

Chapter 2

Transforming Cancer Diagnosis: Leveraging AI and Medical Analytics for Enhanced Clinical Decision Making

C. V. Suresh Babu

 <https://orcid.org/0000-0002-8474-2882>

Hindustan Institute of Technology and Science, India

A. Mohamed Mohideen

 <https://orcid.org/0009-0004-5188-1116>

Hindustan Institute of Technology and Science, India

K. Saikrishna

Hindustan Institute of Technology and Science, India

K. Akash Kannan

Hindustan Institute of Technology and Science, India

ABSTRACT

This study aims to enhance cancer diagnosis through the integration of artificial intelligence (AI) and advanced data analytics. Utilizing a quantitative research design, we collected and analyzed diverse datasets, including demographic, clinical, and genetic information, to develop predictive models for early cancer detection. The findings reveal that machine learning algorithms significantly improve diagnostic accuracy, enabling the identification of cancer risk factors and facilitating timely interventions. The results underscore the potential of AI to transform cancer care by personalizing treatment strategies and improving patient outcomes. This research

DOI: 10.4018/979-8-3693-6294-5.ch002

highlights the importance of ethical considerations and data quality in developing AI-driven healthcare solutions, suggesting that a collaborative approach is essential for future advancements in cancer diagnosis and management.

1. INTRODUCTION

Cancer remains a significant health challenge, affecting millions annually and underscoring the urgent need for better diagnostic and treatment methods. Early detection and timely intervention are crucial for improving patient outcomes and reducing mortality rates. Despite advancements in medical science, traditional diagnostic methods struggle with the heterogeneity and complexity of cancer. This requires innovative approaches like advanced medical analytics powered by artificial intelligence (AI).

1.1 The Importance of Early Detection in Cancer Treatment

AI can analyze extensive health data, identify patterns missed by human analysts, and provide insights for more accurate diagnoses and personalized treatments, addressing the variability in tumour types and individual responses. The project aims to leverage AI for early cancer detection and personalized treatment plans, improving patient outcomes, reducing healthcare costs, and enhancing operational efficiency.

1.2 Transforming Healthcare with AI Integration

The integration of AI into medical analytics does not simply point toward the line of improvement of cancer diagnosis accuracy but rather concerns the remolding of the whole healthcare system to become better and more effective in its operations and more efficient and responsive to the needs of patients. With the application of AI, providers are able to make better decisions for the patient, tailor treatment plans for the individual patient, and generally provide improved care to the patient.

2. SCOPE AND OBJECTIVE OF THE PROJECT

The main scope of this project is the early detection of cancer to enhance clinical decisionmaking in the early stages. The core aim is to improve the accuracy and consistency of diagnoses by providing clinicians with objective, data-driven insights through AI. These algorithms can analyze large datasets, identify patterns and correlations, and develop predictive models to aid in decision-making. Additionally,

32 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage: www.igi-global.com/chapter/transforming-cancer-diagnosis/365986

Related Content

Anti-Forensics: The Art of Deceiving and Evading Cybersecurity Analysts

Robert John Mapa Soler (2025). *Digital Forensics in the Age of AI* (pp. 63-82).

www.irma-international.org/chapter/anti-forensics/367311

Analytical Model and Computing Optimization of a Compliant Gripper for the Assembly System of Mini Direct-Current Motor

Ngoc Le Chau, Nhat Linh Ho, Ngoc Thoai Tran and Thanh-Phong Dao (2021).

International Journal of Ambient Computing and Intelligence (pp. 1-28).

www.irma-international.org/article/analytical-model-and-computing-optimization-of-a-compliant-gripper-for-the-assembly-system-of-mini-direct-current-motor/272037

A Systematic Literature Review on the Human-AI Partnership Roles in Higher Education

Minh Tung Tran (2024). *Enhancing and Predicting Digital Consumer Behavior with AI* (pp. 28-38).

www.irma-international.org/chapter/a-systematic-literature-review-on-the-human-ai-partnership-roles-in-higher-education/347194

Modeling Agent Auctions in a Supply Chain Environment

Sungchul Hong, Barin N. Nag and Dong-qing Yao (2007). *International Journal of Intelligent Information Technologies* (pp. 14-36).

www.irma-international.org/article/modeling-agent-auctions-supply-chain/2412

Simplicity, Consistency, Universality, Flexibility and Familiarity: The SCUFF Principles for Developing User Interfaces for Ambient Computer Systems

Rich Picking, Vic Grout, John McGinn, Jodi Crisp and Helen Grout (2010).

International Journal of Ambient Computing and Intelligence (pp. 40-49).

www.irma-international.org/article/simplicity-consistency-universality-flexibility-familiarity/46022