

# Chapter 14

## Introduction to Machine Learning and Its Application

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### ABSTRACT

*In today's world, a huge amount of data is available. So, all the available data are analyzed to get information, and later this data is used to train the machine learning algorithm. Machine learning is a subpart of artificial intelligence where machines are given training with data and the machine predicts the results. Machine learning is being used in healthcare, image processing, marketing, etc. The aim of machine learning is to reduce the work of the programmer by doing complex coding and decreasing human interaction with systems. The machine learns itself from past data and then predict the desired output. This chapter describes machine learning in brief with different machine learning algorithms with examples and about machine learning frameworks such as tensor flow and Keras. The limitations of machine learning and various applications of machine learning are discussed. This chapter also describes how to identify features in machine learning data.*

### INTRODUCTION

Machine learning is a sub-branch of artificial intelligence. It came into existence as previously programmers need to explicitly write instructions that computer used for calculating problems. Machine learning algorithms train computers on input data and statistical methods used to do analysis on data to get output. By using the machine learning data, the system can predict the results and so using this complex system that needs to be developed using programming is not required now. Machines analyses previous data and learns from it to give the required output. This leads to less human intervention with systems, and the system becomes automatic to predict the result. Machine learning has a wide variety of fields where

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it is used successfully, such as in the field of medical, weather predicting, stock market prediction, etc. The most important thing in machine learning is to provide correct input so as to make the machine give the correct prediction. The research work contains an explanation of different machine learning algorithms, its pseudocode along with code snippets, and the output of different algorithms. For different machine learning algorithms, various mathematical notations are also included in this chapter. The chapter includes an explanation of methods for selecting features and extracting the best features from the machine learning dataset for computation. The chapter briefly explains artificial neural network, TensorFlow, “which the open-source framework used in machine learning for computation” and Keras library, “which is on top of tensor flow with examples.” The chapter also contains information about various machine learning algorithms application and the limitations of machine learning.

## **BACKGROUND**

The term machine learning first came into existence by Arthur Samuel in the year 1959 in the area of computer gaming and artificial intelligence. In year 1997, Tom Mitchell gave definition that “A computer program is said to learn from experience  $E$  with respect to some task  $T$  and some performance measure  $P$ , if its performance on  $T$ , as measured by  $P$ , improves with experience  $E$ . Machine learning is a subset of artificial intelligence where the computer gets the ability to learn automatically, and it improves the results from previous learning experience without programming explicitly, (Mitchell, 1997). It accesses data and learns from it. The goal of machine learning is to allow computers to learn by themselves automatically without human interference. This also reduces the complex coding previously done by a programmer to develop an application.

With a lot of beneficial uses, the business industries took no time to realize the fact that they need to use machine learning to increase their calculation potential to stay ahead of other competitors. Some large projects include:

- GoogleBrain, in the year 2012, Jeff Dean created a deep neural network, which was designed keeping more focus on images and videos for pattern detection.
- AlexNet, in the year 2012 which gave the use of GPU and created ReLU (an Activation function) by winning a competition called ImageNet.
- DeepFace, in the year 2014, was the project started by Facebook claimed to have precision as humans in recognizing the people.
- OpenAI, in the year 2015 created by Elon Musk, is a non-profit organization focusing on creating a safe artificial intelligence to benefit humanity.

## **MAIN FOCUS OF THE CHAPTER**

### **Classification of Machine Learning**

Machine learning implementations are classified into three parts, and they are:

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