Chapter 14
Relative Analysis on Algorithms and Applications of Deep Learning

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ABSTRACT

Deep learning is an artificial intelligence function that reproduces the mechanisms of the human mind in processing records and evolving shapes to be used in selection construction. The main objective of this chapter is to provide a complete examination of deep learning algorithms and its applications in various fields. Deep learning has detonated in the public alertness, primarily as inspective and analytical products fill our world, in the form of numerous human-centered smart-world systems, with besieged advertisements, natural language supporters and interpreters, and prototype self-driving vehicle systems. Therefore, it provides a broad orientation for those seeking a primer on deep learning algorithms and its various applications, platforms, and uses in a variety of smart-world systems. Also, this survey delivers a precious orientation for new deep learning practitioners, as well as those seeking to innovate in the application of deep learning.

INTRODUCTION

In the past decade there has been a rapid paradigm shift in the field of computer science due to apex achievements in artificial intelligence (Pallis et al., 2008). Machine learning which is a sub field of artificial intelligence has taken the capabilities of imparting the intelligence across various disciplines.

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Beyond the horizon. In 1959, Arthur Samuel defined machine learning as a “Field of study that gives computers the ability to learn without being explicitly programmed” (Samuel 1959). The machine learning algorithms work on the fact that the learning happens persistently from the training data or with the past experience and can enhance their performance by synthesizing the underlying relationships among data and the given problem without any human intervention. In contrast with the optimization problems, the machine learning algorithms generally encompasses a well-defined function that can be optimized through learning. This optimization of the decision-making processes based on learning has led to rapid rise in employing automation in innumerable areas like Healthcare, Finance, Retail, E-governance etc. However, machine learning has been considered as the giant step forward in the AI revolution the development in neural networks has taken the AI to a completely new level. Deep learning which a subset of machine learning is incorporates neural networks as their building blocks have remarkable advances in natural language and image processing (Chen et al., 2003).

With big data landscape being able to store massive amount of data that is generated every day by various businesses and users the machine learning algorithms can harvest the exponentially growing data in deriving accurate predictions. The complexity raised in maintaining a large computational on primes infrastructure to ensure successful learning has been efficiently addressed through cloud computing by eliminating the need to maintain expensive computing hardware, software and dedicated space. The businesses have started adopting Machine Learning as a service (MLaaS) into their technology stacks since they offer machine learning as a part of their service, as the name suggests. The major attraction is that these services offer data modeling APIs, machine learning algorithms, data transformations and predictive analytics without having to install software or provision their own servers, just like any other cloud service. Moreover, MLaaS can help manage big data better by collecting huge amounts of data to get insights by correlating the data, crunching numbers and understanding patterns of the data to helps business take quick decisions. As data sources proliferate along with the computing power to process them, going straight to the data is one of the most straightforward ways to quickly gain insights and make predictions (Ten et al., 2005). The combination of these two mainstream technologies yields beneficial outcome for the organizations. Machine learning is heavily recommended for the problems that involve complex learning. However, it is essential to remember that Machine learning is not always an optimal solution to every type of problem. There are certain problems where robust solutions can be developed without using Machine-learning techniques (Jyoti & Goel, 2009).

This chapter will explore the end-to-end process of investigating data through a machine-learning lens from how to extract and identify useful features from the data; some of the most commonly used machine-learning algorithms, to identifying and evaluating the performance of the machine learning algorithms. Section 2 introduces steps for developing suitable machine learning model and various paradigms of machine learning techniques such as supervised, unsupervised and reinforcement learning. Section 3 discusses about various applications of machine learning in various fields and then concludes whole chapter with research insights.

DEVELOPING A MACHINE LEARNING MODEL

As discussed, machine Learning is the field where an agent is said to learn from the experience with respect to some class of tasks and the performance measure P. The task could be answering exams in a particular subject or it could be of diagnosing patients of a specific illness. As shown in the Figure 1 given below, it is
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