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Applications and Challenges of Artificial Intelligence in Business Decision Making

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Abstract: Business decision-making is fundamentally reliant on data, and the rapid increase in data volume has led to a growing demand for advanced data analytics technologies to support intelligent decision-making. This paper utilizes the Baidu Index platform to gather data on the keyword "artificial intelligence" and conducts a comprehensive analysis of this information. Through case studies, the paper explores current applications of artificial intelligence in business decision-making, emphasizing the benefits such as improved data analysis and predictive modeling, optimized supply chains, and enhanced risk management. Specifically, AI dramatically improves the accuracy and efficiency of predictive modelling by integrating and processing large-scale unstructured data, helping companies adjust their business strategies in real time. However, the study also points out that in practical application, enterprises face a number of challenges, including data privacy and security risks, algorithmic bias and ethical issues. These issues may pose obstacles to the effective implementation of AI and public trust. It further discusses the need for businesses to develop strategies to mitigate these risks while fully leveraging AI's potential to enhance decision-making processes and maintain a competitive edge in the market.

Keywords: Artificial intelligence, Business decision, Data analysis

1. Introduction

In the context of global economic integration and fast-changing business environment, whether an enterprise can quickly respond to market changes and accurately grasp consumer demands is related to the survival and development of an enterprise, among which the efficiency and accuracy of business decisions are directly related to the survival and development of an enterprise. Artificial intelligence occupies a key position in business decision making [1]. As the volume of data continues to expand, the traditional business decision-making process is often limited by data processing capabilities, predictive model accuracy and the limitations of decision support systems, and it is difficult to meet the increasingly complex and changing market demands. Enterprises tend to adopt business intelligence and analysis methods, aiming at mining valuable information and patterns, thus promoting the efficiency of decision-making process and improving economic benefits [2]. Artificial intelligence (AI), through advanced data analysis tools and techniques, is becoming a key factor in making business strategic decisions, improving operational efficiency and creating competitive advantage [3].

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Artificial intelligence technologies include machine learning, computer vision, natural language processing, and many others. Machine learning is a core branch of artificial intelligence technology that enables computers to learn and improve performance based on data without having to be explicitly programmed. Computer vision enables computers to recognize and process information from images and videos, such as image classification, object detection, face recognition, etc. Natural language processing enables computers to understand, interpret and generate human language for tasks such as text analysis, sentiment analysis, semantic understanding [4]. Through the study of the existing literature, it is found that artificial intelligence provides a variety of educational AIDS for the strengthening of students' business English translation ability [5]; Through deep learning algorithms and big data analysis, artificial intelligence can simulate and learn traditional skills of intangible cultural heritage, such as painting, carving, etc., and then create artworks that integrate integrated aesthetics and modern design elements [6]; Through intelligent algorithms and data analysis, teachers can more accurately identify students' learning needs, thus providing more personalized teaching content and methods [7]. Based on institutional theory and stakeholder theory, digital responsibility not only reflects a company's attitude toward social responsibility, but also is an effective means for companies to cope with the pressure of legitimacy [8]. The booming development of artificial intelligence will also bring about many governance issues such as privacy invasion, technology ethics, data leakage and digital divide [9]. For example, in the medical field, when using artificial intelligence technology to diagnose melanoma, the skin disease image data mainly records the clinical characteristics of white patients, which may lead to the inaccurate diagnosis and treatment effect of black patients, damage the equal medical rights of black people, and even induce misdiagnosis, missed diagnosis and other risks [10].

2. Literature review

At present, from the perspective of relevant studies on the application of artificial intelligence to practice, existing scholars mainly study the application of artificial intelligence in medical care, education, economy and other aspects, and some scholars discuss the possible security threats and countermeasures of artificial intelligence from the perspective of potential security risks and ethics of artificial intelligence technology.

There are two types of research literature closely related to this paper. One is the study on the impact of artificial intelligence application on the sustainability of enterprise innovation; The other is the in-depth analysis of the ethical and social impact of artificial intelligence. Specifically, Zhao Shuo [11] concluded that banks can use artificial intelligence technology to extract, analyze and apply these data, so as to better understand customer needs, insight into market development trends and risk changes. Yue Haiou, Bai Mei et al. [12] obtained the development trend of artificial intelligence industry in Shandong Province by using SWOT analysis. Zhu Siwei, Lv Kangjuan et al. [13] concluded that artificial intelligence technology can not only improve the operational efficiency and financial performance of enterprises, but also enhance the capability of enterprises in R&D innovation and operation management. Xu Weixiang et al. [2] concluded that artificial intelligence can significantly improve the development level of new quality productivity, which includes scientific and technological productivity, digital productivity and green productivity. However, Zhao Yue [14] found that generative AI-assisted scientific research may involve risks such as privacy security, the spread of discrimination, integrity challenges, and lagging supervision. Xie Xiao and Luo Shijie [15] analyzed the dynamic risk representation of generative AI and found that it has complexity of risk generation, uncertainty of risk occurrence and high fluidity of risk impact. Bao Chenting, Wen Bo et al. [12] found that artificial intelligence is an idea formed by human operation, and it is unable to independently understand and think about practical moral and ethical issues from a Marxist perspective.

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Through combing, it is found that the existing research involves many fields and has made relevant progress, which provides theoretical and methodological support for this paper. However, the existing research still has the following shortcomings: In terms of research content, there is still a gap in the field of studying the unique role of artificial intelligence in business decision making. In terms of research methods, the existing researches tend to focus on qualitative analysis and lack large-scale data support. Although these studies provide us with valuable insights, they still fall short in revealing the universal laws and deep mechanisms of AI in business decision- making. The lack of quantitative research makes it difficult to accurately assess the specific extent of AI's impact on different types of business decisions, and to compare the advantages and disadvantages of different algorithms and models in business practice.

Therefore, the innovation of this paper mainly includes the use of big data analysis, machine learning and other advanced technologies to carry out large-scale empirical research, in order to reveal the general rules and deep-seated mechanisms of artificial intelligence in business decision-making.

3. The application of artificial intelligence in business decision making

3.1. Data analysis and predictive modeling

As the core asset of modern business, how to extract and utilize data efficiently has become a major challenge for enterprises. Traditional manual analysis methods are often difficult to cope with the processing needs of massive data, which is not only inefficient, but also prone to errors. Artificial intelligence, on the other hand, has shown strong capabilities in data analysis, being able to quickly process and analyze large amounts of data and extract valuable information. Through machine learning algorithms, companies can analyze historical data and identify key factors that affect business performance to optimize inventory management, promotion strategies, and more. For example: Amazon's personalized recommendation system.

Amazon uses artificial intelligence to analyze users' purchase history, browsing history, search keywords and other data to build user profiles, and then provide personalized product recommendations for each user. This system not only improves the user experience, but also significantly increases Amazon's sales. Through AI technology, Amazon can track changes in user preferences in real time, identify potential market trends, and dynamically adjust recommendation strategies to ensure that recommended content is always in line with user interests and reduce inventory costs.

In addition, predictive modeling is an indispensable tool in business decision-making. While traditional forecasting methods often rely on experience and intuition, AI, based on a large amount of historical data, can predict future market trends and consumer behavior with higher accuracy through the establishment of mathematical models, providing strong support for enterprises to formulate long-term strategies and short-term tactics. Netflix's content recommendation system makes use of predictive modeling. By analyzing users' viewing history, ratings, search records and other data, Netflix uses AI technology to optimize content recommendation algorithms. This system not only improves user retention, but also helps Netflix make more accurate decisions about content production and procurement. By predicting users' viewing preferences, Netflix is able to layout its content library ahead of time to meet the diverse needs of its users.

3.2. Personalized marketing

In customer relationship management (CRM), the application of AI has significantly increased customer satisfaction and loyalty. By deeply analyzing consumer behavior data, AI is able to provide tailor- made product recommendations and marketing strategies for each customer, so that enterprises can develop personalized marketing strategies and provide customized products and services, thereby

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enhancing customer experience and sales. For example, Pang Wenying [16] explores how enterprises can skillfully combine AI technology and human factors to achieve more intelligent and personalized marketing strategies that meet customer needs. His research found that enterprises can use AI technology to collect and analyze consumers' behavioral data, understand consumers' browsing and search habits on the Internet, and grasp their interests and preferences. Therefore, enterprises' personalized marketing can design interactive marketing activities in combination with consumers' interests and preferences to improve user engagement and brand affinity. Google's search engine is to provide users with relevant search results by applying AI technology to analyze the content of web pages and users' search behavior, improving the accuracy of search results and users' search experience.

3.3. Supply chain optimization and risk management

In business decision-making, supply chain optimization and risk management are two important aspects for enterprises to ensure the stable and efficient operation of supply chains, and the introduction of AI technology has brought brand new solutions for these two aspects.

Supply chain optimization aims to improve the efficiency and effectiveness of the supply chain, making it more flexible and efficient by improving processes, reducing costs and enhancing collaboration. This includes the selection and management of suppliers, the optimization of procurement strategies, the improvement of logistics and distribution, and the refinement of inventory management. Through optimization, enterprises can better meet market demand, improve customer satisfaction and enhance market competitiveness. Take Jiangxi Cement Company as an example, which has successfully integrated AI technology into coal supply chain management. Aiming at the business processes of coal supply chain management such as "procurement, transportation and inventory", Jiangxi Cement company has built an AI- based optimization model. The model can accurately predict coal demand, optimize purchase orders, and improve procurement accuracy; At the same time, through the real-time monitoring of the logistics process, the controllability of the logistics is enhanced, and the loss during transportation is reduced. In addition, the model also helps the company shorten the average inventory cycle of coal, reduce inventory overhang and capital occupation, and further improve the operation efficiency of the enterprise. A study by China Building Materials [17] found that thanks to the help of AI technology, Jiangxi Cement Company has achieved remarkable results in coal supply chain management, which not only enhances the company's competitive advantage, but also lays a solid foundation for its sustainable development.

With strong data analysis capabilities, AI is able to dig deep into the potential information in historical data and conduct real- time analysis combined with market dynamics to identify and assess potential risks in a timely manner. This capability enables enterprises to formulate corresponding coping strategies before risks occur and effectively avoid or mitigate losses caused by risks.

For example, Wang Kun [7] found in his research that financial institutions can use artificial intelligence in risk management to process massive data in real time through advanced data analysis, machine learning and predictive modeling, identify potential risk factors from it, and enhance the ability to predict market dynamics.

4. Challenges faced by AI in business decision making

While AI shows great potential in business decision making, its application also faces many challenges, and here are some of the main ones.

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4.1. Data quality and security

Although AI performs well in data analysis, high-quality data is the basis of AI's effectiveness, and the quality and security of data have become an urgent problem to be solved. In the process of collecting, storing and analyzing data, enterprises may face risks such as data leakage and hacking, and once data is illegally obtained or tampered with, it will cause immeasurable losses to enterprises. In addition, with the introduction of privacy regulations such as GDPR, access to and processing of user data face tighter restrictions.

Therefore, we can strengthen data governance in strict compliance with data privacy regulations, establish high-quality data collection and cleaning mechanisms, and ensure the legality, security, accuracy and integrity of user data. For example, the Roomba sweeping robot can intelligently plan its cleaning path through the use of AI technology, so that it can scan the room, accurately locate obstacles, and calculate how much it needs to move according to the size of the room. At the same time, it also protects the user's home layout data, thereby improving the privacy of users. And Twitter, in a period of time, used artificial intelligence to identify hate speech, fake news, and illegal content, and deleted nearly 300,000 terrorist accounts identified by artificial intelligence, sparking controversies over freedom of speech and privacy protection. Twitter needs to protect the legitimate rights and interests of users while cracking down on undesirable content.

4.2. Algorithmic bias and ethics

Artificial intelligence is increasingly being used in business decision making. It helps companies make more accurate decisions and improve work efficiency through data analysis and pattern recognition. However, algorithmic bias and ethical issues have also emerged as challenges that need to be addressed.

Algorithmic bias refers to the potential for AI to introduce or amplify social biases during design and training, leading to unfair outcomes. Take Amazon's hiring algorithm, which aims to automate the hiring process and make hiring more efficient by analyzing job applicants' resumes. However, the algorithm has shown a bias against women in its application, automatically lowering the rating of resumes containing words such as "female" and even biased against graduates of all-female universities. The incident attracted widespread attention and controversy, eventually forcing Amazon to abandon the algorithm.

The case sheds light on the severity and impact of algorithmic bias in business decisions. Due to bias in data or unreasonable algorithm design, AI systems may inadvertently amplify certain biases in business decisions, leading to unfair results. This may not only damage a company's reputation and trust relationships, but also trigger legal risks and a crisis of public opinion.

In addition, AI faces ethical challenges in business decision- making. For example, the decision-making process of AI systems often lacks transparency, making it difficult for users to understand and question the basis of their decisions. This may not only trigger a crisis of trust, but also violate users' privacy and data security.

Therefore, companies must pay attention to algorithmic bias and ethical issues when applying AI to business decisions. Measures such as strengthening data management and quality control, and establishing a sound ethical framework and regulatory mechanism will ensure the healthy development and rational application of AI technology. Only in this way can AI play a greater value in business decisions and bring more benefits to enterprises and society.

5. Conclusion

With the rapid development of science and technology, artificial intelligence (AI) has gradually penetrated into every field of business decision-making and become a key tool for enterprises to gain

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competitive advantage. However, the application of AI in business decision making is not always smooth sailing, and it also faces many challenges, especially in the areas of algorithmic bias and ethics.

On the application side, AI, through its powerful data processing and pattern recognition capabilities, provides enterprises with unprecedented decision support. Whether it is market demand forecasting, personalized marketing, supply chain management, or risk management, AI has demonstrated its unique advantages and value. It has not only improved the accuracy and efficiency of decision making, but also helped companies better understand the market and consumers, so as to formulate more scientific business strategies.

However, challenges come with it. Algorithmic bias is a big problem for AI in business decisions. Due to the incomplete and subjective nature of the data, AI systems may inadvertently amplify certain biases in the decision-making process, leading to unfair results. This may not only damage a company's reputation and trust relationship, but also trigger legal risks and crisis of public opinion. Therefore, companies must attach importance to the quality and diversity of data when applying AI, and establish effective mechanisms to identify and correct algorithmic biases.

In addition, ethical and moral issues are also challenges that AI cannot ignore in business decision-making. The decision-making process of AI systems often lacks transparency, which has led to disputes over responsibility and ethical attribution. While pursuing commercial interests, companies must ensure compliance with relevant laws and regulations and respect for consumers' privacy and data security. Therefore, establishing a sound ethical framework and regulatory mechanism to ensure the healthy development and rational application of AI technology is an important issue that enterprises must face when applying AI.

To sum up, the application and challenge of AI in business decision making coexist. While enjoying the convenience and benefits brought by AI, enterprises must also face up to the problems and risks it brings. Enterprises need to strengthen technology research and development, improve data quality and security, and actively address ethical and legal issues. Only in this way can they ensure that AI plays a greater value in business decisions, brings more benefits to enterprises and society, and achieves sustainable development. In the future, as the technology continues to advance and its applications continue to deepen, it is reasonable to believe that AI will play an increasingly important role in business decision making.

Authors Contribution

All the authors contributed equally and their names were listed in alphabetical order.

References

[1] *Adamson A,Smith A. (2018) "Machine learning and health care disparities in dermatology".JAMA Dermatology, 154 (11) : 1247-1248.*

[2] *CAI M, Wang Y, Liu Y. (2024)"Research on Strategies for Improving College Students' Business English Translation Ability in the context of Artificial Intelligence". Journal of Jiamusi Vocational College, 40(11):152-154.*

[3] *Bo avdeev IC, k.; Dimovski,V. (2019) "Business intelligence and analytics use,innovation ambidexterity,and firm performance:A dynamic capabilities perspective". J. Strateg.inf.syst, 28.*

[4] *Liu D. (2024) "Exploration on Digital Teaching Reform of Artificial Intelligence- enabled Logistics Management Major". Logistics Technology.*

[5] *Pang W. (2023) "Research on Personalized Marketing Strategy combining AI and Human Characteristics". International Brand Observation, (17):34- 42.*

[6] *Liang X. (2024) "Research on the application of artificial Intelligence in non- genetic inheritance and innovation". Screen Printing, (22):105-107.*

DOI: 10.54254/2754-1169/168/2025.21777

[7] *Zhu S, Liang R, Lv K. (2024) "The impact of artificial intelligence and corporate digital Responsibility on corporate social performance: Evidence based on ESG performance of Chinese listed companies". Journal of Xi 'an University of Finance and Economics.*

[8] *Du S,Xie C. (2021) "Paradoxes of artificia lintelligence in consumer markets: Ethical challenges and opportunities".Journal of business research, 129:961-974.*

[9] *Nasser, I. M. and S. S. Abu-Naser. (2019) "Predicting Books ' Overall Rating Using Artificial Neural Network." International Journal of Academic Engineering Research, IJAER, 3(8): 11-17.*

[10] *Jiangxi C. (2024) "Building a Large Model of Coal Supply Chain Optimization with AI Innovation". China Building Materials, (09):89-90.*

[11] *Nasser, I. M. and S. S. Abu-Naser. (2019) "Predicting Tumor Category Using Artificial Neural Networks." International Journal of Academic Health and Medical Research, IJAHMR, 3(2): 1-7.*

[12] *Panetta, K. (2018) "Gartner Top 10 Strategic Technology Trends for 2018."*

[13] *Yue H, Bai M, Liu H, et al. (2024) "SWOT analysis and development strategy of artificial intelligence industry in Shandong Province". China Science and Technology Information, (24):110-112.*

[14] *Xu W, Shi Y, Zhou J. (2024) "The impact of artificial intelligence on the development of new quality productivity: An empirical study based on the Yangtze River Economic Belt". Journal of Zhejiang University of Technology, Social Science Edition, 23(04):404-413.*

[15] *Zhao Y. (2019) "How to regulate the application of generative Artificial Intelligence in scientific research: Risk and Strategy -- Based on the analysis of EU and US artificial intelligence policies". Modern Distance Education Research, 36(06):20-29.*

[16] *Zhao S. (2024) "Exploration and Practice of Artificial Intelligence Application in Suzhou Bank". China Credit Card, (07):62-64.*

[17] *Wang K. (2024) "The Application Prospect of Artificial Intelligence Technology in Risk Management of Financial Institutions". National Circulation Economy,(23):161-164.*

[18] *Bao C, Wen B, Qiu L. (2024) "Ethical Concerns and governance approach of artificial Intelligence Application -- Starting from Marx's machine View". Research in Dialectics of Nature, 40(09):70-76.*

[19] *Xie X, Luo S. (2024) "Dynamic Risk and Adaptive Governance of Generative Artificial Intelligence". Journal of Beijing University of Technology, Social Sciences Edition, 1-14.*

[20] *Yang X, Lian Z. (2023) "Enterprise Digital Responsibility, digital Trust and Enterprise high-quality development". China Soft Science, (1):145-155.*

[21] *Zhong Z. (2023) "Research on the Integration of Artificial Intelligence into the Design and Practical Innovation of non-inherited products". New Chu Culture, (25):94-96.*