Chapter 9
Machine Learning Algorithms

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ABSTRACT

Human intelligence is deeply involved in creating efficient and faster systems that can work independently. Creation of such smart systems requires efficient training algorithms. Thus, the aim of this chapter is to introduce the readers with the concept of machine learning and the commonly employed learning algorithm for developing efficient and intelligent systems. The chapter gives a clear distinction between supervised and unsupervised learning methods. Each algorithm is explained with the help of suitable example to give an insight to the learning process.

INTRODUCTION

Can a person with both his legs amputated still drive a car, or a man with impaired vision can cross a busy road without assistance. The answer to these questions, which once seemed impossible, is in affirmative now. This has become possible due to machine learning. So what is machine learning then? It is a field of science which provides systems the ability to learn and adapt from the environment conditions. Here, the objective is to develop programmed models that can access data and further use them for improving their performance without much human intervention. So

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straight away next question that comes into one's mind how these systems acquire intelligence? So the intelligence is acquired through learning. Learning is a very crucial component in developing an intelligent system. Learning may be supervised or unsupervised. Supervised learning refers to inferring a mapping function between input and output using a set of training data. Later the function can be employed for assessing testing data. Unsupervised learning refers to developing hidden structure in the input data. These learning models can be employed in developing a classifier or a predictor. As an example let us consider a person with impaired vision and he is wearing intelligent goggles while moving on the roads. The intelligent gadget in the form of goggles is continuously monitoring the scenario on the road. Now if the person has to cross the road these goggles would take the input in the form of image and classify whether the road in front of the person is busy or not and would help him in making the decision of whether to cross the road or not. It is often observed that if one has browsed for the flight cost from Delhi to Mumbai two three times on the home page of an air services, and the next time when he logs on to the site, he gets a display of prices offered by various air service provider along with their routes for round trip between Delhi and Mumbai. This is an example of adaptive learning or more specifically, learning from the query. Thus objective is to create intelligent systems that could assist human in the areas where human intelligence has limitation. Lot of researches and investigations are going across the globe to evolve new and better learning methods.

Machine learning is a field of Computer Science which often uses statistical techniques to give computers the ability to learn. It is closely related to artificial intelligence which is enabling computers to perform human-like activities. Machine learning is giving computers the ability to learn without being explicitly getting programmed. Thus, this chapter introduces the reader with commonly employed supervised and unsupervised learning algorithms.

The chapter is organized mainly in four sections: first section deals with the introduction to Machine Learning and how intelligent systems can work for the betterment of life. Second section deals with parametric and nonparametric algorithms. Third section discusses in details the commonly employed supervised learning algorithm with example to assist readers gain an insight towards learning techniques. Fourth section deals with unsupervised learning algorithms example clustering and a priori methods.