

Chapter 5

Cloud Computing and IoMT in Disease Screening and Diagnosis: AI Approaches in Transmuting Healthier Homes

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ABSTRACT

The cloud and the Internet of Medical Things (IoMT) are changing a landscape where near-patient home healthcare can now integrate AI-based tools to redefine disease screening and diagnosis. Real-time data storage and processing with cloud computing permit seamless communication between IoMT devices and healthcare providers. This network enables real-time health monitoring and alerts to catch issues before they lead to larger system failure. AI solutions monitor data from IoMT sensors and identify patterns or anomalies that could signify diseases to provide individualised, accurate diagnoses. This chapter focuses on the various dimensions of evolving role of cloud computing in prioritizing disease screening and managing pandemic outbreaks, with a focus on innovative approaches for mass vaccine scattering.

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1. INTRODUCTION

The new scope of the cloud-based screening includes machine learning algorithms, natural language processing, and even computer vision in disease detection (Sardar et al., 2024). This allows for the identification of patterns and anomalies in patient data, which results in more tailored health maintenance services. This combined power of technology means healthcare is now predicting health, call outs are swift and interventions can be localised with individuals in their own sanctum getting fitter. Cloud-based platforms also enable diagnostic tests to scale and be globally accessible, including in remote or underserved areas. By blending cloud computing with IoMT making use of certain AI, healthcare as it was known is changing to a more sensitively smooth & patient-directed service. (Khurana, 2024). With the wave of global health crises that we are now all too familiar with, a need to develop streamlined plans for simple disease screening and mass vaccine deployment has only become more apparent. Pandemic outbreaks, like the more recent COVID-19 crisis have clearly shown that we need rapid and effective management strategies (Li et al. 2021). In fighting pandemics AI applications are very vital for predicting, tracking and limiting the occurrence of infectious diseases. These are covered in the following sections on using machine learning models to analyze epidemiological data Predict outbreak trajectories Optimize resource allocation in healthcare systems (Sejdic & Falk, 2018). Effective vaccine delivery is a critical part of pandemic response. However, traditional supply-chain mechanisms face numerous roadblocks such as the difficulties in logistics and equal distribution (Luo et al., 2016).

The use of predictive analytics by AI-driven mass vaccine scattering represents a paradigm shift in vaccine allocation and distribution routes, as well as cold chain management. To hasten the delivery of treatments or vaccines to people across various conditions, such AI systems are capable of dealing with adaptive circumstances (Mohammadi et al., 2018). Balancing tech and ethics is crucial for trust in AI-driven health care For an effective treatment plan and patient safety, it is important to identify the exact ailment (Scarpato et al., 2017). Nevertheless, this approach comes with substantial challenges: reliability and validation concerns regarding the conditions covered by these models; extent of condition addressed to encompass a spectrum of various diseases/health situations including rare instances; cross-sequence evaluation leading towards no constraints of modality-based tests however deploying broad experiments; recent imaging systems raise open critical issues in testing new(-born) (cross-erupted modalities); eventually successful CBIR or CADx relies on an effective integration appropriate computer vision feature/cue extraction techniques using hard-coded infectious patterns together state-of-the-art machine learning strategies such as ensemble-learning assisted deep convolutional

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