
**SYSTEMATIC LITERATURE REVIEW:
INTEGRATION OF BIG DATA AND ARTIFICIAL INTELLIGENCE****Zulfadli¹, Ronaldo Syahputra²**¹Computer and Network Engineering Technology, Universitas Bung Hatta, Indonesia²Information System, Universitas Putra Indonesia YPTKEmail: ¹zulfadli@bunghatta.ac.id, ²ronaldo_syahputra@upiyptk.ac.id

Abstract: The rapid development of Big Data and artificial intelligence (AI) technology has had a significant impact on various industrial sectors. The integration of these two technologies offers opportunities to improve operational efficiency, innovation, and data-driven decision-making. However, challenges such as privacy, bias, and transparency are still important issues that need to be addressed. This study aims to explore how the synergy between Big Data and AI can be utilized to create added value in various sectors, especially health, finance, and marketing. In addition, this study also aims to identify ethical challenges that arise from the use of these technologies and how these challenges can be managed. The method used in this study involves a comprehensive literature review of previous studies, as well as an analysis of real applications of Big Data and AI in various industries. This study also evaluates the ethical implications of the integration of these technologies by considering aspects of privacy, bias mitigation, and transparency. The results of the study show that the integration of Big Data and AI can significantly improve the decision-making process, product innovation, and operational efficiency in various sectors. In the health sector, for example, AI is able to analyze patient data to personalize care, while in the financial sector, AI helps in risk management and fraud detection. However, the study also emphasizes the importance of managing ethical issues to ensure the responsible use of these technologies. Overall, the synergy between Big Data and AI offers great potential for industrial transformation and improving social outcomes, but requires special attention to ethical and governance aspects.

Keywords: artificial intelligence; big data integration; impact analysis.

Abstrak: Perkembangan pesat teknologi Big Data dan kecerdasan buatan (AI) yang telah memberikan dampak signifikan pada berbagai sektor industri. Integrasi antara kedua teknologi ini menawarkan peluang untuk meningkatkan efisiensi operasional, inovasi, dan pengambilan keputusan berbasis data. Namun, tantangan seperti privasi, bias, dan transparansi masih menjadi isu penting yang perlu diatasi. Penelitian ini bertujuan untuk mengeksplorasi bagaimana sinergi antara Big Data dan AI dapat dimanfaatkan untuk menciptakan nilai tambah di berbagai sektor, khususnya kesehatan, keuangan, dan pemasaran. Selain itu, penelitian ini juga bertujuan untuk mengidentifikasi tantangan etika yang muncul dari penggunaan teknologi ini dan bagaimana tantangan tersebut dapat dikelola. Metode yang digunakan dalam penelitian ini melibatkan tinjauan literatur yang komprehensif terhadap studi-studi sebelumnya, serta analisis terhadap aplikasi nyata dari Big Data dan AI di berbagai industri. Penelitian ini juga mengevaluasi implikasi etis dari integrasi teknologi ini dengan mempertimbangkan aspek privasi, mitigasi bias, dan transparansi. Hasil penelitian menunjukkan bahwa integrasi Big Data dan AI dapat secara signifikan meningkatkan proses pengambilan keputusan, inovasi produk, dan efisiensi operasional di berbagai sektor. Di sektor kesehatan, misalnya, AI mampu menganalisis data pasien untuk mempersonalisasi perawatan, sementara di sektor keuangan, AI membantu dalam manajemen risiko dan deteksi penipuan. Namun, penelitian ini juga menekankan pentingnya pengelolaan isu-isu etika untuk memastikan penggunaan teknologi ini secara bertanggung jawab. Secara keseluruhan, sinergi antara Big Data dan AI menawarkan potensi besar untuk transformasi industri dan peningkatan hasil sosial, namun memerlukan perhatian khusus pada aspek etika dan tata kelola.

Kata kunci: analisis dampak; integrasi big data; kecerdasan buatan.

INTRODUCTION

Big data is a term used to describe large volumes of data that are growing rapidly and are so complex that they are difficult to manage with traditional data processing tools. This data can come from various sources, including social media, sensors, online transactions, and various other digital applications. The main characteristics of big data are the three "Vs", namely Volume (very large amount of data), Velocity (high speed of data entering and being processed), and Variety (diversity of data types). With big data analysis, companies can identify trends, patterns, and relationships that are not visible with traditional data analysis methods, which in turn helps in making better and faster decisions. Big data implementation requires sophisticated technological infrastructure and powerful analytical algorithms to process these large amounts of data efficiently[1].

Big data has various advantages and disadvantages that are important to consider. Advantages include the ability to analyze very large volumes of data quickly, allowing organizations to make more informed decisions based on deeper insights. Additionally, big data helps in identifying market trends, consumer behavior, and operational efficiency, and enables personalization of products and services to increase customer satisfaction. However, big data also has several disadvantages. One of them is the complexity of data management and analysis which requires sophisticated technological infrastructure and trained experts [2]. Data privacy and security issues are also a major concern, as large data volumes increase the risk of sensitive information being leaked. Additionally, the costs of implementing and maintaining big data systems can be a significant financial burden for organizations[3][4].

Currently, the application of Big Data has expanded to various fields with significant impact. In the world of business and marketing, Big Data is used to understand consumer behavior in more depth, enabling companies to develop more effective marketing strategies and increase customer retention through personalization of products and services. In the healthcare sector, Big Data

plays an important role in medical research, helping to discover patterns in patient data that can be used to develop more targeted treatments and predict disease outbreaks. Educational institutions are also utilizing Big Data to improve curricula, optimize learning processes, and identify student needs more accurately [5].

In the financial sector, Big Data is used for risk analysis, fraud detection, and the development of financial products that are more innovative and in line with market needs. In the field of transportation and logistics, Big Data analysis helps optimize delivery routes, increase operational efficiency, and predict future transportation needs, thereby reducing costs and improving service. Additionally, governments use Big Data to create better policies, improve public services, and strengthen national security by identifying and responding to threats more quickly. With its wide range of applications, Big Data has become an essential tool in a variety of sectors, helping organizations optimize operations, increase efficiency and generate valuable insights [6].

Artificial Intelligence, or Artificial Intelligence (AI), is a branch of computer science that focuses on developing systems and technology that are able to imitate human thinking and learning abilities. AI encompasses a variety of technologies, including machine learning, deep learning, natural language processing, and computer vision. AI systems are designed to understand, analyze, and process data autonomously, enabling them to perform tasks that typically require human intelligence, such as speech recognition, image recognition, decision making, and language translation. With its ability to improve efficiency and accuracy in a variety of fields, AI has become a key driver of innovation in industries such as healthcare, finance, transportation, and more [7]. However, the development and implementation of AI also faces challenges, including issues of ethics, privacy and data security.

The potential of artificial intelligence (AI) is very broad and covers various aspects of human life and industry. In the health sector, AI has the potential to revolutionize patient diagnosis and treatment through fast and accurate analysis of medical data, helping

doctors detect disease earlier and plan more effective treatment. In the financial industry, AI is used to detect fraud, manage risk and provide better investment recommendations. AI also has great potential in improving production efficiency in the manufacturing sector through automation and predictive maintenance [8]. In the transportation sector, AI supports the development of autonomous vehicles that can reduce accidents and increase traffic efficiency. In addition, AI plays an important role in personalizing user experiences on digital platforms, such as product recommendations in e-commerce and content on social media. However, to realize this potential requires special attention to ethical, privacy and data security challenges, as well as the need for appropriate regulation [9][10].

The impact of artificial intelligence (AI) is significant and broad, covering various aspects of life and industry [11]. In the labor sector, AI can improve efficiency and productivity, but it also raises concerns about job replacement by automation, which could lead to unemployment in some sectors. In healthcare, AI has the potential to improve the quality of care through more accurate diagnoses and faster drug development, although it also raises ethical issues regarding the privacy of patient data. In education, AI can expand access to learning resources and personalize learning, but it can also widen the digital divide between those who have access to technology and those who don't. In the financial industry, AI can improve transaction security and risk management, but can also be

leveraged for more sophisticated fraud activities. The impact of AI on everyday life can be seen in the capabilities of virtual assistants, content recommendations, and more efficient customer service. While AI brings many benefits, it also poses challenges that require serious attention, including proper regulation, privacy protection, and addressing bias in algorithms.

METHOD

This research uses a literature study method where the research conducts a study of 10 selected journals that are relevant and use certain standards. Overall, the steps can be seen as shown in the following picture [12]:

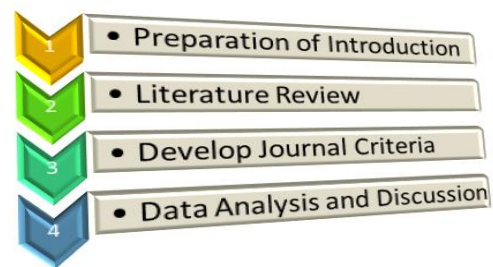


Image 1. The Step of Research

As can be seen in the picture, there are stages in completing this research, namely Preparation of Introduction, Purpose of Literature, Preparation of Journal Criteria, Data Analysis, and finally Discussion and Conclusion. For more details, see the following table.

No	Action	Activity	Achieved goals
1	Preparation of Introduction.	Identify problems and goals.	Map the background of the problem and research objectives.
2	Literature review.	Collect initial literature appropriate to the topic.	Initial selection of journals.
3	Developing Journal Criteria.	1. Set standards for journals. 2. Make a selection of journals.	1. Relevant journal standards and criteria. 2. Successfully obtained 10 selected journals using predetermined standards.
4	Data Analysis.	Conduct analysis on 10 selected journals.	Gain new views and deeper knowledge.
5	Discussion and Conclusion.	Make systematic conclusions based on analysis of 10 journals.	Conclusion is drawn up.

RESULTS AND DISCUSSION

Based on the method description Above there are 10 (ten) scientific articles selected as the main article to answer research objectives

of this paper. From In this article, the author finds several strategies for utilizing big data with artificial intelligence (AI) in technology today, as seen in Table 1.

Table 1. Research on the use of big data by combining artificial intelligence as new knowledge of big data and artificial intelligence (AI) can be integrated.

No	Title Article	Year	Result Conclusion
1	Artificial Intelligence (AI) and Big Data for Coronavirus (COVID-19) Pandemic: A Survey on the State-of-the-Arts	2020	Highlighting the important role of AI and Big Data in monitoring and detecting the spread of COVID-19, helping diagnostics through medical image analysis, predicting the spread of the virus, and accelerating the development of vaccines and drugs. Technologies such as machine learning, NLP, and sentiment analysis are used for various data analyses, while cloud computing enables large-scale data processing. Challenges faced include data quality, privacy, interoperability, and scalability. Nevertheless, AI and Big Data have provided a rapid and efficient response to the pandemic, improving health services and contributing to scientific knowledge. Cross-disciplinary collaboration and improved data infrastructure are necessary to maximize the potential of this technology in the future.
2	Prototype Cross Platform Oriented on Cybersecurity, Virtual Connectivity, Big Data and Artificial Intelligence Control	2020	The cross-platform prototype oriented towards cybersecurity, virtual connectivity, big data and artificial intelligence control offers a comprehensive solution to modern technology challenges. Strong cybersecurity integration ensures data protection from threats and attacks, while virtual connectivity enables efficient remote access and collaboration. Leveraging big data provides deep insights through big data analysis, which is further enhanced with artificial intelligence control for automation and intelligent decision making. The synergy between these elements creates a more secure, connected and insightful technology environment, ready to support the needs and innovations of the future.

3	<p>Explainable Artificial Intelligence for Drug Discovery and Development: A Comprehensive Survey</p>	2024	<p>Research on Explainable Artificial Intelligence (XAI) in drug discovery and development indicates that XAI can enhance trust, interpretability, and transparency in AI applications within this field. By implementing XAI, researchers and drug developers can better understand how AI models generate predictions and decisions, which is crucial to ensure that the resulting drugs are safe and effective. XAI also assists in identifying drug targets, discovering new drug candidates, and optimizing the drug development process in a more efficient and explainable manner. Despite the many benefits XAI offers, challenges such as model complexity and the need for consistent interpretability standards still need to be addressed to optimize its use in the pharmaceutical industry.</p>
4	<p>The Role of AI, Machine Learning, and Big Data in Digital Twinning: A Systematic Literature Review, Challenges, and Opportunitie</p>	2021	<p>Reviewing the important role of artificial intelligence (AI), machine learning and big data in the development of digital twinning technology. Key conclusions state that the integration of these technologies enables increased precision, efficiency, and predictability in a variety of sectors, including manufacturing, healthcare, and infrastructure. However, the article also identifies several challenges, such as data privacy concerns, system integration complexity, and the need for better standards. Nonetheless, great opportunities remain for further innovation and performance improvement through multi-disciplinary collaboration and continued technology development.</p>
5	<p>aiSTROM–A Roadmap for Developing a Successful AI Strategy</p>	2021	<p>Provides comprehensive guidance for organizations to develop a successful AI strategy. This article emphasizes the importance of understanding business goals and how AI can support achieving those goals. Key steps include assessing technology readiness, developing strong data capabilities, and training human resources to improve AI-related skills. Additionally, it is important to build an organizational</p>

			<p>culture that supports innovation and collaboration. With this structured and holistic approach, organizations can optimize AI implementation and achieve sustainable competitive advantage.</p>
6	<p>Review of Artificial Intelligence Techniques in Imaging Data Acquisition, Segmentation, and Diagnosis for COVID-19</p>	2021	<p>Discusses various artificial intelligence (AI) techniques used in imaging data capture, segmentation, and diagnosis for COVID-19. AI has proven to be very effective in speeding up and improving the accuracy of this process, especially in medical image processing such as CT scans and chest X-rays. Techniques such as deep learning and machine learning are used for automatic segmentation and rapid diagnosis, which helps medical personnel identify and treat COVID-19 cases more efficiently. The paper also highlights the challenges faced, including the need for large, high-quality datasets and handling variations in patient data, and offers future views on how AI can be better integrated into medical practice for pandemic management.</p>
7	<p>AI Ethics: Algorithmic Determinism or Self-Determination? The GPDR Approach</p>	2021	<p>Discusses two main concepts in AI ethics, namely algorithmic determinism and self-determination. Algorithmic determinism refers to the tendency of AI to make decisions influenced by data and algorithms that may ignore human context and nuances. In contrast, self-determination emphasizes the importance of individuals' rights to control their data and influence outcomes that affect their lives. GDPR (General Data Protection Regulation) was introduced as a framework that supports self-determination by giving individuals more control over their personal data and establishing obligations for organizations to protect that data. This article highlights how GDPR can help strike a balance between technological efficiency and individual rights, ensuring that AI ethics not only prioritizes the accuracy of algorithms but also takes into account their social and moral impact.</p>

8	Securing Data With Blockchain and AI	2019	<p>The use of blockchain and artificial intelligence (AI) in data security offers innovative solutions to protect sensitive information. Blockchain, with its decentralized nature, provides a strong layer of security through encryption techniques and consensus verification, making it difficult to manipulate data without being detected. On the other hand, AI can improve threat detection capabilities by analyzing behavioral patterns and detecting anomalies in real-time, which speeds up response to potential attacks. The combination of these two technologies creates a more secure and reliable ecosystem, where data is effectively protected from internal and external threats. By leveraging blockchain to ensure data integrity and AI to monitor and respond to threats, organizations can significantly improve information security and build greater trust with their stakeholders.</p>
9	The Impact of Artificial Intelligence and Blockchain on the Accounting Profession	2020	<p>A study of the impact of artificial intelligence (AI) and blockchain technology on the accounting profession highlights a significant transformation in the way financial data is managed and reported. The implementation of AI has accelerated the process of data analysis and decision-making, reducing human error, while blockchain offers greater security and transparency in recording transactions. The combination of these two technologies has the potential to change the landscape of the accounting profession by introducing new efficiencies and higher standards in financial reporting.</p>
10	Medical Diagnostic Systems Using Artificial Intelligence (AI) Algorithms: Principles and Perspectives	2020	<p>Outlines how artificial intelligence (AI) algorithms can improve medical diagnosis systems by increasing accuracy, speed, and efficiency in disease recognition and treatment determination. This book highlights the use of techniques such as machine learning and deep learning for medical data analysis, providing deep insight into the potential of AI in transformation global health systems.</p>

CONCLUSION

The integration of Big Data and artificial intelligence (AI) has significantly transformed various sectors of industry and society. Big Data provides a rich database for AI to process, analyze, and make data-driven decisions, which has proven beneficial in sectors such as healthcare, finance, and marketing and retail. In healthcare, AI is able to analyze massive patient data to identify patterns and personalize treatment plans, while in finance, AI is improving risk management and fraud detection. In marketing, AI is leveraging Big Data for customer segmentation and ad campaign optimization. This synergy accelerates innovation and operational efficiency, enabling organizations to optimize processes and supply chains. However, ethical challenges such as data privacy, bias, and transparency must be addressed to ensure the responsible use of AI. Overall, the convergence of Big Data and AI offers tremendous opportunities for insight-driven decision-making, innovation, and competitive advantage, with the potential to transform industries and improve societal outcomes.

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