

Consumer Behavior Prediction in the Big Data Era: a Comparison Analysis

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Abstract. Consumer behavior prediction is one of the critical factors that every business organization needs to understand to aware the market structure as well as purchase and sales pattern in a market kind of structure. To address this issue, the only measure can be undertaken is using the big data analytics. In this case, it makes the most preferred and suitable based on analysis of such complex data and can arrive at specific key findings in general. In this paper, different analysis approaches and scenarios will be compared. Based on the analysis, various variables can be used to undertake consumer behavior, i.e., psychological, social, cultural, personal, and economic factors. On this basis, the organizations can undertake. However, one limitation of big data is data manipulation, which makes some of the findings lack the needed objectivity in general. In this case, the analysis has a higher level of applicability and significance in current and future development in market analysis. These results shed light on guiding further exploration focusing on consumer behavior prediction.

Keywords: Consumer behavior; big data; comparison analysis.

1. Introduction

Consumer behavior and respective status is the critical area of analysis that has gained much momentum in various instances where organization attempts to attract the target consumers in the market. In general, it can be traced back to 1940-the 1950s, when marketing and various consumer aspects gained such momentum. Martin Fishbein and Icek Ajzen, who came up with the idea of marketing, did propose that there is a need to have certain aspects and ideas of the targeted consumer to increase the potentiality and general market share. Based on various theories that have been put forward on consumer behavior, some effective marketing and pre-existing attitudes that consumers can bring will affect purchasing decisions and trends in the market. However, this must be relevant to certain kinds of data and evidence that can be described as big consumer data. In general consumer behavior, big data is critically used to analyze specific points on the consumer journey, perception, and other factors affecting purchasing power to increase the total sales organizations can make in the long and short-run. Besides, big data analysis is significant for decision making and projection on the kind of production to meet the target consumer and features of goods needed, thus crucial in marketing, among other factors surrounding consumer behavior in general.

Various studies have also been conducted on consumer behavior, big data, and the way to significant increase the sales volume among other vital factors. Some of the critical literature findings do include; a study conducted by Mou and Benyoucef did conduct a study on consumer behavior on the social aspect based on the humanistic approach using correlation analysis to determine the respective factors affecting consumer decisions [1]. Based on the findings, trust and general relations with customers significantly influence the purchase made from such effectively and efficiently. Zhao, et al. analyzed methods used to influence consumer pattern and behavior based on statistical analysis and clarified that the cognitive approach is the most effective toward attracting customers which play a key role in influencing purchase [2].

In order to compare the different machine learning analysis for prediction consumer behavior, this paper discusses the features and procedures for the different approaches. The rest part of the paper is organized as follows. The Sec. 2 will give the description of consumer behavior and big data. Subsequently, the Sec. 3 will describe the different types of factors and features regarding to consumer behavior. Afterwards, the Sec. 4 will demonstrate machine learning and big data analysis of consumer behavior. Then, the Sec. 5 will illustrate the differences among various paradigms.

Accordingly, the Sec. 6 will clarify the limitations and give proposals for further study. Eventually, a brief summary will be presented in Sec. 7.

2. Descriptions of Consumer behavior and big data

Consumer behavior that entails analysis of consumer characteristics through looking at various variables is the current aspect that both small and large business organizations cannot ignore. One key factor is relevant to the fact that every business must have a specific target market and some key aspects on them to increase sales through proving the goods and services preferred. In most instances, the considered variables include behaviors of target consumers, demographic factors, and psychographics, among other vital variables that can effectively indicate the critical behaviors of a consumer. To enhance such prediction, most organizations have employed experts that use real-time data to analyze the same effectively and efficiently.

To effectively offer some view and analysis on consumer behavior, big data analytics has been the most effective and critical analysis that various organizations use. It is one of the statistical aspects utilized to uncover certain kinds of trends by various businesses' organizations. Big data can provide a general view and other aspects that affect consumer purchases, e.g., shopping trends, the income of consumers, loyalty programs, and business cycles that influence consumer purchases [3]. To effectively enhance the same various business organizations have employed their personnel to increase the reliability and use to have some forecasting and decision making that is current significant in marketing and increase in market share, among other critical factors in general. Besides, most data collection methods include Google, Facebook, and other computer patterns that have revolutionized general purchases and sales.

In general, consumer behavior requires some analysis to effectively have a clear picture and trends that are indeed significant towards increasing the ability of the consumer to understand the purchase and sales options that can be used. Large organizations use this kind of data to effectively understand the market they operate in before embarking on production based on consumer trends that must be given a higher analysis.

3. Features and variables of consumer behavior

Various critical factors in any market affect a consumer's general behavior based on trends and purchasing patterns. Some key variables that affect consumer behaviors in various kinds of markets include but are not limited to psychological, social, cultural, personal, and economic factors in general. Fig. 1 shows the category of the factors and the general features can be described as follows.

3.1 Psychological factors

The psychological nature of a person does play a significant role in the kind of decisions, and the personality trait of an individual and such are not unique when it comes to a particular aspect in general. It is not unique regarding consumer behavior on the kind of purchases they make and how much can be used to determine trends by business organizations. For instance, motivation and perception do affect such. In addition, to effectively understand the same, various business organizations study such factors to understand the basic features clearly. Consumer beliefs and attitudes are also part of the factors influencing the general purchase that business organizations analyze concerning big data analytics.

3.2 Social factors

Social factors consist of various factors that affect consumer behavior, i.e., the family structures, preference groups, roles, and status of the consumer. Based on the variable, the related organizations can effectively determine the kind of goods to supply, mode of advertising, and price to be charged when price discrimination is available and can work effectively. Besides, the given social factors

enable the organizations to clearly understand some fundamental factors that affect general supply and demand in the market other than psychological aspects.

3.3 Cultural factors

Cultural factors (e.g., social) play a significant role in certain societies on the kind of products consumed. Business organizations and investors cannot ignore such attributes before investing in, otherwise they incur a significant loss, among other insignificant factors that might result afterwards. Besides, any society's purchase patterns always align with the given cultural beliefs.

3.4 Personal factors

In all market, there are always personal characteristics that define it and affect the purchase and sales that are made. Some of it does includes age, income, occupation, and lifestyle. For instance, age influences the kind of products bought regarding trends in the market. Individuals' income must also be considered as consumer behaviour characteristics as its impact on the general consumer perception.

3.5 Economic factors

Economic factors affect the consumer's ability to purchase certain products as experience in the consumer frontier and the given utility. The more favourable the economic factors, the higher the purchase power. Such motivates business organizations to increase supply due to demand and price level owing to forces of demand and supply.

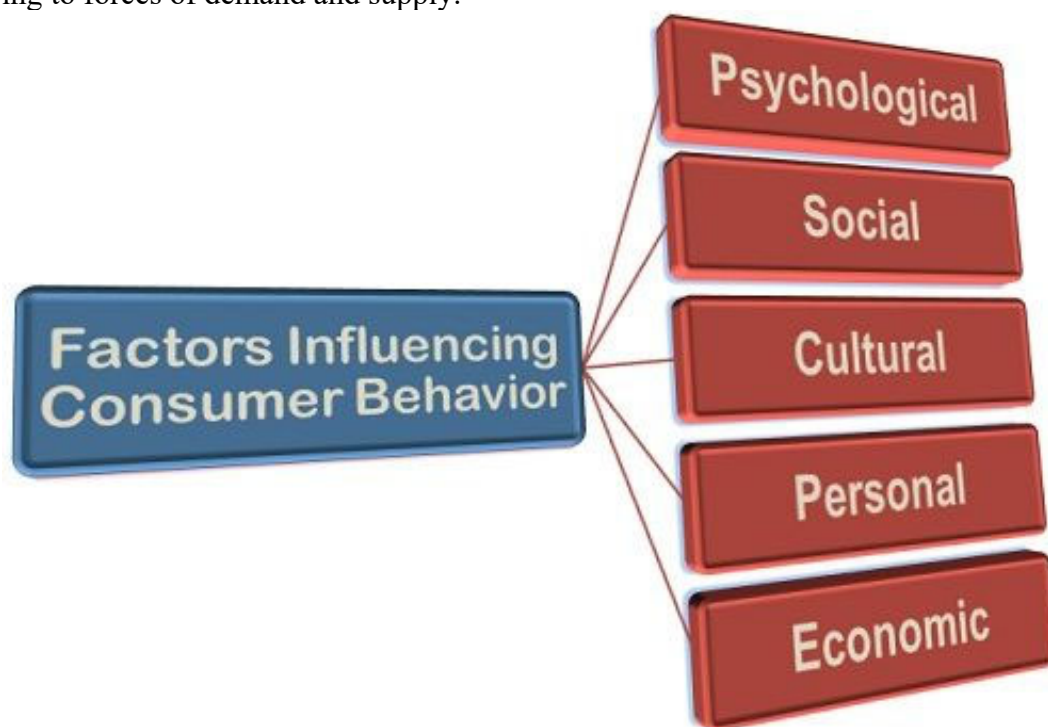


Fig. 1 Factors category for consumer behavior

4. Machine learning and big data analysis of consumer behavior

Machine learning, which entails using various algorithms in big data, is one of the key logical steps that plays a key role towards understanding key aspects on the general understanding of critical aspects in companies. Besides analyzing trends in marketing and consumer, machine learning is widely used in decision-making by providing specific key evidence that concerns the respective potential value of the respective aspects in general [4]. In addition, machine learning employs driven algorithms and other statistical models to assess the data sets effectively. Then, it draws a conclusion

that is coherent towards a decision on productivity. Other management aspects that entails general predictability of specific occurrence in market structures.

Based on the algorithm that is used in the big data, various organizations can predict consumers behavior based on a particular general aspect such as sales, trend, market optimization, and share, planning production level and related inventory, detecting fraud that might occur in the market structure [5]. Some of the critical aspects that are employed in machine learning and big data analytics do entail the following aspect towards understanding the critical consumer behavior, i.e., segmenting the general audience. In this instance, they are the respective consumers, identifying the key benefits that accrue from them, comparing the respective data under consideration, analyzing the same towards marketing campaign, which is applied and general comparing the results on consumers behavior before making the following step opinion that concerns the general trend among other critical aspects in general.

According to the respective analysis, the business organization can accurately predict the consumer probability purchasing criteria based on various variables, i.e., psychological, social, cultural, personal, and economic factors in the respective predictability, which is generally vital towards enhancing certain critical aspects in general. However, some distinctions surround both big data and machine learning. Machine learning, in most instances, entails teaching the respective unknown inputs to produce desired output which is vital for the enhancement of the given development. At the same time, big data uses data and statistical tools to arrive at a certain kind of conclusion that is essential for enhancing development and growth in general [6]. In general, both big data and machine learning entail gathering data and analyzing the same. The usage of massive digitalization to aid in improving certain business operations that arise from the same. Therefore, it can be effectively analyzed towards enhancing the general development of consumer behavior and purchase trend, which is essential towards decision making, among other factors in marketing.

5. Comparison between Big Data analysis and traditional analysis

Big Data and traditional analysis have been used in most instances by various organizations towards consumer behavior to understand certain aspects that concern the same for effectively planning on sales, production, and kind of marketing strategies based on their respective suitability. Traditional analysis, for instance, relies primarily on dashboards that are, in most instances, composed of data visualization and other kinds of analysis to understand trends by the respective analyst, making it the most effective and convenient way of undertaking such kind of analysis in particular. However, it has certain technicalities and requires data analysts' assistance to evaluate the key findings' critical analysis and general interpretations. Nevertheless, extensive data analysis is based on collecting data from specific consumers' perceptions and behaviors and analysis, e.g., clearly understanding the basics surrounding the consumer based on the trend, among other unique factors. Besides, the traditional analysis only looks at the general effect of general learning in one or two years using specific metrics, while the big data has unlimited analysis of period. Thus, it is based on a considerable volume of data that enables the researcher to arrive at crucial analysis.

One of the key advantages of traditional analysis carried out by Aljumah et al. is based on the fact that it is a more focused centralized database kind of architecture, while big data uses the distributed database [7]. Big data is assumed to be more scalable than the traditional one based on its enhanced objectivity. It also enhances better decision-making, reduces the cost associated with business processes, and can enhance the detection of fraud, which is common in various instances of business growth and development. The traditional method is also effective based on the use of non-complex techniques. It does not require a higher level of expertise to be able to complete various kinds of projects in general. However, the disadvantage of traditional data analysis based on Zhu claims that is the lack of real-world connections [8], which cannot be used in instances of complex analysis and understanding of the market structure, among other critical aspects in general. Big data, on the other hand, is preferred in most instances based on the violation of the data privacy principle, which is a

critical factor that is considered given the higher level of manipulation of data which is against the law, as was pointed out by Nam et al. [9]. In general, both kinds of analysis are effective based on the analysis being undertaken in general. The three V features of the bigdata are illustrated in Fig. 2.

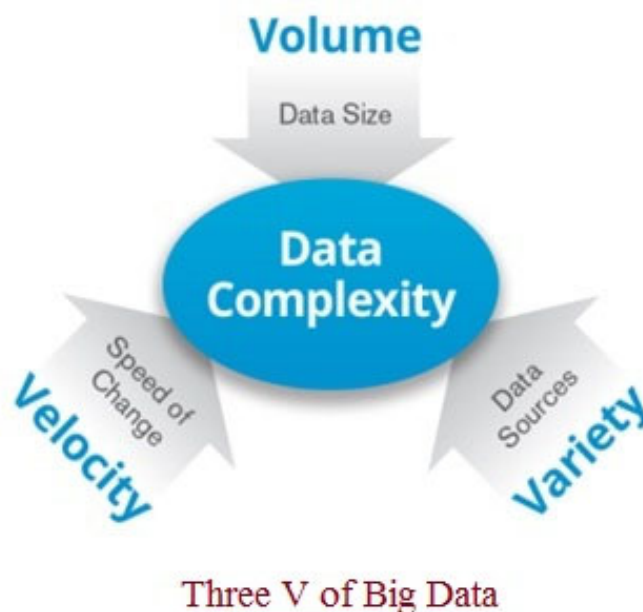


Fig. 2 A sketch of the 3V of big data.

6. Limitations & Prospects

The applicability of big data is faced with numerous challenges that make it impossible to apply in most instances by organizations. For instance, in most instances, big data involves data manipulation, which are biased and therefore cannot effectively lead to some coherent results that make the general study lack the intended objectivity, among other vital factors considered in the study. Similarly, it can only be used in specific select channels based on the preferred data analysis and output, making it one of the least used kinds of analysis in context of its applicability. In this case, these results cannot be presented directly and used for decision making, which is the principal aim. In most instances, it is less preferred according to various data designs and applicability, which can be attributed to a number of factors that surround the same both in the short and long run.

However, despite the above disadvantages surrounding big data, it still has greater future applicability, making it more suitable and applicable [10]. Some of these are based on the applicability to project-specific revenue and sales levels, which makes them used by management. Moreover, this makes it mainly used in the general technological development and decision-making in terms of facts rather than imaginations that cannot be ascertained, among other critical factors in general. Besides, based on technological advancement, the future of big data is ascertained, making it the most effective and efficient among other critical factors in general [11].

7. Conclusion

In summary, understanding critical consumer behaviors require ascertained analysis based on facts rather than imagination. It makes the current market trend analysis based on consumers based on various kinds of assumptions and outcomes that involve several analyses (e.g., extensive data analysis). Based on the kind of analysis undertaken in the text, big data analysis is the critical growing kind of analysis that most organizations cannot ignore based on its suitability to understand the trends in the market. In this case, it is possible to clearly understand the basic requirements that business organizations need to meet, among other critical factors in general. Besides, big data has the applicability by both small and large organizations in general ability to understand consumer behavior

and purchase trends that they then use to gauge the market and plan the general prediction planning, which is equally sensitive among other critical development in general. Moreover, the traditional data analysis is also applicable in instances with some centralized databases based on the applicability and non-complex nature of the same. Overall, these results offer a guideline for consumer prediction in the context of bigdata analysis paradigms.

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