Chapter 67
Application of Machine Learning Techniques in Healthcare

Sathya D.
Kumaraguru College of Technology, India

Sudha V.
Kumaraguru College of Technology, India

Jagadeesan D.
Cherraan's Arts Science College, India

ABSTRACT

Machine learning is an approach of artificial intelligence (AI) where the machine can automatically learn and improve its performance on experience. It is not explicitly programmed; the data is fed into the generic algorithm and it builds logic based on the data provided. Traditional algorithms have to define new rules or massive rules when the pattern varies or the number of patterns increases, which reduces the accuracy or efficiency of the algorithms. But the machine learning algorithms learn new input patterns capable of handling complex situations while maintaining accuracy and efficiency. Due to its effectual benefits, machine learning algorithms are used in various domains like healthcare, industries, travel, game development, social media services, robotics, and surveillance and information security. In this chapter, the application of machine learning technique in healthcare is discussed in detail.

INTRODUCTION

In recent days, the people are using medical sensors and other health devices to monitor health status. Using the advanced medical devices the patients' health related parameters can be monitored continuously and in real time, and then processed and transferred to medical databases. This certainly improves patient's quality-of-care without disturbing their comfort and significantly reduces the hospital occupancy rates. At the same time, the enormous amount of health data collected using the sensors are difficult to analyse by the human beings. The advancement in technologies like machine learning when combined

with health care helps the health care to move a step ahead. Machine learning infact helps us to improve the performance in health care from experience rather than programming.

Since the health data is more sensitive and any fault may affect person's life, it has to be processed and the health problem has to be predicted quickly. The human being's cannot process the data quickly using the conventional methods. So the machine learning techniques are used in these cases to find out the disease pattern and the cause. Similarly, the machine learning techniques are used in various applications like disease diagnosing systems, drug detection, and assistive technology. The benefits of machine learning algorithm includes accuracy, decision making, quick and powerful processing, handling complex data and cost effective. The objective of this study is to explore the current applications of AI techniques in health care systems in detail.

The applications of machine learning techniques in health systems are listed below:

1. Disease Diagnosing systems
2. Remote Health Monitoring Systems
3. Drug detection and analysis
4. Assistive Technologies
5. Medical Imaging Diagnosis
6. Smart Health Records
7. Clinical Trial and Research
8. Crowd sourced Data Collection
9. Better Radiotherapy
10. Outbreak Prediction

The chapter is organized as follows: Section 1 gives the brief Introduction on the uses and applications of AI, Section 2 explains the types of disease diagnosing systems, AI system in diagnosing stroke and cancer, Section 3 describes the Remote Health monitoring systems and AI in mobile Health, WMSN and Internet of Things (IoT), Section 4 discusses the AI in drug detection and analysis, Section 5 explains the Assistive technology devices and its use, Section 6 describes the Medical Imaging diagnosis, Section 7 presents the smart health records and its use, Section 8 briefs about the Clinical trial and research, Section 9 explains the crowd sourced data collection, Section 10 illustrates the radiotherapy and Section 11 briefs on outbreak prediction.

DISEASE DIAGNOSING SYSTEMS

In most of the disease diagnosing systems the AI techniques analyses the data from medical images, genetic test reports, electrophysiological data, and clinical notes etc. The clinical notes are the unstructured data which has to be processed before analysing. The AI techniques converts the unstructured data into machine readable Electronic Medical Record (EMR), which is analysed by the machine learning techniques easily (Fei et al. 2017).

The disease diagnosing systems are using the below given types (emrj.com):

- **AI-Chatbots:** The speech recognition techniques are used in AI- Chatbots to identify disease patterns and to advise a suitable course of action for the patients.

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