

Chapter 10

Machine Learning–Based Approach for Predictive Analytics in Healthcare

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ABSTRACT

In this internet era, due to digitization in every application, a huge amount of data is produced digitally from the healthcare sectors. As per the World Health Organization (WHO), the mortality rate due to the various chronic diseases is increasing each day. Every year these diseases are taking lives of at least 50 million people globally, which includes even premature deaths. These days, machine learning (ML)-based predictive analytics are turning out as effective tools in the healthcare sectors. These techniques can extract meaningful insights from the medical data to analyze the future trend. By predicting the risk of diseases at the preliminary stage, the mortality rate can be reduced, and at the same time, the expensive healthcare cost can be eliminated. The chapter aims to briefly provide the domain knowledge on chronic diseases, the biological correlation between these disease, and more importantly, to explain the application of ML algorithm-based predictive analytics in the healthcare sectors for the early prediction of chronic diseases.

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1. INTRODUCTION

The internet era has resulted in an exponential increase in the volume of data generated in digital form. Due to these rapid growths in the generation of the data, data is collected at the rate of terabytes to petabytes from each application (Shastri et. al, 2020). Data analytics is the process of analyzing the data to obtain meaningful insights from it. Usage of statistical techniques and machine learning (ML) approaches to predict future trends from historical data is known as predictive analytics. Machine learning (ML) is the science that enables computers to learn and predict their experiences without explicit programming. If a computer software can improve its performance due to past experience, this is called 'learning.' In contrast to artificial intelligence, machine learning is more restricted to data analysis. The use of techniques that allow computers to learn from data iteratively is machine learning (Salkuti et. al, 2020). Predictive analytics is expanding its application in various sectors like Health care, Bank, Education, Governmental organizations, Retail industry, Cybersecurity, Manufacturing, Insurance sectors, stock market, social media, and many more (Wang et. al, 2018). Today predictive analytics is making more buzz in the area of the health care sector. Because of the massive amount of healthcare data is generated in the digital form. Processing and analyzing these data is becoming challenging for the medical practitioner to take effective decisions. Hence predictive analytics are making highlights in the healthcare sector which can convert these digital data in the form of clinical insights using an efficient ML model which helps the physician in providing better treatment for the patient with lesser cost. There are limitless advantages in the application of predictive analytics in the field of healthcare.

One of the prime advantages of the application of predictive analytics in healthcare is an early prediction of disease. Hence by using the predictive analytical-based ML algorithms hospital readmission can be reduced. In recent years the chronic disease is becoming a challenge to the entire globe. According to the World Health Organization, the death rate from chronic disease is anticipated to increase by 73% by 2025, and so these diseases are included in the Global Burden of Disease (GBD). Cancer, dementia, epilepsy, cardiovascular disease (CVD), chronic kidney disease (CKD), and chronic diabetes mellitus (CDM) are all examples of significant chronic diseases (Bikbov et. al, 2020). CVD, CKD, and CDM are considered as interconnected chronic diseases. Because each of these diseases is an interconnected disease that will become a risk factor for the other two diseases. The progressive relationship between the interconnected disease must be analyzed at the early stage itself to reduce the death rate. As per the medical report released in the year 2020 by WHO, world's 70% of death is due to chronic disease. If the severity level of the disease is considered, as per the report released in 2020 from WHO, the chronic disease are responsible for overall 70% of the deaths out of which 50% of the death is only due

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