



International Journal of Innovative Research in Science Engineering and Technology (IJIRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)



Impact Factor: 9.935

Volume 15, Issue 7, July 2026

Cyberbullying Identification using Intelligent Machine Learning Algorithms

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ABSTRACT: Cyberbullying is a growing problem on social media platforms such as Twitter, Facebook, and Instagram. It can cause serious emotional and psychological effects, including stress, anxiety, and depression. Detecting cyberbullying is challenging because social media messages are often short, informal, and contain slang, abbreviations, emojis, and unclear meanings. These factors make it difficult to understand the real intention behind online messages. This project proposes a machine learning-based approach called DEA-RNN for automatic cyberbullying detection. The model combines the Dolphin Echolocation Algorithm (DEA) with an Elman-type Recurrent Neural Network (RNN). DEA is used to optimize the RNN parameters, which improves the learning process and enhances the model's ability to classify tweets accurately. The system processes social media data, extracts useful features, and identifies whether a message is bullying or non-bullying.

KEYWORDS: Cyberbullying Detection, Machine Learning, Deep Learning, RNN, Social Media Analysis, NLP, DEA-RNN.

I. INTRODUCTION

Social media platforms such as Twitter, Facebook, Instagram, and WhatsApp have become important tools for communication and information sharing. Millions of people use these platforms every day to interact with others. However, the increasing use of social media has also led to problems such as cyberbullying. Cyberbullying refers to the use of digital technologies to harass, threaten, insult, or harm individuals online. It can negatively affect a person's mental health, confidence, and overall well-being.

Detecting cyberbullying on social media is a challenging task because online messages often contain slang words, abbreviations, emojis, sarcasm, and informal language. Traditional methods are not always effective in identifying harmful content accurately. Therefore, there is a need for intelligent systems that can automatically detect cyberbullying and help prevent its spread.

II. LITERATURE SURVEY

Jin et al. [1] proposed a Hybrid CNN-LSTM model for sentiment analysis on social media by combining CNN for feature extraction and LSTM for understanding text context, which improved the accuracy of detecting harmful content. Jain et al. [2] presented a systematic review of machine learning techniques used for sentiment analysis and concluded that selecting appropriate algorithms and feature extraction methods improves text classification performance. Fazil and Abulaish [3] developed a hybrid framework for detecting automated spammers on Twitter using content-based, community-based, and interaction-based features, helping to identify malicious users and harmful online activities.

Abulaish and Fazil [4] studied the impact of social bots on online social networks and explained how automated accounts spread harmful content and cyberbullying. They emphasized the need for intelligent machine learning systems to improve online safety. Abulaish et al. [5] conducted a survey on figurative language detection, including sarcasm, irony, and satire, and concluded that advanced Natural Language Processing (NLP) and deep learning models are essential for understanding contextual meaning and improving the accuracy of cyberbullying detection.

III. METHODOLOGY

The proposed system uses Machine Learning and Deep Learning techniques to detect cyberbullying on social media platforms. Initially, tweets and social media posts are collected from online sources. The collected data is pre-processed by removing unwanted symbols, URLs, hashtags, and stop words to improve data quality. After preprocessing, feature extraction techniques such as TF-IDF and Word2Vec are applied to convert textual data into numerical form. These features help identify important patterns and keywords associated with cyberbullying behaviour. The extracted features are then provided to the DEA-RNN model, which combines the Dolphin Echolocation Algorithm (DEA) with a Recurrent Neural Network (RNN). DEA is used to optimize the network parameters, while RNN effectively captures contextual information from text sequences. The system also performs sentiment analysis to understand the emotional tone of user messages. This helps in distinguishing harmful and offensive content from normal conversations. Finally, the trained model classifies social media posts into cyberbullying and non-cyberbullying categories. The proposed approach improves accuracy, reliability, and efficiency in detecting harmful online behaviour.

IV. EXPERIMENTAL RESULTS

The experimental results demonstrate the effectiveness of the proposed DEA-RNN model in detecting cyberbullying on social media platforms. Fig. 1(a) shows the User Registration Page, where new users can create an account. Fig. 1(b) shows the User Login Page used for authentication. Fig. 1(c) shows the Home Page of the system after successful login.

1.



2.



3. (b)

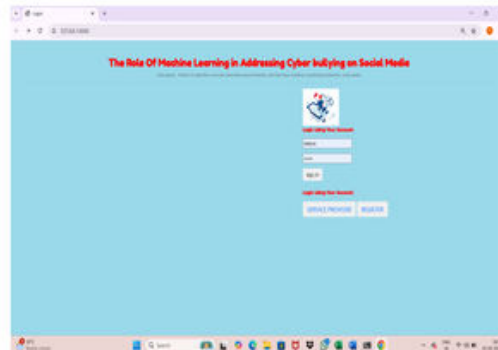
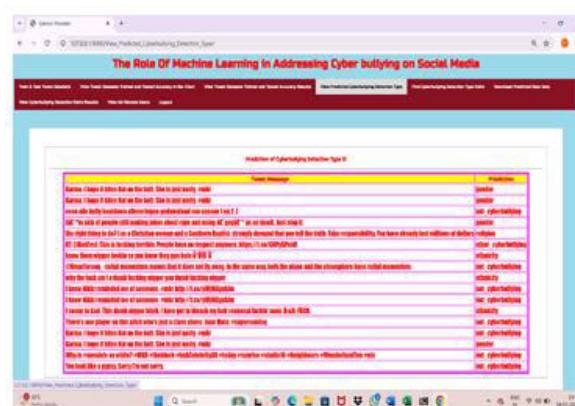
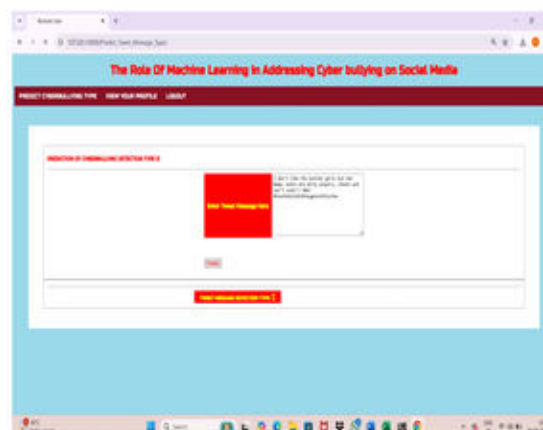


Fig.2. Cyberbullying Detection Results: (a) Prediction of Datasets (b) Prediction Data (c) Predicted Result.

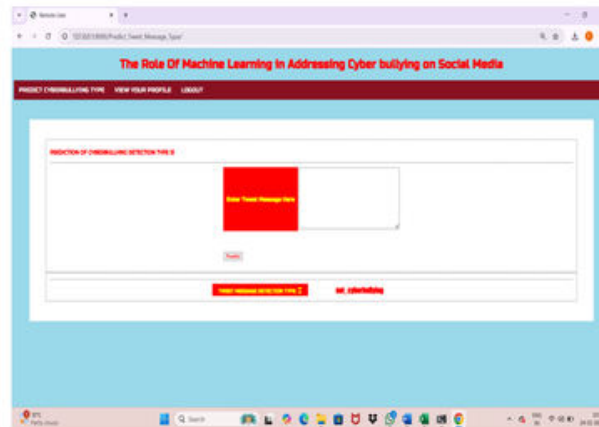
(a)



(b)



(c)



V. CONCLUSION

Cyberbullying has become a major concern on social media platforms due to its negative impact on individuals and online communities. This project presents an effective cyberbullying detection system using Machine Learning and Deep Learning techniques. The proposed DEA-RNN model analyzes social media content and accurately identifies harmful and abusive messages. The system incorporates data preprocessing, feature extraction, sentiment analysis, and classification to improve detection performance. Experimental results demonstrate that the proposed approach achieves high accuracy and efficiently distinguishes cyberbullying content from normal conversations. Thus, the developed system can assist social media platforms in monitoring online interactions and creating a safer digital environment for users.

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