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Future of Artificial Intelligence & Business Analytics

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Abstract:

Artificial intelligence (AI) and business analytics are two rapidly developing technologies transforming how businesses operate. AI is the branch of computer science that focuses on developing intelligent machines that can perform tasks that typically require human intelligence, while business analytics refers to the process of using data to make informed business decisions. The purpose of this paper is to explore the future of AI and business analytics and how these technologies will shape the business landscape in the coming years. The increasing availability and use of artificial intelligence (AI) technologies in business analytics have the potential to revolutionize the way organizations operate. This research paper explores the future of AI and business analytics, examining how advances in AI technology are shaping the field and what changes we can expect to see in the coming years. The paper examines the benefits and challenges of using AI in business analytics, as well as the ethical considerations that arise with the increased use of this technology. Additionally, the paper explores how organizations can best leverage AI in their business analytics strategies to maximize the potential benefits while minimizing the risks. Through a review of existing literature and analysis of emerging trends, this paper provides valuable insights for businesses and policymakers seeking to understand the evolving landscape of AI and business analytics. Looking ahead, the future of AI and business analytics is likely to be shaped by a number of key trends. These include the increasing use of machine learning and deep learning algorithms, the integration of AI with other emerging technologies such as blockchain and the Internet of Things, and the growing importance of explainable AI that can provide transparency and accountability in decision-making.

Keyword:

Artificial intelligence, Business Analytics, Sustainability, Emerging Trends, Machine Learning, Algorithms.

Introduction:

Artificial intelligence (AI) and business analytics are two rapidly developing technologies transforming how businesses operate. AI is the branch of computer science that focuses on developing intelligent machines that can perform tasks that typically require human intelligence, while business analytics refers to the process of using data to make informed business decisions. The integration of AI with business analytics has the potential to revolutionize the way organizations operate. The integration of AI with business analytics can enable businesses to analyze data more effectively and derive insights that were previously impossible. For example, AI-powered predictive analytics can help businesses anticipate future trends and identify opportunities for growth. Business analytics includes a variety of techniques, such as data mining, predictive analytics, and machine learning.

Benefits and Challenges of Using AI in Business Analytics:

The integration of AI with business analytics can offer many benefits, including improved efficiency and accuracy, reduced costs, and better decision-making. However, there are also several challenges to consider. One of the main challenges of using AI in business analytics is the potential for bias. AI algorithms can be trained on biased data, which can lead to biased results. This can be particularly problematic in areas such as hiring and lending, where biased algorithms can perpetuate discrimination. Another challenge of using AI in business analytics is the lack of transparency and accountability. AI algorithms can be complex and difficult to understand, which can make it difficult to determine how decisions are being made. This can be problematic in areas such as healthcare, where decisions made by AI algorithms can have life-or-death consequences. Another challenge of using AI in business analytics is the issue of data privacy and security. As AI algorithms rely on large amounts of data to learn and make decisions, there is a risk that sensitive information may be exposed or stolen. This is especially concerning in industries such as healthcare, finance, and government, where the data being used may contain highly sensitive information. Furthermore, the integration of AI with business analytics can also result in job displacement. As AI technology improves and becomes more advanced, there is a risk that certain jobs may become automated, leading to unemployment for certain workers. This can have significant economic and social consequences, particularly in industries such as manufacturing and customer service. Finally, the implementation of AI in business analytics requires significant investment and resources, which may be prohibitive for some businesses. Developing and maintaining AI systems requires specialized skills and expertise, which may be difficult to acquire or expensive to retain. To address these challenges, it is important for businesses to prioritize ethical considerations and accountability when implementing AI in their analytics processes. This includes ensuring that AI algorithms are trained on diverse and unbiased data, implementing transparency measures to ensure that decisions made by AI systems can be understood and reviewed, and investing in data privacy and security measures to protect sensitive information. It is also important for businesses to consider the potential

impact of AI on their workforce and to develop strategies to mitigate the negative consequences of automation. Finally, businesses should carefully consider the costs and benefits of implementing AI systems and ensure that the benefits outweigh the costs before investing in this technology.

Emerging Trends in AI and Business Analytics:

There are several emerging trends in AI and business analytics that are likely to shape the future of the field. One of the key trends is the increasing use of machine learning and deep learning algorithms. These algorithms can analyze large amounts of data and identify patterns and relationships that were previously impossible to detect. This can enable businesses to make more informed decisions and improve their operations. Another trend in AI and business analytics is the integration of AI with other emerging technologies such as blockchain and the Internet of Things (IoT). Blockchain is a decentralized ledger technology that can be used to store and share data securely. The integration of AI with blockchain can enable businesses to analyze data more securely and efficiently. The Internet of Things refers to the growing network of connected devices and sensors that are capable of collecting and sharing data. By integrating AI with IoT, businesses can analyze data from a wide range of sources and gain insights into consumer behavior and preferences. Explainable AI is another emerging trend in AI and business analytics. Explainable AI refers to AI algorithms that can provide transparency and accountability in decision-making. As AI algorithms become more complex and difficult to understand, there is a growing need for transparency and accountability in the decision-making process. Explainable AI can provide businesses with a clear understanding of how decisions are being made, which can help to build trust and mitigate the risk of bias. Sustainability is another important trend in the future of AI and business analytics. Businesses are increasingly recognizing the importance of sustainability and the role that data and analytics can play in achieving sustainability goals. AI and business analytics can be used to analyze energy consumption, reduce waste, and identify opportunities for more sustainable operations.

Ethical Considerations:

The increased use of AI in business analytics raises a number of ethical considerations. One of the key ethical considerations is the potential for bias. As mentioned earlier, AI algorithms can be trained on biased data, which can perpetuate discrimination. It is important for businesses to take steps to ensure that their AI algorithms are free from bias and that they are used in a fair and ethical manner. Another ethical consideration is the privacy of personal data. As businesses collect and analyze more data, there is a growing risk of data breaches and misuse of personal information. It is important for businesses to ensure that they are collecting and using data in a responsible and ethical manner and that they are taking steps to protect personal information. accountability in decision-making. Explainable AI can help businesses ensure that their algorithms are making decisions that are fair, unbiased, and consistent with their values. This can be particularly important in areas such as finance, healthcare, and criminal justice, where decisions made by AI algorithms can have significant impacts on people's

lives. Another important ethical consideration in the use of AI in business analytics is the potential impact on job displacement. As AI becomes more advanced, there is a risk that it will replace human workers in certain industries and roles. This could have significant social and economic implications, particularly for workers in low-skilled or repetitive jobs. It is important for businesses to consider the potential impact on workers and to take steps to mitigate any negative effects, such as retraining programs and support for workers who are displaced. Additionally, the use of AI in business analytics raises questions about accountability and responsibility. When decisions are made by AI algorithms, it can be difficult to determine who is responsible for any negative outcomes. It is important for businesses to establish clear lines of accountability and to ensure that there are mechanisms in place to address any negative impacts of AI algorithms. Finally, there is also a risk that the use of AI in business analytics could exacerbate existing power imbalances. For example, larger businesses may have more resources to invest in AI technologies, giving them a competitive advantage over smaller businesses. It is important for businesses to ensure that the benefits of AI are distributed fairly and that there are opportunities for all businesses to access and benefit from these technologies. In summary, the increased use of AI in business analytics raises a number of important ethical considerations. It is important for businesses to ensure that their AI algorithms are free from bias, that they are collecting and using data in a responsible and ethical manner, and that there are mechanisms in place to ensure accountability and responsibility for any negative outcomes. By prioritizing ethical considerations in the use of AI, businesses can help to ensure that these technologies are used in a way that benefits society as a whole.

The Future of AI and Business Analytics:

Looking ahead, the future of AI and business analytics is likely to be shaped by a number of key trends. These trends include the increasing use of machine learning and deep learning algorithms, the integration of AI with other emerging technologies such as blockchain and IoT, and the growing importance of explainable AI. One of the main benefits of AI and business analytics is the potential to improve sustainability. By using data to identify inefficiencies and areas for improvement, businesses can reduce their environmental footprint and operate more sustainably. For example, AI-powered predictive maintenance can help businesses reduce waste and energy consumption by identifying maintenance needs before equipment breaks down. However, there are also concerns about the potential negative impacts of AI and business analytics on sustainability. For example, the growing use of AI in industries such as transportation and logistics could lead to increased energy consumption and carbon emissions if not managed properly. Additionally, there are concerns about the ethical implications of using AI to make decisions that affect people's lives, such as in healthcare and criminal justice. Another key trend that is likely to shape the future of AI and business analytics is the increasing use of edge computing. Edge computing involves processing data locally on devices rather than sending it to a centralized data center, which can reduce latency and improve efficiency. This trend is particularly important in industries such as manufacturing and healthcare, where real-time data processing is critical. In addition, the use of AI in business analytics is likely to become more democratized in the future, with smaller businesses and individuals having greater access to AI tools and

technologies. This can help to level the playing field and enable businesses of all sizes to benefit from the insights and efficiencies offered by AI. However, the increasing use of AI in business analytics also raises a number of ethical concerns. For example, there is a risk that AI algorithms could perpetuate existing biases and discrimination if they are trained on biased data or if they are not designed to take into account the diverse needs of different communities. There is also a risk that AI could be used to automate decision-making in ways that infringe on people's rights and freedoms. To address these concerns, it is important for businesses to prioritize ethical considerations when implementing AI in their analytics processes. This includes ensuring that AI algorithms are trained on diverse and unbiased data, implementing transparency measures to ensure that decisions made by AI systems can be understood and reviewed, and investing in data privacy and security measures to protect sensitive information. Overall, the future of AI and business analytics is likely to be shaped by a complex set of trends and considerations. While there are significant benefits to be gained from the use of AI in business analytics, it is important for businesses to approach this technology with caution and to prioritize ethical considerations in their implementation. By doing so, businesses can unlock the full potential of AI while minimizing the risks and negative impacts.

Sustainability of AI and BA:

The sustainability of AI and business analytics is a crucial topic that is gaining more attention in recent years. The increasing use of AI and analytics in various industries has raised concerns about the environmental impact and social responsibility of these technologies.In terms of environmental impact, AI and analytics have the potential to contribute to sustainability by reducing energy consumption, waste, and greenhouse gas emissions. For example, AI can be used to optimize energy consumption in buildings, transportation, and manufacturing processes, resulting in lower carbon footprints. Analytics can also help businesses identify areas where they can reduce waste and use resources more efficiently. On the other hand, the increasing demand for computational power and data storage required to support AI and analytics can also have a significant environmental impact. The use of high-performance computing and data centers consumes significant amounts of energy, and the production of electronic components required for these technologies can result in large amounts of e-waste. To ensure the sustainability of AI and analytics, it is essential for businesses to implement sustainable practices in the design, development, and use of these technologies. This includes using energy-efficient hardware, reducing unnecessary data storage and processing, and developing algorithms that prioritize energy efficiency. In addition to environmental sustainability, it is also important to consider the social responsibility of AI and analytics. These technologies have the potential to affect human rights, privacy, and ethical issues, and businesses need to be aware of the impact their use of AI and analytics can have on society. For example, the use of AI in hiring and recruitment processes can result in biased outcomes, which can perpetuate discrimination and inequality. Similarly, the use of analytics in financial services can result in unfair practices, such as discriminatory lending or insurance policies. To ensure the social responsibility of AI and analytics, businesses need to develop ethical frameworks and guidelines for the use of these technologies. This includes ensuring transparency and accountability in algorithmic decision-making,

protecting individuals' privacy and data rights, and promoting diversity and inclusivity in the development and deployment of these technologies. In conclusion, the sustainability of AI and business analytics is a complex issue that requires a multi-stakeholder approach. Businesses, policymakers, and society as a whole need to work together to ensure that these technologies are developed and used in a way that promotes environmental sustainability and social responsibility.

Conclusion:

The integration of AI with business analytics has the potential to revolutionize the way organizations operate, providing businesses with powerful tools to gain insights from their data and make informed decisions in real-time. However, it is crucial for businesses to consider the potential benefits and challenges of using AI in their analytics strategies, as well as the ethical implications of using AI to make decisions that affect people's lives. By staying up to date with emerging trends and best practices in AI and business analytics, businesses can leverage these technologies to drive innovation, improve sustainability, and create value for their stakeholders. By implementing AI-powered analytics, businesses can streamline operations, reduce costs, and create personalized experiences for their customers. To overcome the challenges associated with AI, businesses must ensure that their data is accurate and unbiased, hire skilled professionals to design and implement AI solutions, and address ethical concerns by being transparent and accountable for their AI-powered decisions. Overall, the successful integration of AI with business analytics can help businesses stay competitive in their respective markets and unlock new opportunities for growth and innovation.

Literature review:

1. **Priyanka Kaushik (2022),** stated in the research paper entitled as "**Role and Application of Artificial Intelligence in Business Analytics: A Critical Evaluation**" explained the increasing complexity and volume of company data have led to the adoption of artificial intelligence (AI) in business analytics across various industries. AI and machine learning is being used in business intelligence to derive meaningful insights from large and complicated datasets and provide clear business recommendations to users. In the IT industry, business analytics refers to the use of computing to gain insights from data obtained from internal sources such as enterprise resource planning applications, data warehouses and marts, third-party data providers, and public sources. A sample of 198 respondents from various business sectors was surveyed to understand the role, application, and impact of AI in business analytics. The study found that AI plays a significant role in business analytics, and this paper aims to provide a thorough review of the literature on how organizations can leverage AI technologies to create value in their operations. The study highlights the different forms of AI use, first- and second-order impacts, usage typologies, as well as the key enablers and inhibitors of AI adoption and use. The analysis presents a synthesis of the current literature.

1. **Anjum Razzaque, Magdalena karolak, Frank Lorne, & Sekhar Amba (2022),** stated in the research paper entitled as "**Diffusing IT Competence with Business Analytics Enables Data-Driven Culture for Achieving Evidence-Based Managerial Decisions for Assuring Sustained Competitive Advantage: A Literature Survey**" In today's globalized economies, organizations are looking to implement Business Analytics (BA) in order to gain a competitive edge. However, many organizations fail in their attempts to do so. As a result, scholars have focused on the importance of IT competence-enabled BA in order to inspire a data-driven culture, which is crucial for long-term organizational sustainable competitiveness. Despite this attention, there is limited evidence on whether IT competence-enabled BA can truly empower an organizational data-driven culture and lead to sustained competitive advantage. Current literature reviews have focused primarily on journals and academic conference papers, and have resulted in a conceptual model consisting of three propositions that are suitable for future empirical research. This study examines the relationship between IT competence, business analytics, data-driven culture, and organizational competition in a single model. Through a review of existing literature, the study shows that business analytics can help organizations visualize mined data and promote a data-driven culture when enabled by IT competence. In turn, such a culture can enable evidence-based managerial decisions that help organizations sustain a long-term competitive advantage. The proposed model has both theoretical and practical implications, which are discussed in detail in the article.

2. **Christoph Elsner, Jan Bosch & Helena Holmström Olsson (2021)**, stated in the research paper entitled as "**Breaking the vicious circle: A case study on why AI for software analytics and business intelligence does not take off in practice"** Artificial intelligence (AI) has become an essential tool in various industries, including software engineering. It can analyze data generated in software engineering to provide valuable insights into customer behavior, product performance, bugs and errors, and more. However, AI for software analytics and business intelligence is still at a prototypical stage, and the results are not often used to make data-driven decisions. To understand the reasons behind this, we conducted an explanatory case study that included interviews and a survey on the challenges of implementing and utilizing AI in software-intensive businesses. Our study revealed a vicious circle that hinders practitioners from adopting AI-based analytics continuously and productively. We identified a set of solutions based on previous research, interviews, and surveys to break this vicious circle effectively. Finally, a focus group of experts validated these solutions.

3. **Thomas H. Davenport (2018),** stated in the research paper entitled as "**From analytics to artificial intelligence**" For several decades, companies have been utilizing analytics to gather insights. However, many organizations are now interested in incorporating artificial intelligence (AI) into their operations. Although AI systems are often based on statistical and analytical techniques, companies can leverage their existing analytical competencies to gain a head start in the transition to AI. This article outlines three previous eras of analytical focus and presents AI as the fourth era. It also highlights the different types of AI methods, some of which rely on

analytics, while others do not. The article discusses how companies can leverage their analytical strengths to develop AI applications. It further suggests approaches for evaluating analytical capabilities that can help in the transition to AI and outlines steps for developing an organizational plan and strategy for AI

4. **Nripendra P. Rana, Sheshadri Chatterjee, Yogesh K. Dwivedi & Shahriar Akter (2020),** stated in the research paper entitled as "**Understanding the dark side of artificial intelligence (AI) integrated business analytics: assessing firm's operational inefficiency and competitiveness**" Business analytics and AI have become integral to firms' success, but their unintended consequences on a firm's competitive advantage have not been fully explored. This study aims to identify how factors such as AI-BA opacity, suboptimal business decisions, and perceived risk can lead to operational inefficiency and competitive disadvantage. Drawing on the resource-based view, dynamic capability view, and contingency theory, the research model examines the components and effects of AI-BA opacity on a firm's risk environment and negative performance. Data from 355 managers across various service sectors and organization sizes in India revealed that lack of governance, poor data quality, and inefficient employee training lead to AI-BA opacity. This triggers suboptimal business decisions and perceived risk, resulting in operational inefficiency. The study found that operational inefficiency contributes to negative sales growth and employee dissatisfaction, leading to competitive disadvantage. The results also show the significant moderating effect of a contingency plan in the nomological chain.

5. **Marc Schmitt (2022**), stated in the research paper entitled as "**Deep learning in business analytics: A clash of expectations and reality**" In today's digital economy, businesses need to make data-driven decisions using artificial intelligence (AI) and machine learning (ML) to remain competitive. While deep learning (DL) has many benefits, its adoption within business analytics has been limited due to various factors. This paper explores why DL faces challenges in gaining widespread adoption despite its popularity. The study finds that DL's adoption is hindered not only by its computational complexity, lack of big data architecture, opacity (black box), skill shortages, and leadership commitment but also by its inability to outperform traditional ML models on structured datasets with fixed-length feature vectors. DL should be viewed as a powerful complement to existing ML models rather than a "one size fits all" solution. The study suggests that gradient boosting is the preferred model for predicting structured datasets in business analytics. The paper also provides a detailed discussion of the study's empirical results, practical implications, and a roadmap for future research based on three industry use cases.

6. **Milla Ratia, Jussi Myllärniemi, and Nina Helander(2019)** stated in the research paper entitled as "**The potential beyond IC 4.0: the evolution of business intelligence towards advanced business analytics**" The private healthcare sector is looking to improve its performance by gaining a better understanding of its business processes. This paper aims to explore the future needs of private healthcare organizations in terms of business

intelligence (BI) and business analytics (BA) to create value. The study uses the framework of the four evolution stages of intellectual capital enriched by a data-driven approach to highlight the future of BI and BA in the private healthcare sector. The research involves private healthcare organizations, BI vendors, and management consultants in Finland. The findings suggest that private healthcare is moving towards a new phase of data-driven decision-making, requiring a shift in mindset and capabilities towards the use of data. The future factors of BI range from practical tools such as predictive and prescriptive analytics, and AI, to more conceptual factors such as social BI co-creation and platforms. The study provides valuable insights into the role of intellectual capital components in future BI and BA and their potential for creating new business opportunities for private healthcare. This research is original and contributes to the current discussion on data-driven decision-making and new business opportunities in the private healthcare sector.

7. **Marc Schmitt (2020),** stated in the research paper entitled as "**Artificial intelligence in business analytics, capturing value with machine learning applications in financial services**" The aim of this Ph.D. thesis is to assess the effectiveness of machine learning-based classifiers in the realm of business analytics, specifically for data-driven decision-making using supervised binary classification on structured datasets commonly found in relational databases across all industries. The significance of predictive analytics in capturing business value across the financial services value chain is highlighted and different models, including Generalized Linear Models, Random Forest, Gradient Boosting, and Artificial Neural Networks, are tested, compared, and combined across different scenarios and use cases. The results demonstrate that Gradient Boosting outperforms other classifiers when it comes to structured datasets, which contributes to the slower adoption of Deep Learning in business analytics. The thesis also proposes the use of ensemble learning method stacking and automated machine learning as valuable tools for improving model accuracy and democratizing predictive analytics for small to medium-sized corporations with limited ML expertise. The thesis provides a suggested ML pipeline setup that, once automated, can achieve human expert-level accuracy for binary classification on structured datasets. The models are tested on different business analytics use cases, with a focus on financial services, to solve problems in credit risk management, insurance claims prediction, and marketing and sales, demonstrating direct value gains. The thesis considers the advantages and constraints of using ML models in the industry and provides managerial implications as well as discusses general economic and business implications for the future of the field.

8. **Halil İbrahim ÇELEBİ (2021),** stated in the research paper entitled as "**Artificial Intelligence Applications in Management Information Systems: A Comprehensive Systematic Review with Business Analytics Perspective**" The motivation behind artificial intelligence studies lies in the need to tackle complex problems and to comprehend human behavior. In today's digital age, where digitalization is an essential component of the industrial revolution, the significance of management information systems at the junction of information, business, and industry has increased considerably. This study aims to analyze the usage of artificial

intelligence techniques in the literature on management information systems in a comprehensive and systematic manner, using a semi-automatic text mining-supported systematic literature review method. The study found that studies on deep learning and swarm intelligence have gained importance in recent years. In terms of application, there has been a shift towards cybercrime, security, and fault detection, despite information system support and information management being at the forefront of the informatics field. Similarly, in other business areas such as production and supply chain studies, there has been an inclination toward environmental factors. The health sector has increased in value while manufacturing-oriented areas lead the way due to digital transformation. The findings of this study provide a detailed guide for professionals and academics working in this field.

9. **Gerda Žigienė, Egidijus Rybakovas, Rimgailė Vaitkienė & Vaidas Gaidelys (2022),** stated in the research paper entitled as "**Setting the Grounds for the Transition from Business Analytics to Artificial Intelligence in Solving Supply Chain Risk**" Businesses are seeking efficient tools for managing supply- chain risk due to the increasing complexity of supply chains globally. The supply chain risk management (SCRM) literature proposes tools and methodologies that mostly rely on experts' judgments, their knowledge, and past data. However, this approach could be replaced by AI solutions, which can increase objectivity, and impartiality, and reduce human mistakes, biases, and inefficiencies in SCRM. The transition from BA to AI in SCRM is not a simple process, and the purpose of this research is to define the conceptual grounds for this transition. The theoretical basis for the AI-suitable SCRM structure and its implementation terms are defined based on a literature review. The proposed structure consists of five building blocks: risk events, risk-event indicators, data-processing rules and algorithms, analytical techniques, and risk-event probability forecasts. The study concludes that the business environment meets AI-based SCRM implementation terms of data existence and access. However, since data on risk events and negative outcomes are limited for machine learning, experts' experience and knowledge can be utilized to build initial rules and data-processing algorithms for AI.

10. **Schmitt, Marc** (2022), stated in the research paper entitled as "**Automated machine learning: AI-driven decision making in business analytics**" The increasing need for AI-driven decision-making in today's highly competitive market has led to a surge in interest in industrial machine learning (ML) applications. However, the shortage of analytics experts has made it difficult for many businesses to adopt ML. One solution is to improve the accessibility of ML frameworks by making them more user-friendly for non- experts. Automated machine learning (AutoML) has been proposed as a way to address this issue by providing off-the-shelf solutions for model selection and hyperparameter tuning. This study explores the potential of AutoML in business analytics to increase the adoption of ML across industries. The H2O AutoML framework was evaluated against a manually tuned stacked ML model on three real-world datasets. While the manually tuned model outperformed H2O AutoML, the latter proved to be a powerful tool with reliable results that are close to professionally tuned ML models. H2O AutoML is fast, user- friendly, and can support rapid prototyping, shortening development and deployment cycles.

It has the potential to bridge the gap between supply and demand for ML experts and foster human empowerment in a rapidly automated and digital world.

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