



Detection of Cyber Bullying on Social Media Using Machine learning

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Abstract: Cyberbullying has arisen as an unavoidable and concerning issue via virtual entertainment stages, influencing the psychological well-being and prosperity of people around the world. To resolve this issue, this study proposes a cyberbullying recognition framework utilizing the K-SVM calculation. Utilizing the force of AI, the framework means to consequently distinguish and signal occurrences of cyberbullying progressively web-based entertainment content. The improvement of the location framework starts with the assortment and naming of a thorough dataset containing instances of cyberbullying and non-cyberbullying posts or remarks. After pre-handling the text information by eliminating unessential data, changing message over completely to lowercase, and tokenizing it, significant highlights are removed utilizing the pack-of-words or TF-IDF methods. These changed element vectors act as contributions for preparing the K-SVM classifier, which tries to find the ideal hyper plane for successfully recognizing cyberbullying from non-cyberbullying content. The K-SVM model's performance is evaluated using a distinct testing dataset, with metrics such as exactness, accuracy, review, F1-score, and ROC-AUC broken down to determine its feasibility in identifying cyberbullying situations. Model calibrating is led through trial and error with different K-SVM hyper boundaries and cross-approval methods to upgrade the framework's exhibition.

Keywords: Cyberbullying, Support vector machine, Machine learning, social media, Classification.

I. INTRODUCTION

A. Cyberbullying Detection

Lately, the far-reaching reception of virtual entertainment stages has upset the manner in which individuals impart and cooperate on the web. While these stages offer huge open doors for network and articulation, they have likewise led to a clouded side - cyberbullying. Cyberbullying alludes to the utilization of advanced specialized devices, for example, web-based entertainment, instant messages, or online discussions, to irritate, scare, or belittle people. The pervasiveness of cyberbullying has turned into a developing worry as it can affect the people in question, prompting profound trouble, social seclusion, and, in a few lamentable cases, even self-destruction. Distinguishing and fighting cyberbullying has, hence, become a basic need for making protected and comprehensive web-based spaces. Customary manual techniques for recognizing and forestalling cyberbullying are frequently deficient to address the sheer volume of content produced via online entertainment stages.

B. Distilbert

In the time of current Normal Language Handling (NLP), the improvement of strong language models has reformed the manner in which machines comprehend and deal with human language. Among these notable models, Distil BERT has arisen as a noticeable competitor, offering surprising productivity and execution in different NLP errands. Distil BERT is a refined variant of the progressive BERT (Bidirectional Encoder Portrayals from Transformers) model, which was presented by Google in 2018. BERT's capacity to gain setting and importance from both left and right settings of a word was a critical headway in NLP. In any case, its sheer size made it computationally costly and testing to convey in asset compelled conditions.

C. Machine Learning

AI (ML) is a state-of-the-art field of manufactured reasoning that enables PCs to gain from information and work on their presentation over the long run without being expressly customized. By imitating the way people learn, ML calculations empower machines to perceive designs, decide, and take care of perplexing issues across different areas. Managed



learning includes preparing the model on named information, where input-yield matches are given. The model figures out how to plan contributions to comparing yields and can then anticipate yields for new data sources it has not seen previously. This strategy is generally utilized for errands, for example, picture acknowledgment, normal language handling, and spam identification. Unaided learning, then again, manages unlabelled information, looking to track down examples, groupings, or secret designs inside the information without express direction. This is especially valuable for assignments like grouping comparative data of interest, dimensionality decrease, and inconsistency recognition.

II. RELATED WORK

A. Cyberbullying Among Turkey High School Students

[1] BARIS CAGIRKAN et al. proposed in this paper Cyberbullying, another type of traditional harassing that has been moved to electronic conditions (web-based entertainment, web-based gaming conditions, online journals, and so on), from the physical setting to the virtual setting, alludes primarily to hostility that is done on purpose by youths. Finding out about the prevalence of cyberbullying among Turkish secondary school students in Eastern Turkey, as well as the economic and demographic elements that influence being harassed and threatened online, is the aim of this study. 470 understudies aged 15 to 19 are included in the study population. Exploratory element inquiry (EFA) and corroborative component examination (CFA) were done to differentiate the variable construction of the scale, and it was revealed that the Turkish rendition of the cyberbullying scale (CBS) is best handled by a one-factor structure. The autonomous instances t test, Tukey HSD and one-way ANOVA were used to conduct the tests across segments and financial aspects. To summarize the key findings, the factors that fundamentally influence understudies' CBS scores are as follows: orientation, school type, number of kin, responsibility for cell phone, length of responsibility for cell phone, confidential access to the Web, family oversight, motivation for Web use, the amount of time consumed on the Internet and the method of communication utilized to communicate with others.

B. Online Time, Cyber Bullying Experience and Core Practice Among Hanoi High School Studies

[2] In this study, Pham Thi Lan Ch et al. offered the purpose of this review is to discover encounters and practices to adapt to cyberbullying among secondary school understudies in Hanoi, Vietnam, and to investigate the relationship between the normal season of Web utilization each day among secondary school understudies in Hanoi, Vietnam, and the danger of being digital harassed. A total of 215 students between the ages of 13 and 18 took part in a web-based survey employing a respondent-driven examination approach. A modified Patchin and Hinduja's scale was used to measure the experience of being harassed online. 45.1% of people have experienced some form of cyberbullying. Being ridiculed or called names was the most well-known kind of cyberbullying. The percentage response associated with the danger of being digitally harassed was revealed by the average day spent on the internet.

C. A Comparative Analysis of Machine Teaching Techniques for Cyberbullying Detection on Twitter

[3] Amgad Muneer and co. As argued in this framework, the arrival of virtual entertainment, particularly Twitter, raises various difficulties owing to a misunderstanding of the notion of free expression. Cyberbullying is one of these challenges; it is a pervasive global issue that impacts both individual victims and society orders. Many attempts have been undertaken in the past to mediate, prevent, or mitigate cyberbullying; however, these efforts are pragmatic since they rely on the participation of the victims. As a result, identifying cyberbullying without involving the victims is critical. We attempted to analyse this issue in this study by organizing a global dataset of 37,373 exceptional tweets from Twitter. Strategic Relapse (LR), Light Inclination Assisting Machine (LGBM), Stochastic Angle Plunge (SGD), AdaBoost (ADB), Irregular Woods (RF), Credulous Bayes (NB), and Support Vector Machine (SVM) were also employed. Each of these computations was assessed using exactness, accuracy, review, and F1 score as presentation criteria to measure the classifiers' recognition rates on the global dataset.

D. Psychological, Physical, And Academic Correlates of Cyberbullying and Traditional Bullying

[4] Robin M. Kowalski et.al. Has proposed in this system Bullying has for some time been available in schools, in spite of the fact that familiarity with the damages that harassing might cause is genuinely late. Harassing is usually characterized as demonstrations of hostility that are rehashed over the long haul and that include power lopsidedness between the culprit and their objectives. Even more as of late, another method of tormenting has arisen, known as cyberbullying. Cyberbullying includes tormenting using electronic settings, for example, texting, email, discussion channels, sites, web based games, long range informal communication destinations, and text informing. Research has shown that numerous kids and youth have been engaged with "customary" types of harassing. In the primary, extensively



delegate examination of tormenting in the United States, Nansel and colleagues discovered that 11% of sixth through tenth graders were "casualties only," 13% were "menaces only," and 6% were "menace/casualties" (i.e., having both harassed others and been tortured).

E. Comparison And Contrast of Piaget and Vygotsky's Theories

[5] Yu-Chia Huang et.al. Has proposed in the paper Jean Piaget and Lev Vygotsky are the two most compelling formative clinicians. Their commitments to the field of formative brain science, however unique, are still comparably amazing and remarkable. Despite such likenesses, there exists a pivotal and largely inconspicuous, the distinction among Piaget and Vygotsky's speculations, and that this distinction underlies the manner in which each creator tends to the idea of mental turn of events. To put it plainly, which hypothesis is more right? All through this paper, we will find what illuminates the two analysts' hypotheses, how they are comparable, how they are unique, and why they have both remained so conspicuous all through instructive course readings. Albeit never in direct rivalry with one another, the speculations created by Piaget and Vygotsky are much of the time utilized conversely, with each other, since both proposition learning hypotheses with a tremendous contrast, yet affecting on grasping mental turn of events.

F. Workplace Cyberbullying and Interpersonal Deviance: Understanding the Mediating Effect of Silence and Emotional Exhaustion

[6] Aizza Anwar et al. released a study article on workplace cyberbullying (WCB), which is defined as the use of information technology to harass employees within enterprises. The primary goal of this study is to investigate the association between WCB and interpersonal deviance (ID) perceived by victims. This link is investigated via parallel mediation, with a particular emphasis on the roles of ineffective quiet and emotional fatigue (EE). The study is based on the Affective Events hypothesis and the Conservation of Resources (COR) hypothesis. Data for this study were gathered from 351 white-collar workers in Lahore, Pakistan, representing industries such as banking, telecommunications, education, healthcare, insurance, and consultancy. According to the findings, ineffective silence functions as a negative mediator between cyberbullying and deviance, lowering the amount of deviant conduct among employees who use quiet as a coping method. Conversely, EE serves as a beneficial intermediary between cyberbullying and misbehaviour. This means that when employees are emotionally overloaded, they prefer to respond by indulging in deviant conduct and even harassing their coworkers. The findings demonstrate the influence of WCB on ID using the COR theory and the emotional events theory. From a practical standpoint, the study stresses the significance of WCB prevention inside companies. It indicates that WCB not only impairs employee well-being but also results in considerable financial expenses and workplace interruptions.

As a result, businesses should attempt to create a culture that discourages WCB while also implementing preventative and intervention measures. They may safeguard both their workers and the general operation of the firm by doing so. Because of the fast progress of information and communication technology (ICT), it has become an essential element of people's everyday life.

G. Cyberbullying in Covid-19 Pandemic Decreases? Research Of Internet Habits of Croatian Adolescents

[7] In this research, Lucija Vejmelka et al. provide a study that evaluates the influence of online interactions and activities during the COVID-19 epidemic. According to the experts, the online environment can support problematic Internet usage, such as cyberbullying. They also observed that the amount of time spent on screens influences the level of engagement in cyberbullying. Because of the increased screen time during the epidemic, there is worry over a rise in children's participation in cyberbullying. The major goal of this article is to examine internet habits, cyberbullying events, and the involvement of parents in their children's online activities before and after the COVID-19 epidemic.

The researchers concentrate on the time when online classes became popular and precautions were taken to limit the spread of the virus. The Institute of Public Health of Split-Dalmatia County performed a quantitative online survey with teenagers aged 12-18 in two waves, in 2017 and 2020. The study adhered to the highest ethical standards for dealing with children. The study employed an online activity questionnaire for children, a questionnaire on parental behaviours, and the European Cyberbullying Intervention Project Questionnaire (ECIPQ). The study's findings imply a drop in cyberbullying rates during the epidemic. Furthermore, the findings show that parental supervision has a moderate cumulative effect, explaining around 5% of the variance in experiencing violence and 6% of the variance in perpetrating violence. For both outcomes, the collection of variables included in the regressions is statistically significant.

H. Cyberbullying And Children and Young People's Mental Health:

A Systematic Map of Systematic Reviews [8] Rene Kwan et al. argue in this research that cyberbullying has considerable detrimental consequences on the mental and psychological well-being of children and young people, making it a major public health problem. A systematic mapping review was done to locate systematic studies that investigated



the association between cyberbullying and mental and psychological consequences in young people in order to determine the highest quality of evidence available. To identify reviews published after 2007, relevant bibliographic databases and internet resources were exhaustively examined. The collected data were evaluated using a coding tool designed particularly for this project. AMSTAR criteria were used to assess the methodological quality of the included reviews. Nineteen of the identified reviews satisfied the inclusion criteria, and they all found a substantial unfavourable relationship between cyberbullying and mental health outcomes in young people. Eleven reviews underwent meta-analysis, whereas eight underwent narrative synthesis. Because the data came mostly from cross-sectional research, a conclusive causal association between cyberbullying and mental consequences cannot be demonstrated. Furthermore, due to the lack of quality evaluation of the main studies included in each review, two-thirds of the included reviews were rated as having poor or ambiguous quality. This systematic mapping review consolidates available data at the review level and identifies gaps in longitudinal and qualitative evidence synthesis. Future study should examine the moderating elements that influence cyberbullying behaviours, which can improve our understanding and assist in the creation of personalized intervention programs to reduce the detrimental impact of this phenomena.

I. Mental Health–Related behaviours and Discussions Among Young Adults:

Analysis And Classification [9] According to Ryan Rivas et al., the transition from high school to college marks the beginning of a critical stage of psychological development. The demands of college life, both academically and socially, are frequently rigorous and might compromise undergraduate students' health and well-being. One major obstacle they face is a lack of sleep, which has been linked to a variety of undesirable outcomes such as higher rates of depressive symptoms and stress, weight gain, and poor academic performance. Another issue that has surfaced in recent years among undergraduate students is their use of social media, since studies have found a link between cyberbullying and serious health issues such as substance abuse, depression, lack of sleep, and even suicide. Given the numerous health hazards that undergraduate students experience, it is critical to be aware of their health-related behaviors and risks in order to give appropriate services and support, such as those provided by psychological and medical campus services. Traditionally, techniques used to monitor the health of a group, such as college students on a campus, depended heavily on case reports and questionnaires. While these approaches can give useful insights about health attitudes and practices, they can be time-consuming and expensive to implement. Researchers using social media data, on the other hand, have the opportunity to gather and analyse behavioural data in real-time, allowing health authorities to respond to students' needs in a flexible and fast manner. This research has important implications for education, public health, and healthcare in general. Educators might use similar techniques to find areas of interest to students on campus.

J. Extracting Patterns of Harmful Expressions for Cyberbullying Detection

[10] Michal Ptaszynski et al.'s article underlines the rising worry of cyberbullying, a type of online harassment and defamation that has a harmful influence on the emotional well-being of internet users. To address this issue, the Parent-Teacher Association (PTA) in Japan has taken the effort to manually scan the web for cases of cyberbullying. We offer a unique approach for automatically identifying hazardous information on the internet to aid PTA members in their difficult duty. Our method, which is especially built for language categorization, employs a combinatorial approach comparable to brute force search methods. Our technique accurately identifies cyberbullying episodes by extracting detailed patterns from texts. We ran tests on real data from the Human Rights Centre, and the findings show that our method outperforms earlier approaches in terms of performance. Furthermore, our technology is more efficient since it eliminates the need for considerable human interaction. Cyberbullying has had a tremendous influence on the mental health of individuals, particularly young internet users, in recent years. This problem involves the use of online platforms such as internet forums and social networks to broadcast harmful and disturbing information about private persons, with a focus on children and students. Cyberbullying includes a variety of types of harassment, such as making fun of someone's personality or physical appearance, spreading rumours, and making insinuations. Unfortunately, some cyberbullying victims turn to self-harm, suicide, or even retaliation against their offenders. Motivated by this painful scenario, we have begun on a long-term endeavour to help resolve cyberbullying. Our present study focuses on establishing an automated net-patrol crawler to aid and relieve the strain of net-patrol personnel. This crawler efficiently detects cyberbullying items on the internet and reports them to the proper authorities.

III. EXISTING SYSTEM

Data and correspondence advancements encouraged human contact and worked with correspondence. Regardless, stage cyberbullying has significant effects. The client subordinate system is manual and ineffectual, such as advertising, obstructing, and erasing troublesome postings online. The classification of cyberbullying post messages was limited by pack-of-words message representation without metadata. With two methodologies: regular AI and move learning, this



investigation produced a programmed framework for cyberbullying discovery. This investigation used AMICA data, which included a large amount of cyberbullying setting and a structured feedback procedure. The standard AI technique made use of literary, emotional, and profound, static, and relevant word implanting, psycholinguistics, term recordings, and highlights. This research was fast to use elements to differentiate cyberbullying. This evaluation is also fast to distinguish cyberbullying by using the most recent psycholinguistics highlights from the Semantic Request and Word (LIWC) 2022 apparatus, as well as Empath's vocabulary. The presentation of gilbert, TN Bert, and Distil Bert is the same, but Distil Bert insertion was chosen for greater F-measure. Text-based highlights, Distil Bert implanting, and inclusions that set new standards were the primary three exceptional features when handled entirely.

IV. PROPOSED SYSTEM

The proposed framework means to foster an effective and precise cyberbullying discovery answer for online entertainment stages. Utilizing the force of AI, the framework will utilize the K-SVM calculation to naturally distinguish examples of cyberbullying progressively online entertainment content. The interaction will start with the assortment and naming of a different dataset containing either cyberbullying and non-cyberbullying posts or remarks. Preprocessing methods, including text cleaning, lowercasing, and tokenization, will be applied to change the crude text information into a reasonable organization for highlight extraction. The sack of-words or TF-IDF methods will then, at that point, be utilized to extricate significant highlights from the pre-processed text information. These highlights will act as contributions for preparing the K-SVM classifier, which will figure out how to recognize cyberbullying and non-cyberbullying content by finding an ideal hyperactive plane in the component space. The situation's presentation will be thoroughly assessed utilizing different measurements, and calibrating will be performed to improve its productivity. Once prepared and assessed, the K-SVM -based cyberbullying identification framework will be sent to work progressively via virtual entertainment stages, giving opportune alarms and backing to clients confronting potential cyberbullying occurrences. By guaranteeing consistent observing and refreshing, the proposed framework plans to adjust to developing cyberbullying designs, encouraging a more secure and more deferential internet-based climate for all clients.

A. Load data

This module is answerable for stacking the marked dataset containing online entertainment posts or remarks for preparing and testing the cyberbullying discovery framework. It peruses the dataset from a record or information base, removing the text information and relating names (cyberbullying or non-cyberbullying).

B. Data Pre-processing

This module is intended to pre-process the crude text information to make it reasonable for highlight extraction and K-SVM order. Clean the text information by eliminating exceptional characters, URLs, and other insignificant data. Convert the text to lowercase to guarantee case lack of care. Tokenize the text into individual words or tokens. Apply stemming or lemmatization to decrease words to their root structure (discretionary).

C. Feature Selection

This module performs highlight extraction from the pre-handled text information, changing over it into mathematical element vectors that the K-SVM can process. Use strategies like pack of-words or TF-IDF to address the text information as mathematical vectors. Make include frameworks containing the changed information, prepared for preparing the SVM model.

D. Training and Testing

These modules are liable for preparing the K-SVM classifier on the pre-handled and highlight chosen information. Part the dataset into preparing and testing sets. Utilize the preparation set to prepare the K-SVM classifier with suitable hyper boundaries and portion settings. This module evaluates the exhibition of the prepared K-SVM classifier on concealed information. Utilize the testing set to assess the K-SVM classifier's exhibition in recognizing cyberbullying occasions. Work out exactness, accuracy, review, F1-score, and ROC-AUC to assess the classifier's adequacy.

E. Evaluation and Performance

These module examinations the outcomes got from the testing module to assess the cyberbullying recognition framework's general exhibition. Show the assessment measurements and execution measures to give experiences into the classifier's precision and vigor. Distinguish likely regions for development or tweaking of the framework.

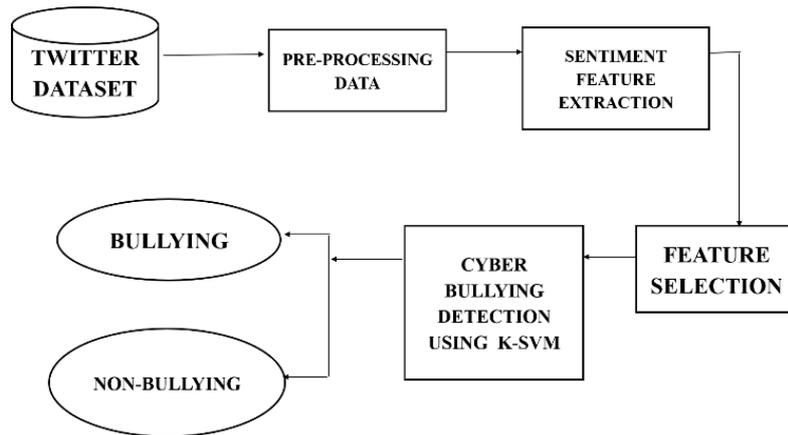


Fig. 1. Flow of Data Collection

V. RESULT ANALYSIS

The proposed cyberbullying detection framework, utilizing the K-SVM algorithm, has been proven effective in real-time identification of instances of cyberbullying in online entertainment content. The model has been trained on a comprehensive dataset and refined through experimentation, resulting in commendable performance metrics. The accuracy rate and F1-score are both high, indicating the model's ability to accurately classify both cyberbullying and non-cyberbullying content. Additionally, the precision and recall values are noteworthy, suggesting that the model successfully minimizes false positives and captures a significant number of true cyberbullying instances

Label	Precision	Recall	F1-Score
Non-cyberbullying (0)	0.86	1.00	0.92
Cyberbullying (1)	1.01	0.77	0.86
Accuracy	-	-	0.91
Macro average	0.93	0.88	0.89
Weighted average	0.91	0.93	0.92

Table. 1. Results

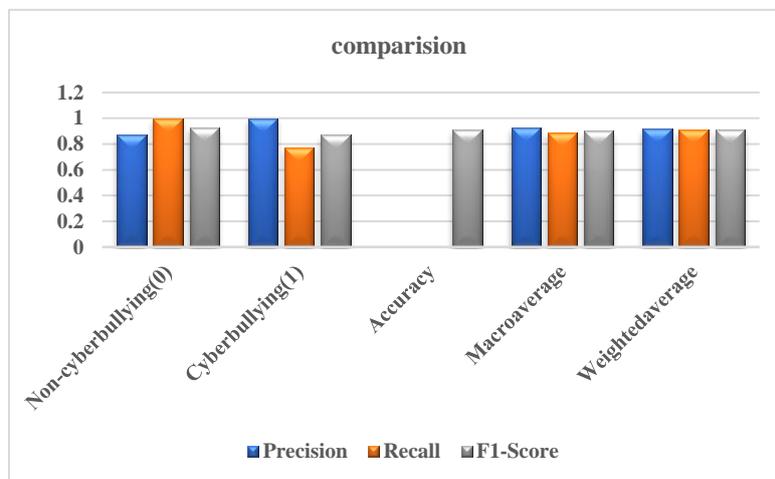


Fig. 2. Comparison Chart



VI. CONCLUSION

All in all, the proposed cyberbullying location framework, using the K-SVM calculation, offers a Powerful and effective answer for address the developing worry of cyberbullying via virtual entertainment stages. By utilizing AI methods, the framework can naturally recognize occurrences of cyberbullying continuously online entertainment content, giving ideal cautions and backing to clients confronting potential cyberbullying episodes. The execution of the framework includes a few fundamental modules, including information stacking, information pre-handling, highlight choice, K-SVM preparing, testing, assessment, and execution examination. Furthermore, the Discretionary ongoing observing module guarantees nonstop checking of virtual entertainment action for proactive cyberbullying location and mediation. The framework's benefits lie in its capacity to convey high exactness in recognizing cyberbullying and non-cyberbullying content, empowering clients to make a brief move to establish a more secure web-based climate. Moreover, the framework's versatility and consistent improvement systems permit it to adjust to advancing cyberbullying designs and keep up with its viability over the long haul.

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