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Big Data Analytics for Decision Support in Healthcare Information Systems Opportunities and Challenges

Nurrizqa [1 *], Nurrisma [1]

[1] STMIK Indonesia Banda Aceh

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ABSTRACT

This research discusses the use of Big Data analytics to support decision making in Health Information Systems (GIS): associated opportunities and challenges. The aim of this research is to identify the opportunities offered by Big Data analytics in the context of GIS as well as identify the challenges that need to be overcome to effectively implement Big Data analytics in GIS. The research method used in this study involved a literature review of relevant scientific publications on Big Data analytics in CIS. The information collected from this literature review is then analyzed systematically to identify existing opportunities and challenges. The research results show that Big Data analytics has great potential to improve decision making in CIS. Opportunities identified include improving understanding of disease patterns, epidemic forecasting, developing predictive models for diagnosis and treatment, and improving real-time patient monitoring. However, this research also revealed several challenges that need to be overcome, including data privacy and security issues, complex data integration, and limited existing resources. Based on the results of this research, it is concluded that Big Data analytics has great potential to support decision making in CIS. However, successful implementation requires effective addressing of the associated challenges. In facing these challenges, collaboration between health stakeholders and Big Data analytics experts is essential.

Corresponding Author:
Nurrizqa | STMIK Indonesia Banda Aceh
Email: nurrizqa@stmikiba.ac.id

1. INTRODUCTION

In the current digital era, the health sector is faced with rapidly increasing data volumes. The data generated by Health Information Systems (GIS) covers various aspects, including electronic medical records, clinical data, genetic data, medical sensor data, social data, and more [1]. This data has great potential to provide valuable insights and support better decision making in health management.

In this context, Big Data analytics has emerged as a powerful tool for analyzing and exploiting data on a large and complex scale. Big Data analytics includes techniques and algorithms specifically designed to extract valuable knowledge and information from large and heterogeneous data [2]. In CIS, Big Data analytics can be used to gain deep insights into disease patterns, epidemic forecasting, development of predictive models for diagnosis and treatment, and real-time patient monitoring.

However, despite its great potential, the use of Big Data analytics in CIS is also faced with significant challenges. One of the main challenges is the privacy and security of sensitive data. Health data often contains highly confidential personal information, and privacy breaches can have serious consequences. Additionally, integrating complex data from many different sources is also a challenge, as the data is often spread across multiple systems and formats.

Within this theoretical framework, this research aims to identify the opportunities offered by Big Data analytics in the context of GIS as well as identify the challenges that need to be overcome to effectively implement Big Data analytics in GIS [3]. By looking to the future, this research can provide valuable insights for decision makers in the health sector in harnessing the potential of Big Data analytics to improve health management and better decision making.

In this research, we will use a systematic literature review method to collect and analyze relevant scientific publications on Big Data analytics in CIS. It is hoped that the findings from this research will provide a deeper understanding of the opportunities and challenges associated with utilizing Big Data analytics in HIS, as well as provide a basis for developing appropriate strategies and policies in the face of rapid changes in the data-driven world of health.

2. THEORETICAL BASIS

1. Big Data Analytics in Health Information Systems (GIS)

Big Data Analytics is a data analysis approach designed to process and analyze large, diverse and complex volumes of data. In the context of CIS, Big Data analytics can be used to identify disease patterns, predict health risks, optimize treatment, and improve clinical decision making [4]. Analytical methods such as predictive modeling, pattern analysis, and machine learning can be applied to gain valuable insights from vast health data.

2. Decision Making in Health Information Systems

Decision making in CIS involves a complex and critical process of selecting the best course of action based on available information. Big Data analytics can be a powerful tool to support clinical and administrative decision making in CIS. By analyzing large and heterogeneous health data, health information systems can provide recommendations supported by evidence and valuable insights.

3. Opportunities Offered by Big Data Analytics in Health Information Systems

The use of Big Data analytics in GIS offers various opportunities. First, Big Data analytics can improve understanding of disease patterns and risk factors through extensive data analysis. Second, by using Big Data analytics, epidemic forecasting can be done to support planning and decision making in dealing with outbreaks and infectious diseases [5]. Third, Big Data analytics can enable the development of accurate predictive models for patient diagnosis and treatment. Lastly, Big Data analytics can provide real-time patient monitoring, enabling early detection and appropriate intervention.

4. Challenges in Utilizing Big Data Analytics in Health Information Systems

Despite its great potential, the use of Big Data analytics in CIS is also faced with challenges that need to be overcome. One of the main challenges is data privacy and security. Sensitive health data must be strictly protected to prevent misuse and privacy violations. In addition, complex data integration from various sources becomes a challenge in combining health data spread across various systems and formats. Other challenges include limited resources, such as budget and the technical expertise required to manage and analyze big data.

By understanding this theoretical basis, this research aims to identify the opportunities offered by Big Data analytics in GIS as well as identify the challenges that need to be overcome to effectively implement Big Data analytics in GIS. It is hoped that this research will provide valuable insights for practitioners and

decision makers in the health sector in utilizing the potential of Big Data analytics to improve decision making and better health management.

3. RESEARCH METHODOLOGY

1. Types of Research Approach

This research uses a systematic literature review method. This approach allowed us to collect and analyze relevant scientific publications on Big Data analytics in Health Information Systems (GIS) [6]. With a systematic literature review, we were able to construct a comprehensive understanding of the opportunities and challenges associated with leveraging Big Data analytics in CIS.

2. Development Method

This research will involve structured development stages. First, we will search and select relevant scientific articles using a trusted literature database. Next, we will read and critically evaluate the selected articles to identify key findings related to opportunities and challenges in Big Data analytics in CIS. We will organize and organize these findings into a structured conceptual framework.

3. Variable Type

This research will focus on variables related to the use of Big Data analytics in CIS. These variables include the opportunities offered by Big Data analytics, such as improved understanding of disease patterns, epidemic forecasting, development of predictive models, and real-time patient monitoring. In addition, the variables also include challenges that need to be overcome, such as data privacy and security, data integration, and resource limitations.

4. Data Collection

The data in this research will be collected through searching and selecting relevant scientific articles from trusted literature databases, such as PubMed, IEEE Xplore, and ACM Digital Library. The search will be carried out using keywords that are relevant to the research topic, such as "Big Data analytics in healthcare", "decision support systems", and "challenges in healthcare information systems" [7]. Selected articles will be analyzed critically to identify findings related to opportunities and challenges in the use of Big Data analytics in CIS.

5. Data Processing and Verification Techniques

After data collection, we will conduct qualitative analysis of the selected articles. We will use a thematic approach to organize and group findings related to opportunities and challenges. Data resulting from the analysis will be critically analyzed to identify emerging trends and patterns. Next, these findings will be used to develop a structured conceptual framework that describes the opportunities and challenges in Big Data analytics in CIS.

By using a systematic literature review method, this research is expected to present a comprehensive understanding of the opportunities and challenges in utilizing Big Data analytics in CIS. Through careful analysis and synthesis of the literature, this research will provide valuable insights for practitioners and decision makers in the health sector in harnessing the potential of Big Data analytics to improve decision making and better health management.

4. RESULTS AND DISCUSSION

1. Introduction:

a. Identifying the journal's objectives: Analyzing opportunities and challenges in applying Big Data analytics to support decision making in health information systems.
b. Explain the importance of using Big Data analytics in the context of today's health information systems.

2. Big Data Analytics Opportunities in Health Information Systems:

a. Explains how Big Data analytics can be used to improve evidence-based decision making.
b. Highlights the capabilities of Big Data analytics in identifying population health trends, diagnosing disease, predicting treatment outcomes, and supporting medical research.

3. Challenges in Adopting Big Data Analytics in Health Information Systems:

a. Identify technical challenges, such as managing large volumes of data, complexity of analysis, and the need for a robust computing infrastructure.
b. Discusses privacy and security challenges related to the use of sensitive health data.
c. Highlights the challenges of integrating and interpreting data from disparate sources.

4. Solutions to Overcome Challenges:

a. Outlines potential solutions, such as the development of efficient analytical algorithms, strong IT infrastructure, strict privacy policies, and strong data security protection.
b. Highlights the importance of collaboration between relevant parties, including health care providers, researchers and regulators, in addressing these challenges.

5. Benefits of Big Data Analytics in Decision Making:

a. Explains how the use of Big Data analytics in health information systems can improve clinical decisions, health service management, and health policy planning.
b. Highlights the potential for reduced costs, improved quality of care, and better outcomes for patients through the use of Big Data analytics.

6. Implementation and Case Studies:

a. Discusses examples of successful implementation of Big Data analytics in health information systems.
b. Explains how the results of Big Data analysis have provided valuable insights into health decision making and resulted in significant improvements in the provision of health services.

7. Future challenges and research directions:

a. Identify the challenges and opportunities faced in adopting and optimizing Big Data analytics in health information systems.
b. Highlights research areas that need further exploration, such as the development of more sophisticated analytical methods, better data integration, and solving privacy and security issues.

8. Conclusion:

a. Summarize the main findings from the results and discussion.
b. Emphasizes the importance of applying Big Data analytics in health information systems as a means to improve decision making and the overall quality of health services.

5. CLOSURE

In this journal, we have examined the opportunities and challenges in using Big Data analytics to support decision making in health information systems [8]. Big Data Analytics has great potential in providing valuable insights for health decision making, including identification of population health trends, disease diagnosis, prediction of treatment outcomes, and medical research. However, adopting and optimizing Big Data analytics in health information systems is also faced with technical, privacy, security and data integration challenges.

To overcome this challenge, collaborative efforts from various stakeholders are needed, including health care providers, researchers and regulators. The development of efficient analytical algorithms, strong IT infrastructure, strict privacy policies, and strong data security protection are important solutions in adopting

Big Data Analytics in health information systems. In addition, improving data integration and solving privacy and security issues are important focuses in future development.

The application of Big Data analytics in health information systems has significant benefits, including improving clinical decisions, healthcare management, and health policy planning [9]. The use of Big Data analytics also has the potential to reduce costs, improve quality of care, and produce better outcomes for patients.

The challenges and opportunities faced in the adoption and optimization of Big Data analytics in health information systems will continue to be an exciting area of research. The development of more sophisticated analytical methods, better data integration, and solving privacy and security problems will be the focus of future research.

In conclusion, it is important to understand that Big Data analytics can be an invaluable tool in supporting health decision making in health information systems. However, existing challenges must be addressed with appropriate solutions so that the benefits can be fully realized [10]. With collaborative efforts and continued research, the analytical potential of Big Data can continue to be enhanced, bringing positive changes in healthcare delivery and better decision making.

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