Chapter 8
Studying Into the Diagnostic and Therapeutic Applications of Machine Learning Algorithms in Medicine: Medicinal Applications Using Machine Learning

Swati Shirke
Pimpri Chinchwad University, India

Rahul Ganpatrao Sonkamble
https://orcid.org/0000-0001-6075-9519
Pimpri Chinchwad University, India

Sonali Patil
G.H. Raisoni College of Engineering and Management, Pune, India

Jayashree Rajesh Prasad
MIT Art, Design, and Technology University, India

Sudeep D. Thepade
https://orcid.org/0000-0001-7809-4148
Pimpri Chinchwad College of Engineering, India

Divya Midhunchakkaravarthy
Lincoln University College, Selangor, Malaysia

ABSTRACT

Machine learning (ML) is increasingly transforming healthcare, particularly in disease diagnosis, by improving precision, efficiency, and personalization. The chapter investigates ML's role in early disease detection, addressing the shortcomings of traditional diagnostic methods, including high costs and the need for expert inter-

DOI: 10.4018/979-8-3693-6308-9.ch008

pretation. Through a bibliometric analysis of 1,216 journals from Web of Science (WOS) and Scopus, the study identifies key contributors and influential works in ML-based disease diagnosis. It evaluates the accuracy and challenges of different ML techniques, including decision trees, support vector machines, and convolutional neural networks. Ethical, regulatory, and data privacy issues critical for integrating ML into clinical practice are also discussed. Furthermore, the research introduces a novel ML architecture designed for disease diagnosis, integrating data from diverse sources and emphasizing continuous learning, privacy, and security.

INTRODUCTION

The possibility to increase precision, effectiveness, and personalised healthcare has drawn a portion of interest to the utilisation of machine learning (ML) procedures in medical diagnosis and treatment in recent years. Effective diagnosis of diseases is a significant missed opportunity on a worldwide basis. The development of early diagnosis tools and successful treatments is severely restricted by the difficulty of the many disease processes besides fundamental signs affecting the patient residents. (ML) Machine learning, a subfield of AI, aids in the problem-solving process for physicians, investigators, and sufferers. This article describes how numerous illnesses have been detected earlier due to machine learning (ML) based on pertinent research. The paper is first subjected to a bibliometric analysis utilising information from the (WOS) Web of Science and Scopus records. The goal of the bibliometric analysis of 1216 journals was to identify the greatest creative writers, countries, institutions, also highly referenced works. After that, The research offers a synopsis of the most current developments and methods in machine-learning-based sickness judgment, taking into account the procedure, different illness kinds, different data sources, applications, and assessment metrics. Lastly, we highlight significant findings and offer predictions for future developments and prospects in the domain of machine-learning-based illness judgment in this work. (AI) Artificial intelligence in the medical domains is mostly concerned with creating the procedures as well as methods to ascertain if a scheme's behaviour is accurate in diagnosing a condition. A medical diagnostic pinpoints the disease that account for a patient's indications besides indicators. Usually, a patient's physical examination and medical history provide diagnostic information (McPhee, Papadakis, & Rabow, 2010). It is often challenging because a lot of the symptoms and signs are unclear then need a professional medical professional to recognize. So, it is challenging to provide appropriate diagnostic techniques for their largest patient population in nations like Bangladesh and India that absence sufficient health experts for their inhabitants (Ahsan et al., 2021). Additionally, medical tests are frequently necessary for diagnostic processes,