Chapter 8
Effectiveness of Machine Learning Technology in Detecting Patterns of Certain Diseases Within Patient Electronic Healthcare Records

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Abstract The research article sheds light on the effects of artificial intelligence and machine learning technologies to detect several diseases within patient electronic healthcare records. Apart from that, the usage and importance of machine learning technologies in detecting certain diseases is another major description in this research article. Thus, the purpose of this research article is to investigate the significance of machine learning to develop the healthcare system. In this research article, the researcher has adopted the positivism research philosophy, inductive research approach and the descriptive research design to make the research article presentable. It is identified that machine learning technologies are very important for the development of healthcare organizations and healthcare systems. On the other hand, machine learning technologies are impactful in detecting patterns of certain diseases. Therefore, machine learning technologies are largely impactful on healthcare organizations. In conclusion, it can be said that artificial intelligence and machine learning technologies are essential in the healthcare system as it helps to detect certain diseases quickly. Therefore, quick detection of diseases is helpful for

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protecting the health of the people. On the other hand, machine learning technologies help in the development of the healthcare system.

8.1 Introduction

Artificial intelligence is an important system nowadays and there are a lot of benefits of using artificial intelligence in machines. Therefore, machine learning is one of the important applications of artificial intelligence as it is helpful to improve several types of systems and the usage of this technology is increasing day by day. Thereafter, nearly 65% of the companies are planning to use machine learning globally. Furthermore, artificial technologies and machine learning have impacted the healthcare system as well and it helps to develop the healthcare system. Therefore, the rate of using artificial intelligence or machine learning in the healthcare system is 40% in the year 2021 [1]. Thus, it can be said that machine learning is important for not only the businesses but also healthcare. There are certain diseases that can be detected by the usage of artificial intelligence or machine learning (Fig. 8.1).

On the other hand, it was not easy to detect those diseases without artificial intelligence previously. Therefore, the usage of artificial intelligence and machine learning is not only important for the healthcare system but also important for the health of the people [2]. Thus, in this research article the usage of machine learning and artificial intelligence in medical diagnosis is described. Therefore, the effects of machine learning technologies on the healthcare system is described in this research article. Furthermore, the importance of the usage of machine learning technologies or

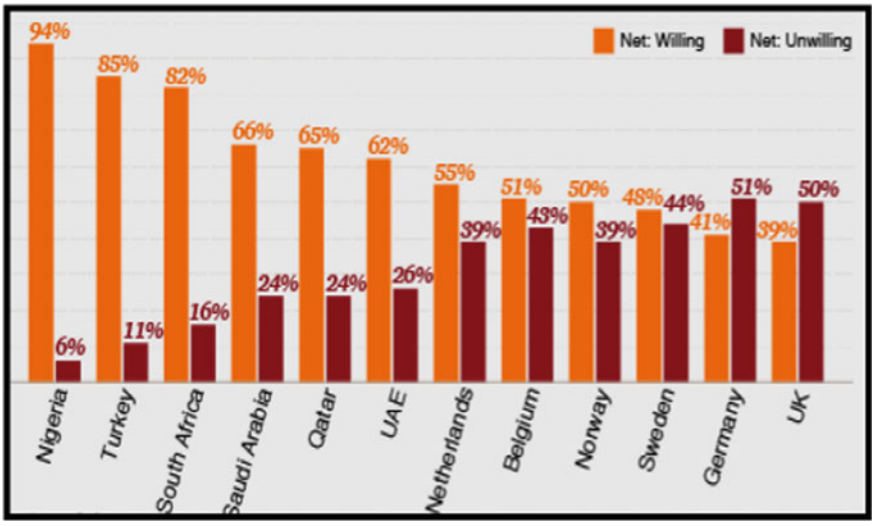

Fig. 8.1 Increment of artificial intelligence in healthcare [1]

artificial intelligence to detect certain major diseases is another important description in this research article. Thereafter, the usage of theory for understanding the concept of machine learning technologies is analyzed in this research article. Apart from that, the research methods that are accepted by the researcher to present a better research study are described in this research article briefly.

8.1.1 Aim and Objective

The aim of this research article is to analyze the effects of machine learning technology in detecting the patterns of certain diseases within patient electronic healthcare records.

The objectives of this research article are

- To investigate the importance of machine learning technology in development of the healthcare system
- To analyze the effect of machine learning technology in detecting patterns of certain diseases
- To understand the usage of machine learning technologies or artificial intelligence.

8.2 Literature Review

8.2.1 Machine Learning Technologies

Machine learning is one of the most important artificial intelligence and the usage of machines in several platforms is increasing nowadays. Thus, there are a lot of different types of technologies in machine learning and those technologies have their own impact on several systems. Therefore, there are six most important machine learning technologies that are analyzed in the table. The first one is Keras, which is an open software source and this technology is very popular for its user friendliness. Furthermore, this technology can be used in CPUs as well as in GPUs and this technology is helpful for fast prototyping. In addition to that, the second one is Torch which was launched in 2002 and is an old technology [3]. Thus, this technology has several algorithms that help to increase the speed in machine learning (Table 8.1).

Therefore, there is Caffe that is a recently released technology and that helps to increase the speed, modularity and expressiveness as well. Moreover, there is TensorFlow that was released in 2015 and it was created by Google firstly then it is now used by several platforms. On the other hand, machine learning technology helps in flowgraphs and helps in development of the neural networks. Therefore, there is Theano which is an advanced machine learning technology that helps in the development of the fashion industry. Furthermore, the next technology is Microsoft

Table 8.1 Six most important machine learning technologies [3]

Machine learning technology	Usage
Keras	It helps to simplify the making of models of deep learning
Torch	It has several algorithms that helps in deep learning
Caffe	It helps to innovate the speed and expressiveness of deep learning
TensorFlow	This technology helps to improve the neural networks
Theano	It helps in processing in defining and optimizing
Microsoft Cognitive Toolkit	This technology helps to make a next level machine learning project

Cognitive Toolkit which is also a new released technology and this helps to make a presentable and next level project.

8.2.2 Usage of Machine Learning Technologies

The usage of this technology is increasing day by day and along with that, there are a lot of benefits of using machine learning technology such as it helps in predictive maintenance. Apart from that, machine learning technologies help in product recommendation as a good product is very important for evaluating projects [4]. Along with that, these technologies are helpful to detect spam and help in several medical diagnoses. Thus, these are the benefits of machine learning technologies and the effect of machine learning technologies in detecting certain diseases is analyzed below in this research article (Fig. 8.2).

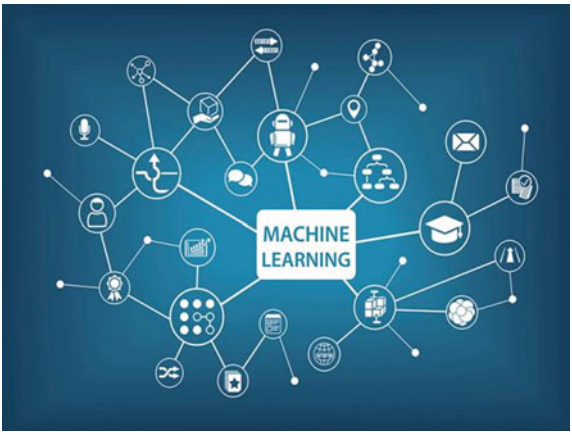

Fig. 8.2 Machine learning technology [4]

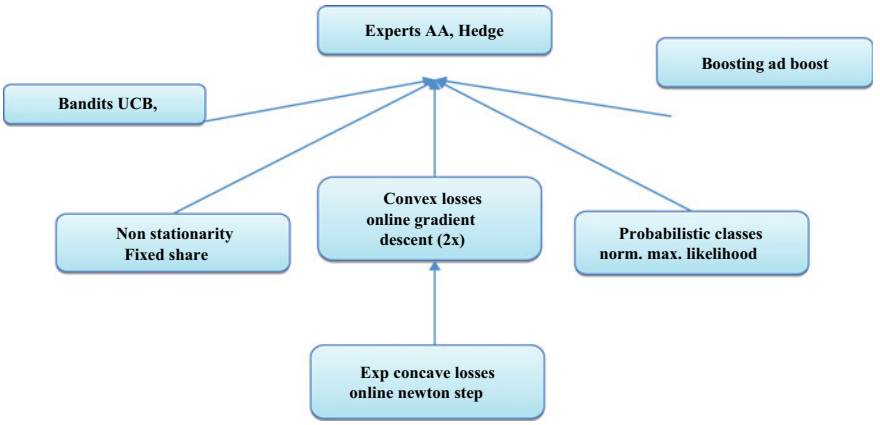

Fig. 8.3 Machine learning theory

8.2.3 Theoretical Framework

There are a lot of theories that are helpful to gain knowledge about machine learning technologies. Thus, the researcher has adopted the ***machine learning theory*** in this research article to understand and analyze the concept of machine learning technologies or artificial intelligence [5]. In addition to that, the machine learning theory was helpful for the researcher to formalize the problems of learning in a statistical way. Thereafter, this theory helps to enhance the efficiency of the researcher to analyze the algorithms of learning. Apart from that, there are a lot of benefits of machine learning theory. Thus, it can be said that the machine learning theory was helpful for the researcher to collect information about machine learning technologies (Fig. 8.3).

8.2.4 Literature Gap

The specific machine learning technologies that are used for detecting several diseases in medical diagnosis are described in this research study briefly. Thus, in the previous literature this is not analyzed significantly. Therefore, the usage and importance of artificial intelligence or machine learning technologies in medical diagnosis is another brief description in this literature review. Thus, this is not described properly in the previous literature review.

8.3 Research Methods

There are several types of research philosophies that are used for gathering essential information about the research topics. Therefore, the researcher has adopted the ***positivism research philosophy*** for this research article. The positivism research philosophy is helpful to find reliable, representable and generalizable data and this is the reason for choosing this research philosophy by the researcher for this research article. Apart from that, the positivism research philosophy is one of the important research philosophies as it helps to understand the social world in an objective way [6]. Thus, these are the reasons for adopting the positivism research philosophy for this research article. Furthermore, the researcher has adopted the ***inductive research approach*** for this particular research article. Therefore, there are a lot of advantages of the usage of this inductive research approach in research studies. First of all, by using the inductive research approach the researcher can focus on the usage of proper language in several projects.

On the other hand, there are a gamut of probabilities in an inductive research approach and this is one of the largest benefits of the usage of this inductive research approach. Thus, the inductive research approach is very important among all the research approaches [7]. Hence, these are the causes for choosing the inductive research approach in this research article. Apart from that, the researcher has adopted the ***descriptive research design*** in this research article among all the research designs. Thus, descriptive research design helps to make a remarkable and presentable project [8]. Along with that, the research design helps in data collection as well and these are the reasons for choosing this descriptive research design for this research article. Thus, it can be said that the research paradigm such as positivism research philosophy, inductive research approach and descriptive research design are very helpful to create better research study and was quite helpful for this research article as well (Fig. 8.4).

Method of data collection is the process of gathering accurate and proper data for research studies. There are two types of methods of data collection such as primary data collection method and secondary data collection method. Therefore, in this research article the researcher has adopted the ***secondary data collection method*** as there are a lot of benefits of using the secondary data collection method. Apart

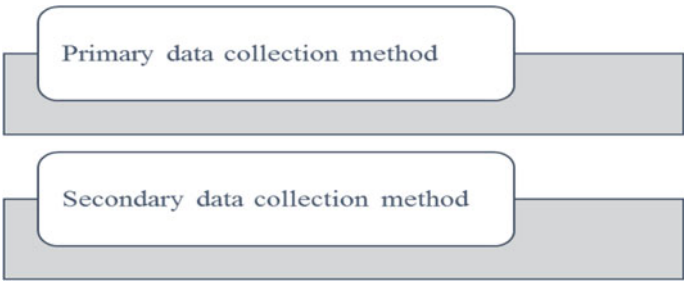

Fig. 8.4 Methods of data collection [9]

from that, there are a lot of sources of secondary data collection methods such as books, magazines, newspapers, government records, public records, journals and other published sources [9]. Thereafter, the secondary data collection method is easy to access, time saving and not expensive and these are the reasons for choosing this data collection method. Furthermore, the secondary data collection method was helpful to gain more data about machine learning technologies and its usage in the healthcare system.

8.4 Result and Discussion

Theme 1: Effect of machine learning technology in detecting patterns of certain diseases

There is a large impact of machine learning technology on medical diagnosis and that effects are discussed in this part of this research article. Thus, there are some diseases that need artificial intelligence and machine learning technologies to recognize such as lung cancer, skin lesions, cardiac attack, heart diseases, diabetic retinopathy and others [10]. Thereafter, machine learning technologies are easy as well as quick and that help to detect the disease more fatly. Furthermore, there are several machine learning methods or technologies that are used in disease detection such as SVM or support vector machines, K-nearest neighbours, random forest and others. On the other hand, there are several technologies for different types of diseases such as CT scan technology that is used to detect lung cancer. Moreover, MRI technology is used to detect cardiac attack and electrocardiogram technology is used to detect several heart diseases [11]. Furthermore, there is an x-ray technology machine that helps to take images of several body parts and that helps to detect disease (Table 8.2).

Theme 2: Several platforms that need the usage of machine learning technologies

The usage of machine learning technologies is increasing day by day among several platforms. Therefore, there are several platforms that need the usage of machine learning the most such as, psychology, artificial intelligence, control theory, neuroscience, information theory, philosophy, Bayesian method and computational complexity theory [11]. Thus, these platforms are largely impacted by machine

Table 8.2 Five diseases that can be detected by machine learning technologies [10]

Diseases detected by machine learning technologies	Name of the machine learning technology
Lung cancer	CT scan
Cardiac attack	MRI process
Skin lesions	Skin images
Heart diseases	Electrocardiograms
Diabetic retinopathy	Eye images

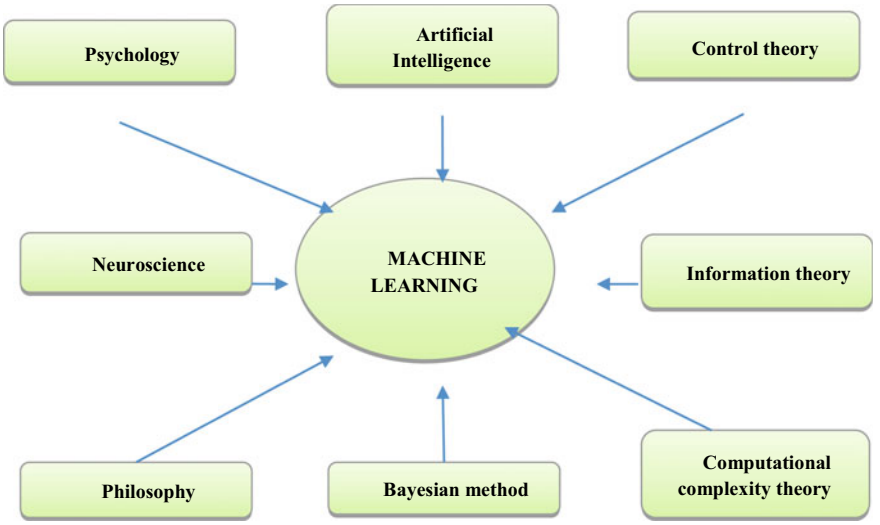

Fig. 8.5 Usage of machine learning technologies

learning technologies and artificial intelligence. Along with that, machine learning theory is used in several ways for several platforms. In addition to that, the usage of artificial intelligence and machine learning technologies in healthcare organizations and medical diagnosis is increasing day by day globally (Fig. 8.5).

8.5 Future Work

Machine learning technologies should be more aware about the social risks and should take more essential steps for protecting the people from those risks. Therefore, they should give proper training to the new artificial society to understand this technology more significantly. Apart from that, transparency is a very important part of artificial intelligence and they should enhance and boost this transparency for improving the technology. Furthermore, they should increase their communication skills so that they can make better teamwork. Thus, these are the future work or recommendations for artificial intelligence to improve the technology.

8.6 Conclusion

In conclusion, it can be said that there is a major impact of machine learning technologies on medical diagnosis. Therefore, there are some diseases that need artificial intelligence for recognition, thus, the usage of machine learning technologies

in different medical diagnoses is increasing day by day. Apart from that, machine learning technologies help in the development of the healthcare system and the importance of machine learning technologies in the healthcare system is analyzed in this research article properly. Thus, it can be said there is a significant effect of machine learning technologies or artificial intelligence in detecting the patterns of certain diseases.

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