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HYBRID DEEP LEARNING-BASED CYBERBULLYING DETECTION ON TWITTER

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ABSTRACT: The prevalence of cyberbullying (CB) in online entertainment settings is rising. Because social media is so widely used by people of all ages, it is imperative that the platforms be protected from cyberbullying. This paper introduces DEA-RNN, a hybrid deep learning algorithm for Twitter CB detection. Elman-type recurrent neural networks (RNNs) and an enhanced Dolphin Echolocation Algorithm (DEA) are combined in the suggested DEA-RNN model to shorten training times and optimize the parameters of the Elman RNNs. We thoroughly tested DEA-RNN using a dataset of 10,000 tweets and contrasted its results with those of state-of-the-art algorithms including Random Forests (RF), Bi-LSTM, RNN, SVM, and Multinomial Naive Bayes (MNB). The studies' outcomes show that DEA-RNN performed better in every circumstance. It fared better than previously thought-of methods in terms of identifying CB on the Twitter website. With an average accuracy of 90.45%, precision of 89.52, recall of 88.98, F1-score of 89.25, and specificity of 90.94%, DEA-RNN performed better in scenario 3.

Index terms: Cyber bullying, social media, Recurrent Neural Network, Deep Learning.

1. INTRODUCTION

The most popular online social media platforms for people of all ages are Twitter, Instagram, Flickr, and Facebook. These mediums have opened up hitherto unimaginable avenues of communication and connection. But they have also facilitated undesirable activities, such as stalking. As a form of psychological assault, cyberbullying significantly affects popular culture. Bullying is more common among young people (those between the ages of 13 and 24) who use many social media platforms. Facebook and Twitter, among many others, are particularly vulnerable to CB due to the large number of users and the anonymity they provide. A whopping 37% of all Twitter and Facebook abuse originates from children in India. Some fourteen percent of all cases involve this kind of misconduct. Harm to mental health and the onset of more serious problems are possible outcomes of cyberbullying. A suicidal ideation or act may result from the stress, anxiety, and despair brought on by cyberbullying. Therefore, a method must be developed to detect cyberbullying in data stored online, such as posts, tweets, and comments.

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The main focus of this essay is how offensive content is identified by Twitter. Finding tweets that reveal cyberbullying and doing something about it is becoming more crucial since cyberbullying is becoming more common on Twitter. More and more, we need studies on cyberbullying on social media to help us understand the issue and find solutions. Combating Twitter trolls alone is a full-time occupation. Finding instances of cyberbullying in social media posts is also a time-consuming process. For example, tweets often include gifs and emoticons, are brief, and are rife with slang. Therefore, one cannot infer an individual's beliefs or aspirations from their behavior on social media alone. Being subtly cruel, like being sarcastic or passive-aggressive, isn't always easy to spot. Cyberbullying research is ongoing, despite the fact that it can be difficult to detect due to the structure of social media postings.

While some studies have used topic modeling techniques, the majority of Twitter abuse detection studies have focused on categorizing tweets. To differentiate abusive tweets from other types of tweets, supervised ML text categorization algorithms are commonly used. Another usage of deep learning (DL) algorithms is the separation of bullying from non-bullying tweets. Supervised classifiers have a hurdle when class names cannot be changed in response to new information. Methods for topic modeling have traditionally relied on extracting sets' most salient topics in an effort to reveal underlying patterns or classes. There might be a limit to the number of events it can handle if real-time tweets are to blame.

Short texts are particularly challenging for generic, unsupervised topic models, regardless of how similar the ideas may be. Researchers overcame this obstacle by developing unsupervised topic models for brief texts. In order to facilitate subsequent processing, these models extract recurrent concepts from tweets. The use of two-way processing allows these models to obtain valuable information. A large amount of training time is required for these unsupervised models, yet it may not be sufficient to extract useful historical information. To avoid classifier-topic model difficulties and achieve high overall flexibility, it is crucial to create a trustworthy tweet categorization system within these restrictions.

2. LITERATURE SURVEY

"Towards the detection of cyberbullying using social network mining techniques," published in the 2017 Proceedings of the 4th International Conference on Behavioral, Economic, and SocioCultural Computing (BESC-2018), January 2018.

Over the past many years, Internet users have grown more open and forthcoming with their opinions and conversations. However, it appears that social media users are being used.

Cyberbullying is a major social problem and one of the worst things that may happen on the internet. In light of this, and using it as motivation, we need to find techniques to identify instances of social media abuse so that we can stop it. Using methods from data mining and studies of social networks, we examine cyberbullying. The three main components of this method will be examined: phrase matching, opinion mining, and social network analysis. Not only will the

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experimental method be discussed, but the notion itself will be elaborated upon."Supervised machine learning for the detection of troll profiles in the Twitter social network: Application to a real case of cyberbullying," published in 2014 by P. Galán-Garca, J. G. de la Puerta, C. L. Gómez, I. Santos, and P. G. Bringas in 2014.

Thanks to the proliferation of social media and other online anonymizing technologies, people can now browse the web with relative ease. The fact that users can create false identities that are completely unrelated to their actual ones makes it difficult to determine whether a page is genuine. In order to circumvent this, some individuals alter their profiles or use false names, rendering their profiles inaccurate representations of themselves. Then, regardless of whether they are aware of the targets, they release media, reviews, or articles designed to be critical of or denigrate them. Because they may alter the victims' physical environment, virtual attacks might cause physical harm. Finding and linking Twitter bot accounts that spread false information to their real counterparts is demonstrated in this research. To achieve this, we examine the relationships between the characters. We also provide a case research of an actual elementary school that successfully implemented this strategy to combat cyberbullying.In their 2015 paper titled "Collaborative detection of cyberbullying behavior in Twitter data," Mangaonkar, Hayrapetian, and Raje addressed the topic.

The increasing amount of information available to Twitter users is causing more and more problems. One such activity that might have devastating consequences is cyberbullying. This highlights the critical need of monitoring Twitter for instances of cyberbullying, ideally in real time. Finding cyberbullying using the most popular methods requires significant effort and time investment from the searcher. Our approach to detection in this research is based on ideas from collaborative computing. This research presents and analyzes a wide variety of methods for collaborative endeavors.

The detection technique outperforms the solo model in terms of speed and accuracy, according to the preliminary results.

3. PROPOSED SYSTEM

The combination of deep learning and neural networks, DEA-RNN is a method that can automatically spot offensive language in tweets. By merging the Elman RNN with an improved Dolphin Echolocation Algorithm (DEA), the DEA-RNN method allows you to modify the RNN's parameters. Subject models and short phrases evolve over time, but DEA-RNN picks up new topics quickly. When it came to detecting cyberbullying on Twitter, DEA-RNN was the best option. Many additional things also fit this description. The content of the page is summarized here.

Improve performance by creating a more trustworthy DEA optimization model that autonomously modifies RNN parameters. To properly categorize tweets, one should employ the DEA-RNN method, which merges the updated DEA with the Elman-type RNN. We create a new Twitter dataset with cyberbullying-related keywords in order to compare it to DEA-RNN and other methods. Extensive experimental evidence demonstrates that

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the DEA-RNN outperforms competing models in the detection and categorization of tweets, particularly those containing cyberbullying. Improved memory, accuracy, precision, F1 score, and specificity are its hallmarks.

4. IMPLEMENTATION

Service Provider

Access to this section is contingent upon the Service Provider providing a legitimate username and password. In addition to a list of all remote users, he will have access to the following once he logs in: training and testing tweet data sets, predicted data sets, results for the cyberbullying detection ratio, and expected cyberbullying detection type. A bar chart illustrating the accuracy of the Tweet Datasets during training and testing.

View and Authorize Users

Anyone in charge of the system can view the roster of students enrolled in this course. Here, the administrator can verify a user's identity by looking up their name, email, and physical address, and provide them access to the website.

Remote User

This module has n participants. Registration is the first step in any attempt. Users' data is stored in a database following registration. After entering his credentials, he can access his account. Users can check their profiles, forecast cyberbullying, or sign up after logging in.

5. RESULTS AND DISCUSION

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6. CONCLUSION

The primary goal of this paper was to enhance topic models' cyberbullying detection capabilities by creating a dependable mechanism for tweet classification. The DEA RNN is the product of merging the Elman-type RNN with the DEA augmentation. Changing the limits became less of a hassle because of this. A fresh Twitter dataset, filtered for CB catchphrases, was also subjected to the Bi-LSTM, RNN, SVM, RF, and MNB techniques. When it came to memory, specificity, accuracy, and precision, the DEA-RNN was the clear winner in the experimental trials. This exemplifies how DEA modifies the visualization of RNN.

The DEA-RNN model isn't great with additional data beyond the first input, therefore the suggested hybrid model isn't as appealing. Researchers should broaden their scope to include Facebook, Instagram, Flickr, and YouTube in future studies on cyberbullying, since this one only looked at data from Twitter. The use of many data sets to identify cyberbullying will be the subject of future studies. We also neglected to consider users' behavior on the platform, opting instead to concentrate on the content of their tweets. This will be seen in artworks created in the future. The proposed approach identifies instances of cyberbullying by analyzing tweet content. Photos, movies, and audio are among the other forms of material that are currently being studied and could be studied further down the road. Having a searchable and sortable stream of CB texts in real-time would be great as well.

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