Chapter 13
Machine Learning and Artificial Intelligence in Disease Prediction:
Applications, Challenges, Limitations, Case Studies, and Future Directions

Kama Ramudu
Kakatiya Institute of Technology and Science, India

V. Murali Mohan
Koneru Lakshmanah Education Foundation Green Fields, India

D. Jyothirmai
B.V. Raju Institute of Technology, India

D. V. S. S. S. V. Prasad
Aditya College of Engineering, India

Ruchi Agrawal
Government Engineering College, Raipur, India

Sampath Boopathi
Muthayammal Engineering College, India

ABSTRACT

Artificial intelligence (AI) based disease identification has the potential to transform medicine by utilizing machine learning algorithms and techniques to analyze large volumes of medical data and identify patterns and features that may be difficult for human experts to detect. However, there are still challenges and limitations to overcome, such as the need for high-quality medical data and concerns around privacy and bias. This chapter explores the growing intersection of machine learning (ML) and AI techniques with disease prediction. The chapter begins by providing an overview of ML and AI methodologies commonly employed in disease prediction, including supervised and unsupervised learning algorithms, deep learning techniques, and ensemble methods. Lastly, the chapter outlines future directions and research opportunities in the field.

DOI: 10.4018/978-1-6684-8913-0.ch013

INTRODUCTION

Medical disease identification is the process of identifying and diagnosing diseases in patients based on their symptoms, medical history, and other factors. This is a critical task in healthcare, as accurate diagnosis is essential for providing appropriate treatment and improving patient outcomes. Traditionally, medical disease identification has relied on the expertise of healthcare professionals, who use their clinical knowledge and diagnostic tools such as medical imaging and laboratory tests to identify and diagnose diseases. However, this process can be time-consuming, costly, and prone to errors. With the rapid advancement of artificial intelligence (AI) technologies, there is a growing interest in using AI-based approaches for medical disease identification. AI algorithms can analyze large amounts of medical data to identify patterns and make predictions about disease diagnosis, treatment, and outcomes. AI-based medical disease identification has the potential to supplement and enhance traditional diagnostic methods, improving accuracy, efficiency, and patient outcomes. This field is still in its early stages, and there are many challenges and limitations to overcome. However, as AI-based medical disease identification continues to develop, it has the potential to revolutionize healthcare and improve patient outcomes on a global scale.

Medical disease identification is an important area of research and development, as accurate and timely diagnosis is critical for effective treatment and improved patient outcomes. With the increasing availability of electronic medical records, medical imaging, and genetic data, there is a growing need for more efficient and accurate methods of disease identification. AI-based medical disease identification has the potential to address some of the limitations of traditional diagnostic methods, by analyzing large amounts of data in a systematic and automated manner. AI algorithms can learn from vast amounts of data and use this knowledge to identify patterns and make predictions, which can improve diagnostic accuracy and speed.

There are many different types of AI algorithms that can be used for medical disease identification, including machine learning, deep learning, and natural language processing. These algorithms can be trained using a variety of data sources, such as electronic medical records, medical imaging, and genetic data. One of the key advantages of AI-based medical disease identification is its ability to provide personalized and precise diagnoses and treatment plans for individual patients. By analyzing a patient's medical history, genetic data, and other relevant information, AI algorithms can identify the most effective treatments for that particular patient, which can improve treatment outcomes and reduce healthcare costs (Palanisamy et al., 2019).

Despite the many potential benefits of AI-based medical disease identification, there are also some challenges and limitations to overcome. For example, AI