Chapter 21
Utilization of Artificial Intelligence Algorithms for Advanced Cancer Detection in the Healthcare Domain

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ABSTRACT

AI has become a valuable tool for early disease identification and diagnosis, especially during pandemics. Artificial intelligence is used to construct advanced healthcare systems that can help diagnose medical diseases, including cancer. This research aims to establish an AI-powered healthcare system for early cancer diagnosis. Millions of people worldwide suffer from cancer, a serious healthcare opponent. Potentially saving many lives. First and foremost, the AI-powered healthcare system must detect cancer-prone patients. This phase relies heavily on AI algorithms, especially deep learning algorithms. These algorithms scan massive datasets of medical records, genetic data, and lifestyle factors to detect cancer-prone individuals. Deep learning algorithms are essential here since they excel at pattern identification and picture analysis.

INTRODUCTION

Artificial Intelligence (AI) represents a groundbreaking technological advancement, bringing us closer to a future where machines can simulate human-like thinking and decision-making processes. It is a significant leap towards automation across various domains, promising remarkable efficiency and accuracy while eliminating the potential for human error (Davenport & Kalakota, 2019). The intricate neural networks within the human brain inspire the core concept of AI. These networks, composed of neurons, serve as the foundation for artificial intelligence (Yu et al., 2018). AI systems are designed to replicate the functionality of these neurons, creating artificial clones capable of learning and performing tasks just like their biological counterparts (Jiang et al., 2017; Kothuru, 2023). AI is at the forefront of technological innovation, whether optimizing complex industrial processes, enhancing customer service through chatbots, improving medical diagnostics, or even powering autonomous vehicles (Farooq & Khan, 2022). Its potential to transform industries and streamline operations is why it is hailed as one of the most significant developments in the next generation of technology (Bi et al., 2019). In essence, AI represents a convergence of human-inspired neural networks, machine learning, and automation, offering a future where machines can perform tasks with efficiency, accuracy, and adaptability, ultimately reshaping how we interact with technology and the world around us (Rodríguez-Ruiz et al., 2019).

To perform specific tasks, natural or artificial neurons rely on transmitting electrical signals. In the case of artificial neural networks (ANNs), which emulate the human brain's functioning, a limited number of artificial neurons, typically ranging from 10 to 10,000, are employed (Ansarullah et al., 2022). This number pales compared to the billions of neurons in the human brain. Artificial neural networks, often called ANNs, are computational models designed to mimic the human brain's pattern recognition and machine-learning capabilities (Ganesan & Dhas, 2018). These networks consist of interconnected artificial neurons that process information, learn from data, and make decisions or predictions based on their training (Bala Kuta & Bin Sulaiman, 2023). ANNs have found extensive application in various fields, including image and speech recognition, natural language processing, and data analysis (Aditya Komperla, 2023). Their ability to recognize complex patterns and relationships in data makes them valuable tools for solving real-world problems and automating tasks that once relied on human expertise (Raja & Kousik, 2021).

As ANNs continue to evolve and adapt, they promise to advance technology and enable intelligent systems in numerous domains. Artificial intelligence has made our daily lives more efficient (Boopathy, 2023). AI is being used in various industries to make our lives easier. In banks and financial systems, artificial intelligence (AI) manages various tasks (Mintz & Brodie, 2019). Customers will get better and faster service thanks to more intelligent chatbots. As well as managing finances and investing wisely in stocks, it also takes care of property management, among other things (Mojjada & Yadav, 2020).

Production units in manufacturing organizations and industries also employ AI (Krishna Vaddy, 2023). Moving an object from place to place or transforming an object into a different shape is a common use for these robots. AI is used by businesses to keep track of staff records and to locate certain pieces of information. It helps you manage your time and get reliable results (Lorkowski et al., 2021). The vast majority of air transportation activities are now aided by artificial intelligence (AI). AI-based software improves the customer's flying experience (Farhan et al., 2018). AI algorithms have created bots against which players can compete on gaming consoles. AI technology has made it possible to play against superior opponents for a better gaming experience (Karthick et al., 2021).

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