

Chapter 2

Machine Learning Algorithm With TensorFlow and SciKit for Next Generation Systems

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ABSTRACT

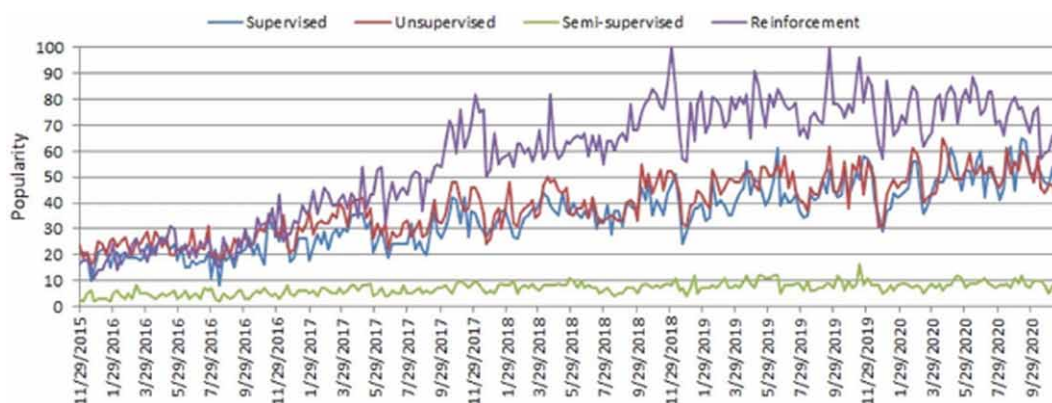
Machine learning plays a vital role in all major sectors like healthcare, banking, finance, and marketing. There is a need to understand the role and working of ML algorithms in a better way. Google also uses a learning algorithm to rank the web pages whenever we try to browse the internet to get the desired information. Understanding the platform and working of these algorithms is crucial for researchers. In this chapter, the authors have presented an overview of machine learning fundamentals and the working of these algorithms with suitable examples. They have also highlighted the importance of major machine learning libraries like TensorFlow and SciKit in developing and deploying vast applications. Finally, a case study of ML application is presented to better understand the concept. Future prospects of ML applications are also depicted in detail.

1. INTRODUCTION

Since the Stone Age, humanity has used different types of tools to make life easier. The ingenuity of the human brain has in turn made many different machines possible. Machine learning is one such invention. According to Arthur Samuel Machine learning is defined as “the field of study that gives computers the

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Figure 1. Rise in popularity of ML algorithms (Sarker, 2021)



ability to learn without being explicitly programmed” (Mahesh, 2020). A quick overview of different types of Machine Learning (ML) algorithms is presented in Figure-1.

Machine learning has emerged as a crucial branch of artificial intelligence (AI) that focuses on data manipulation and modeling to make predictions and analyze complex patterns. This literature review aims to provide an overview of machine learning fundamentals, explore various machine learning algorithms, emphasize the importance of popular machine learning libraries such as TensorFlow and SciKit, and highlight the practical applications through a case study.

“The worldwide popularity score of various types of ML algorithms (supervised, unsupervised, semi-Supervised, and reinforcement) in a range of 0 (min) to 100 (max) over time where x-axis represents the timestamp information and y-axis represents the corresponding score” (Sarker, 2021).

Machine learning is a branch of AI that deals with data manipulation and model which in turn help in making predictions and graphs from the data to collectively analyze it. Through use of statistical methods algorithms make predictions ranging from cost of a stock price in a week to level of global warming increase in the next decade. With the advancement of technology, machine learning is prevalent in every facet of our life and is often use by big companies to help do behavioral analysis of the consumers and then suggest them products and services which they would be inclined to purchase, thus in turn boosting their revenue. The manipulation of data to make models which aid in prediction of next data sets is called machine learning algorithm.

Now we will discuss various types of learning methods:

1.1 Supervised Learning

Supervised learning takes place in the supervision of the teacher. For a given set of inputs we know the output or we can say the class levels are known. We can train the models based on supervised data. When we present the new data to the model, it will predict the class level which is not known to us. Classification is one of the supervised learning techniques which have lot of real world applications. For example in medical field we can classify if the cancer is benign or malignant. Figure-2 depicts the working of supervised machine learning algorithms. The goal of supervised learning is to build a predictive model that can accurately predict the output for new, unseen input data.

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