

# Chapter 1

## Performance Evaluation of Deep Learning and Machine Learning Techniques for Opinion Mining

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### ABSTRACT

*With the technological developments in the fields of natural language processing (NLP) and opinion mining (OM), many real-time applications are concentrating on analyzing the opinions of the people. The opinions or reviews given by the people through the internet are collected for summarization or classification based on the need. The feature selection typically saves the operating time, eliminates irrelevant features and redundancy. For feature selection, a semantic based feature selection algorithm called information gain (IG) is used. Naive Bayes, bagging, support vector machines (SVM), classification and regression trees (CART), and algorithms along with optimization techniques like ant colony optimization algorithms are used to optimize and classify the opinions. Also, in this chapter, the state-of-the-art machine learning technique, deep learning, is also involved with the convolution neural networks (CNN) algorithm to identify the positive and negative opinions in different fields such as movie reviews, emojis and medical data.*

## **1. INTRODUCTION OF OPINION MINING AND THE ISSUES FACED**

### **1.1 Introduction to Opinion Mining**

A subset of natural language processing (NLP) called opinion mining (OM) is used to monitor public sentiment toward a certain good, service, or subject. Sentiment analysis (SA) is another name for it, and it entails creating a system to gather and analyze opinions and feelings about a product, service, or issue expressed in blog posts, reviews, comments, or tweets. Remarkably, there isn't much confusion among academics and researchers on the distinction between sentiment and opinion, or if the discipline belongs under the umbrella of opinion mining or sentiment analysis. According to Merriam-Webster, an opinion is a perspective or judgment made in the mind about a certain issue, whereas sentiment is defined as an attitude, thinking, or judgment caused by feeling. There is a noticeable difference.

Opinion mining has various applications. For instance, in marketing, it assists in assessing the performance of an advertising campaign or the debut of a new product, ascertains which of several iterations of a good or service is the most well-liked, and even pinpoints the demographics that find certain aspects objectionable or appealing. (Vinodhini & Chandrasekaran 2012).

One area of research that examines people's opinions, feelings, assessments, appraisals, attitudes, and emotions about goods, services, people, groups, problems, occasions, subjects, and their characteristics is called opinion mining. It encompasses a vast array of issues. In addition, it goes by various names and involves quite varied duties. Some of them are affect analysis, emotion analysis, sentiment mining, opinion extraction, subjectivity analysis, sentiment analysis, review mining, and so forth. Nevertheless, sentiment analysis and opinion mining encompass all of them. (Liu 2012).

Opinion mining automates the process of extracting opinions from the internet. Individuals write blog entries, reviews, comments, and tweets about many subjects to share their opinions. It is possible to monitor companies and items on the internet and ascertain whether people have a favorable or negative opinion of them. Sentiment analysis research has focused on several key topics, including opinion summarization, feature-based sentiment classification, and sentiment categorization (Buche et al. 2013).

Facts and opinions are the two types of textual information that are typically referred to from the standpoint of sentiment and opinion mining.

- **Facts:** See the objective descriptions of a product's nature. The majority of studies have focused on factual information extraction, including information retrieval, web searches, and numerous other text mining and natural language processing tasks.
- **Opinions:** Describes attitude, evaluations, and emotional extraction of a good, service, subject, or problem.

Opinion analysis is a relatively recent field of study. Researchers have developed a number of methods up to this point for resolving various issues. These days, sentiment analysis, also known as opinion mining, is a branch of information retrieval (IR) and natural language processing (NLP) that shares some traits with other domains like text mining and information extraction (IE), including extraction, categorization, and concept linking

People, and even companies, are generally curious about other people's opinions. For example, when someone wants to buy a new product or learn more about a topic, they first try to look up reviews online to see what other people think about the product and the topic. Based on these reviews, they decide which

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