

An Optimized Customers Sentiment Analysis Model Using Pastoralist Optimization Algorithm (POA) and Deep Learning

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Abstract—Users usually express their sentiment online which influences purchased products and services. The computational study of people's feelings and thoughts on entities is known as sentiment analysis. The Long Short-Term Memory (LSTM) model is one of the most common deep learning models for solving sentiment analysis problems. However, they possess some drawbacks such as longer training time, more memory for training, easily over fits, and sensitivity to randomly generated parameters. Hence, there is a need to optimize the LSTM parameters for enhanced sentiment analysis. This paper proposes an optimized LSTM approach using a newly developed novel Pastoralist Optimization Algorithm (POA) for enhanced sentiment analysis. The model was used to analyze sentiments of customers retrieved from Amazon product reviews. The performance of the developed POA-LSTM model shows an optimal accuracy, precision, recall and F1 measure of 77.36%, 85.06%, 76.29%, and 80.44% respectively, when compared with LSTM model with 71.62%, 78.26%, 74.23%, and 76.19% respectively. It was also observed that POA with 20 pastoralist population size performs better than other models with 10, 15, 25 and 30 population size.

Keywords—*Sentiment Analysis, Natural Language Processing (NLP), Deep Learning, Pastoralist Optimization Algorithm*

I. INTRODUCTION

In today's world of technology, huge amount of information, data, reviews or opinions are being stored in the websites of social media or e-services in the form of raw data. In other to work with those raw data proper methods are required. A study that describes peoples' opinion concerning products, services and other characteristics is termed sentiment analysis. [1]. Sentiment analysis systematically identifies, quantify, extract and study effective states and subjective information. It is often used in Web, text and data mining, and for information retrieval [24]. Sentiment analysis covers other sciences such as; computer, social and management sciences and so on. In order to analyze sentiments, objects and characteristics, viewpoints holder, and direction are the three terms that are used. Sentiment Analysis involves some challenges such as object recognition, opinion orientation classification, and feature extraction.

Deep Learning (DL), an advanced machine learning model have solved some of the challenges brought about by the lack of vocabulary resources and the improvement of sentiment classification in this field. DL has been successful in solving various challenging problems in the field of artificial intelligence. Despite its success, determining the appropriate layers, number of hidden variables a hidden layer should have, slow training is among the greatest challenge of deep learning [25]. The algorithm has been very successful in solving combinatorial optimization problems and therefore, possess a suitable candidate for optimizing the DL models for sentiment analysis.

In this paper, an optimized sentiment analysis model using deep learning (LSTM) and POA for optimizing the model was proposed. The model will be tested on datasets obtained from social interactions of users. When developed, the, model will improve sentiment analysis tasks by improving the LSTM model and presents opportunity to explore ideas of audience members and study the state of the product from the opposite perspective. This makes sentiment analysis an ideal tool for expanding product analysis and other market and public business analysis.

The rest of the paper is organized as follows: The section II presents the works that are connected to the first. This comprises of sentiment analysis review, deep learning and POA. In section III, the materials and methods required to accomplish the research objectives are presented. Section IV is a presentation of the expected results and in section V, the conclusion is presented.

II. REVIEW OF RELATED WORKS

A. Sentiments Analysis

The research interest in sentiment analysis have grown over the years due to its importance in various sector of life. Sentiments analysis can be classified based on some criteria which include; techniques used, dataset structure and rating level [12]. Figure shows the several categories of sentiment analysis. The various ways in which sentiment analysis can be implemented are;