intention framework. Based on smartphone brand fan pages on Facebook, the study integrates aspects of rational action theory (TRA), value co-creation theory, and attribution theory to assess a comprehensive ePWOM purchase intention framework. Precise word choices are utilized, and the text is free from grammatical errors, spelling mistakes, and punctuation errors. Overall, the text is refined for improved academic writing quality according to specific principles and language variants. It evaluates customer purchase intention as an outcome of ePWOM, mediated by customer trust beliefs, value co-creation, and perceived brand image. When first used, technical term abbreviations are explained. Common academic sections are included, and regular author and institution formatting is maintained. Passive tone and impersonal constructions are employed, and first-person perspectives are avoided unless necessary. According to attribution theory, value co-

creation theory, and integrated rational action theory, there is a correlation between electronic positive word-of-mouth (ePWOM) and consumers' purchase intentions, as evidenced by research conducted on smartphone brand fan pages on the Facebook social networking site. The study found a positive correlation between ePWOM and consumers' purchase intentions in the SNS environment. The recurring nature of these findings indicates the importance of ePWOM in influencing consumer behavior. Customers often rely on user-generated content on social media to gather product-related information before making a purchase. This is because they seek to comprehensively understand the product. Therefore, customers constantly search for information related to the product in order to gain a better understanding of it. The relationship between trust, belief, value co-creation, hedonic brand image, and functional brand image plays a role in this behavior. Furthermore, the results provide evidence for a serial mediation model in which ePWOM enhances purchase intentions sequentially by combining value and trust beliefs [9]. An hypothesis diagram is given in Fig. 2.

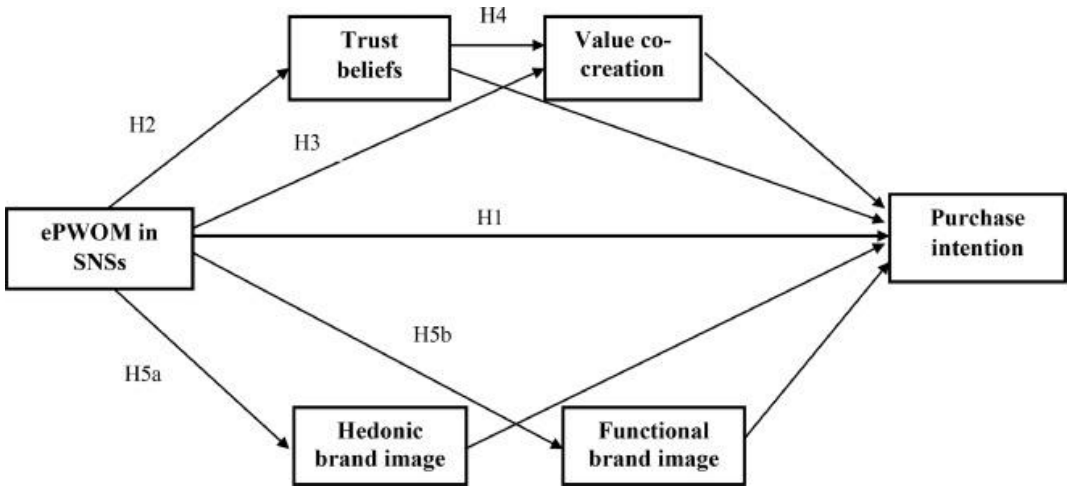

Fig. 2 Hypothesis diagram.

Due to the market's complexity and the rising competition, it is challenging for customers to find suitable products, online or offline. As the internet's importance grows, recommender systems play a vital role in customer decisions. Big data analysis can aid in achieving this. Therefore, our study proposes a fuzzy-based recommender system to understand consumer preferences. Use user-generated content (UGC) for collecting market opinions on product attributes to create a powerful recommendation system [10]. It is important to note that technical term abbreviations, e.g., UGC, should be explained when first used. The present study introduces new recommendation methods based on fuzzy concepts, e.g., bigram fuzzy language representation and the fuzzy market research system approach. These methods employ the user's general perception of products, such as smartphones, as input and output the user's sequential preferences for the product.

Recommendation technology describes the capacity of features to anticipate other features based on the natural connections between consumer traits, particularly in indistinct and unknown contexts. The technology being analyszed discerns consumers' preferences by analyzing how purchasers make choices between product attributes. This analysis presents how a bigram fuzzy language model converts consumers' perceptual data of smartphone features into its corresponding numerical data. Using statistical analysis and probability to gather both linguistic and numerical data makes recommendations more practical. Additionally, the framework allows for flexibility in selecting attributes as dependent and independent variables, enabling one to measure the predictive power of one attribute on others. This research has introduced a new approach to incorporating reviews from other users to recommend products to customers. By explaining the inherent connections between user attributes, this technology could enhance the relevance of its recommendations (seen from Fig. 3).

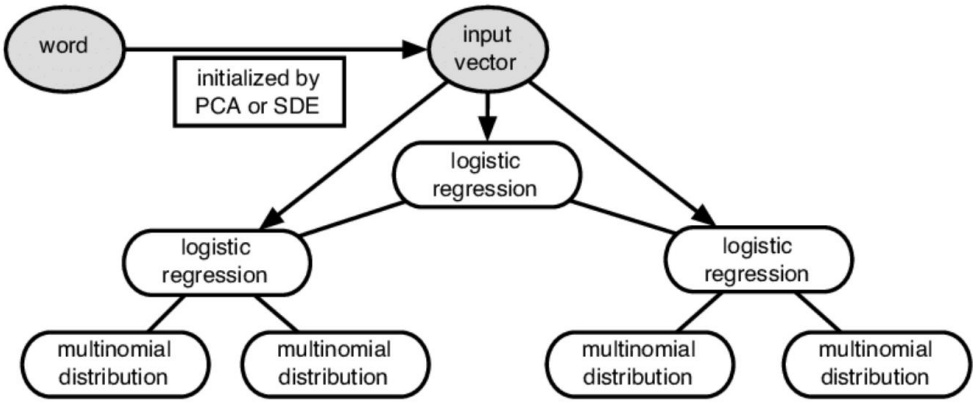

Fig. 3 A sketch of bigram fuzzy language model.

4. Limitations and Prospects

In consumer behavior research, the use of big data is crucial, yet the technology has its limitations. Firstly, significant amounts of data are required for successful big data applications. Furthermore, collecting consumption data raises concerns about privacy. This creates challenges when obtaining and using data. Secondly, there are numerous interference data within the collected consumption data. How to eliminate interference data effectively and accurately is a method of great interest. Consumer behavior is a complex phenomenon, involving repeated purchases, post-purchase refunds, and more. Big data has the potential to play a significant role in all aspects of life going forward. In terms of consumer behavior specifically, big data can more precisely identify individuals and products and provide more accurate predictions.

5. Conclusion

To sum up, this study introduces several consumer behavior analysis applications that utilize big data. Big data models can integrate resources, collect and analyze data to help us understand consumer behavior. While big data has potential, its precision and accuracy still require improvement. Nevertheless, big data is poised to play a greater role in the future. This article introduces big data models and their applications to help readers understand how big data is used in consumer applications. This can lead to greater appreciation of the impact of big data in daily life, which can promote social progress.

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