Chapter 4
Real-Time Disease Prediction With Machine Learning Algorithms

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ABSTRACT

Real-time disease forecasting has become an extremely important branch of health care and is used to predict disease developments and time of diagnosis using new

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technologies. The efficiency of the computation in recognizing large volumes of data was made possible by the advancement of this particular method widely known as machine learning (ML) algorithms. This chapter offers comprehensive analysis of real time disease prediction systems powered by ML. It starts with the literature review where we express current findings, major contributions, and the lack of research in predictive healthcare. Thus, the state of the art of several subfield machine learning approaches, such as supervised, unsupervised, as well as deep ones, is examined in terms of real-time. It also introduces the necessary tools, datasets and data pre-processing for making use of these systems.' Details derived from the case study show enhanced feasibility of these algorithms in disease prediction with other features such as accuracy, precision, and response time demonstrated.

INTRODUCTION

The role of disease prediction in real-time healthcare is invaluable, as detecting a condition as early as possible is a key to improvement of the patient's condition. Prior approaches used in diagnostics have several disadvantages that make them inefficient in active healthcare environments. Often, these methods are very time consuming and include manual processing and laboratory tests which hinders the beginning of treatment. Also, they are expensive, which compromise their availability for use especially in the underserved low resource settings (Abdellatif e al., 2022). The absence of real-time data adds to these problems since decisions are made using outdated and sometimes erroneous information. Prolonged treatment, lack of quality health care and certain progression of the disease may worsen the ailment, financial cost incurred in treating such diseases may also be high and sometimes some effects are irreversible.

Machine learning (ML) has become one of the most promising approaches to tackle these challenges due to the availability of big data enhanced rapid and accurate data analysis. Through higher levels of data abstraction, ML commonly performs on high volumes of inputs from electronic health records, imaging data or in real time data streamed from sensors to predict diseases even before the patient shows symptoms (Agarwal et al., 2024). Supervised learning algorithms such as logistic regression and SVM are applied in diseases diagnosis and patients classification as well as in deep learning, CNNs are applied in real-time medical imaging and detection of abnormality. Such advancements serve not only to improve the accuracy of diagnoses and prognosis but also to provide the client with unique individual outcomes based on his or her profile (Yogi et al., 2024).

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