

The Advantages and Challenges Faced by Business Analytics in the Context of Big Data

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Abstract: In recent years, with the booming development of big data technology, data acquisition and data analysis have become more convenient and efficient, and business data analysis is gradually being widely used in various industries. This paper analyses how business analytics can seize the opportunities for better development in the era of big data, and also explains the challenges faced by business analytics in the era of big data and provides corresponding solutions. The article finds that big data can help business analytics better predict market trends, optimise marketing strategies, provide visual analysis reports, and detect fraud risks; at the same time, the problems of data quality, data security, data processing speed, and data processing capacity arise; finally, the article puts forward ways to solve these problems from the perspectives of improving the quality of data, improving the level of protection, improving the speed of processing, and improving the capacity of analytics, which provides diversified ideas for people.

Keywords: big data background, business analysis, advantages, challenges, measures

1. Introduction

With the rapid development of information technology and the widespread use of big data technology since the 21st century, the question of how data can be better utilised has become a hot research issue in today's society. In business analysis, the role of data analysis cannot be underestimated due to the huge volume and high-quality requirements of data. Previous research has focused on traditional business analysis and empirical analysis, without effective integration with the context of the big data era.

In order to effectively combine business analytics with big data and analyse its advantages, problems and proposed solutions, this paper, based on reference to previous literature, finds the application of big data technology in the field of business analytics, analyses and integrates it, and elaborates on its advantages, problems and solutions, aiming to present the application of big data in the field of business analytics more clearly. The main contribution of this paper is an effective analysis of business analytics in the context of big data.

2. Introduction to Business Analysis

Business analytics is the process of collecting, analysing and interpreting data to provide decision support and strategic planning for a business or organisation. It involves the study and analysis of markets, customer needs, competitors, internal processes and other aspects to identify and improve business performance and operational efficiency. Kelin's article only focuses on how big data can be used in business analysis, but does not analyse the risks involved [1], Zhang's article only focuses on one of the applications of using big data for business analysis, which is not broad in scope [2]. and Zhao's article focuses on the identification and prevention of fraud [3]. This paper builds on the previous ones to form a comprehensive article describing business analytics in the era of big data.

Business analytics can help a business or organisation make the right decisions and strategies in areas such as product and service development, sales and marketing, cost control, and optimisation of organisational structure. Business analytics typically uses techniques such as data mining, statistical analysis, machine learning and visualisation to identify trends, predict future directions and assess business risks. Business analytics can be applied in various industries such as finance, retail, healthcare, manufacturing, etc. The aim is to enable businesses to better meet customer needs, optimise business processes, improve profitability and achieve sustainable growth through more accurate insights.

3. The Advantages of Business Analytics in the Context of Big Data

The opportunities for using Big Data for business analytics are enormous, as the size and complexity of business data is growing rapidly with the rapid growth of digitisation and the Internet. Big Data technologies can help businesses collect, store, process and analyse this data and derive valuable insights from it to support business decisions.

3.1. Predicting Market Trends

By analysing large amounts of data, companies can understand market dynamics and trends, so that they can predict future market directions and develop business plans and strategies accordingly. Over time, companies accumulate more and more sales data. How to store this data safely and effectively and apply it to future market forecasts is a top priority for marketing. Market forecasting is not only related to the success or failure of a business but also has a direct relationship with the development strategies and tactics developed by the business. Without effective sales data processing methods, important information can be lost in the noise and distractions.

Big data technologies can help companies collect, integrate and process huge amounts of data quickly and efficiently. This data includes consumer behaviour, market trend, social media, etc. This can provide companies with a comprehensive and accurate information base. Based on data mining, by using techniques such as machine learning, data mining and statistical analysis [4], companies can analyse and mine huge data sets in depth to discover patterns, trends and correlations hidden behind the data. These insights help companies understand the dynamics of market changes and consumer demand. In day-to-day marketing management, big data technologies enable businesses to monitor market conditions and consumer behaviour in real-time. By continuously collecting and analysing data, companies can quickly identify changes in the market and take timely action. This real-time feedback and ability to adjust enable businesses to be more responsive to market fluctuations, reduce risks and seize opportunities, helping them to maximise and optimise profitability and minimise losses.

3.2. Optimise Marketing Campaigns

Big Data leverages the sheer volume of data and powerful analytics to help businesses better understand consumer behaviour, trends and preferences to guide marketing strategies and decisions. One of its most important functions is to enable companies to monitor and analyse market dynamics and consumer behaviour in real-time [5]. By collecting and processing real-time data, businesses can adjust their marketing strategies and promotions to adapt to market changes in a timely manner. For example, companies can make personalised recommendations, adjust pricing strategies or optimise promotional campaigns based on immediate consumer feedback. At the same time, Big Data technology provides comprehensive data analysis and measurement tools that enable businesses to accurately assess the effectiveness and ROI of marketing campaigns. By tracking key metrics and analysing data, companies can quickly identify problems and improve their marketing strategies so that they can continuously optimise the effectiveness of their campaigns.

3.3. Data Visualisation and Reporting

Presenting analytics through data visualisation and reporting tools makes data easier to understand and share, and helps businesses discover new insights from their data. Firstly, it can provide a clear visual presentation: Data visualisation reports translate data into an easily understood and assimilated form through charts, graphs and other visual elements. In this way, business management and decision-makers can quickly access key information and better identify trends, spot patterns and understand the relationships between data. Secondly, it can facilitate data exploration and discovery: Visual reports can help companies discover hidden patterns and insights in data that can reveal potential business opportunities or challenges. Through interactive visualisation tools, users are free to explore data and perform slicing and drilling operations to gain deeper insights. Thirdly, it can support for real-time monitoring and forecasting: Data visualisation reports can show changes and trends in data in real-time, enabling organisations to monitor business operations in a timely manner. In addition, it can combine statistical models and algorithms to provide businesses with accurate forecasting and trend analysis to support decision-making and planning. Fourthly, it can facilitate cross-departmental collaboration and communication: Data visualisation reports provide a shared platform that enables different departments and teams to understand and analyse data in a consistent manner. This helps to facilitate cross-departmental collaboration and communication, reducing information barriers and thus better-supporting business decisions [6]. Lastly, it can help optimise decision-making: By visualising data into an easy-to-understand format, businesses can better assess the outcomes and impacts of different decision options. This helps reduce decision risk and enables management to more accurately predict the impact of different decisions on business performance.

3.4. Fraud and Risk Detection

Big data analytics can help enterprises detect fraud and risk, and through real-time monitoring can quickly identify anomalies and take appropriate measures. Firstly, the acquired data is extracted from key risk scenarios elements such as transaction amount, time, location, IP address, device type and other elements to obtain the base data. Secondly, predictive models are built using machine learning or deep learning techniques. Commonly used models include decision trees, random forests, logistic regression, support vector machines, etc. These models are able to predict the presence of fraud and risk based on the input features while using historical data to train the built models and improve their accuracy and performance by continuously optimising the parameters and algorithms. Again, the built models are applied to real-time data to monitor and identify possible fraud and risk in a timely manner. In the event of anomalies, the system can send alert notifications and take

appropriate anti-fraud measures. For example, rejecting transactions, requesting additional identity verification, freezing accounts, etc. Of course, Big Data technology monitors the performance and effectiveness of the system and continuously collects new data for model iteration and improvement to address new forms of fraud and risk [7]. It is important to note that Big Data technology is only a tool and cannot, by itself, completely eliminate fraud and risk. In practice, it needs to be combined with other technical tools and artificial intelligence algorithms to improve the accuracy and credibility of detection. It is also necessary to comply with relevant laws and regulations and privacy policies to ensure data security and compliance.

4. Challenges to Business Analytics in the Context of Big Data

4.1. Data Quality Issues

The issue of data quality is an important challenge in the context of Big Data. As Big Data covers a large number of data sources and types and is often generated at high speed, large scale and in a diverse manner, data quality issues become more prominent. The following are some common data quality issues: Firstly, integrity issues. Data integrity refers to whether the data has sufficient integrity and is free from defects. In a Big Data environment, data may be collected from different sources, some of which may be lost, leading to inaccurate or incomplete analysis results. Secondly, accuracy issues. Data accuracy refers to the precision and correctness of the data. Big data collections may contain incorrect data, such as incorrect records, incorrect measurements or human input errors, which will directly affect the accuracy of analysis and decision-making. Thirdly, consistency issues. Data consistency refers to whether data is consistent across different data sources and data sets. In a Big Data environment, data may come from a variety of different systems and platforms, which may lead to inconsistencies between data, such as inconsistencies in format, units, naming conventions, etc. Lastly, credibility issues. Data credibility refers to the authenticity and reliability of the data. In a Big Data environment, the credibility of data sources may be an issue, as data may come from different sources, some of which may be unreliable or potentially fraudulent.

4.2. Data Security and Privacy Issues

In the era of Big Data, data security and privacy issues become particularly important. As technology advances and big data is stored on accessible servers, we are able to collect, store and analyse large amounts of data, but this brings with it many potential risks and challenges. Firstly, data security has become a key issue. Big data stores a large amount of sensitive information, including personal identity, financial data, medical records and more. If this data were to be hacked or compromised, it would cause serious damage to individuals and organisations. It is therefore crucial to protect data from unauthorised access and malicious acts. Security measures such as encryption, access control and network firewalls can help reduce the risk. Secondly, privacy issues are also of wide concern. Big data analytics requires collecting and analysing large amounts of personal data, which reveals various information about an individual's behaviour and preferences. This can lead to an invasion of individual privacy and the potential for misuse. It is therefore necessary to ensure that the use of data complies with personal privacy protection regulations, for example by following appropriate data collection and use principles and obtaining explicit consent from users. In addition, cross-analysis of Big Data may lead to information leakage and identification risks. Even if a dataset is itself anonymised, there is a risk that personally identifiable or sensitive information may be re-identified through cross-analysis with other datasets. Therefore, when sharing and publishing data, appropriate measures need to be taken to prevent identification risks from occurring, such as data desensitisation, de-identification and other technical means.

In the era of Big Data, protecting data security and privacy requires a combination of technical, legal and ethical considerations. Organisations and individuals should pay greater attention to data security, take appropriate measures to protect data and ensure that its use complies with privacy protection principles and regulations. At the same time, governments and relevant agencies need to develop and implement appropriate laws and policies to enhance data security and privacy protection.

4.3. Processing Speed Issues

Unlike traditional relational databases, Big Data involves huge amounts of unstructured data, which makes data processing speed a challenge. Firstly, the volume of data involved in the era of Big Data is usually very large, even reaching previously unimaginable scales. This leads to a huge amount of data being processed during data processing, which increases the processing time. Secondly, the data sources in the era of Big Data are very diverse, including sensor data, social media data, log data and so on. Data from different sources may have different formats and structures and need to undergo processing such as cleaning, transformation and integration, which can consume a lot of time and resources. At the same time, Big Data often needs to be stored and processed in distributed storage systems. While distributed storage can provide high reliability and scalability, it also brings data fragmentation and complexity, requiring data transfer and coordination over networks, which can reduce data processing speed.

4.4. Data Analysis Capability Issues

Big data requires specialist skills to analyse and interpret its value, but businesses may lack such skills and talent [8]. Big data analysis involves knowledge and skills from multiple fields, such as statistics, machine learning, data visualisation, etc. Data analysts need to have an interdisciplinary background and also need to continuously learn and update their knowledge to cope with the ever-changing and complex data analysis scenarios, and such talent is precisely what many companies lack.

5. Enhanced Rationale for Business Analytics in the Context of Big Data

5.1. Improving the Quality of Data

Firstly, data cleansing and pre-processing can be implemented, i.e. data identification, correction and removal of erroneous data. Secondly, data formats can be standardised to make them suitable for subsequent analysis. Finally, the reliability of the data source and the frequency of updates need to be ensured.

5.2. Improve the Level of Data Security Protection in the Enterprise Network

First, security protocols can be deployed to ensure the security of data transmission and storage. In addition, data rights management mechanisms can be put in place and only those who are authorised to access the data can access specific data. Moreover, encryption and other means of data protection can also be employed to protect sensitive data.

5.3. Use a Variety of Technologies to Increase the Speed of Data Processing

Firstly, distributed computing technologies such as Hadoop and Spark can be used to speed up data processing. Of course, it is also necessary to optimise data storage and querying, and use technologies such as NoSQL databases to improve data retrieval efficiency. Finally, cloud

computing platforms are utilised to enable auto-scaling and auto-deployment to cope with growing data sizes [9].

5.4. Improve Enterprise Data Analysis Capabilities in Multiple Ways

The company can establish an internal data analysis team or an external partner dedicated to the analysis and interpretation of big data. On this basis, visualisation tools and report generators can be used to reduce reliance on technical knowledge and improve data analysis efficiency. Of course, providing training and education is also essential to help employees acquire big data skills and improve their analytical abilities [10].

6. Conclusion

Business analytics is widely used in various industries and companies. Nevertheless, with the gradual development of Big Data technology, its flexibility and accuracy in data processing has been favoured by many, and business analytics based on Big Data technology has largely been under-researched.

Traditional business analytics can become difficult because the volume of data is too large or too fragmented, which can narrow its application. In this paper, we combine business analytics with big data technology, review and analyse the current state of application of big data technology in business analytics based on previous research, summarise its advantages and explain why, and at the same time, note its problems and offer a variety of solutions.

There are two aspects of this paper that need further improvement. One is the analysis of examples, as the paper focuses on the characteristics of the whole and does not focus on a particular enterprise. A detailed study and analysis of a particular business would be expected to yield some problems that are more specific and less visible. Secondly, this paper leaves some room for specific measures that should be taken to address the problems with the application of big data in the field of business analytics. In the study of this paper, only directional recommendations are made for the problems that exist, and no specific measures are listed for implementation, which is subject to further research.

References

- [1] TANG Kelin, *Business Analytics and Discovery in the Age of Big Data*[J], *Collective Economy of China*, 2022(09): 20-21
- [2] ZHANG Shanxing, *How to achieve advanced market forecast management in the context of big data*[J], *Modern Business Industry*, 2017(27): 9-10
- [3] ZHAO Xu, *Research on identification and prevention of network fraud in the era of big data*[J], *Modern Business Industry*, 2016,37(25): 51-52
- [4] Mallika Kliangkhlao & Somchai Limsiroratana, *Correction to: Harnessing the power of big data digitization for market factors awareness in supply chain management*[J], *Multimedia Tools and Applications*, 2023, 82: 347-365
- [5] YAN Xiaoshan, *Exploring the change of marketing approach in the context of big data*[J], *Marketing Industry*, 2023(05): 44-46
- [6] Mónica Santana, Mirta Díaz-Fernández, *Competencies for the artificial intelligence age: visualisation of the state of the art and future perspectives*[J], *Review of Managerial Science*, 2023, 17: 1971-2004
- [7] GU Shaohui, *Research on Enterprise Financial Risk Identification and Control in Big Data Environment*[J], *Financial Sector*, 2020, 23: 148-149
- [8] MA Hong, *Exploring the Risk Management Issues of Commercial Banks in the Context of Big Data*[J], *trade show economic*, 2023, 05: 95-97
- [9] LEI Yongqing, *Research on the Application of Big Data Technology in the Field of Internet Financial Risk Monitoring*[J], *SME Technology and Management*, 2023, 09: 130-132
- [10] SHI Dan, *Risks and Preventive Measures of Enterprise Accounting Informatisation in the Era of Big Data*[J], *Taxable*, 2023,17(17): 43-45