

Cyberbullying Instilled in Social Media



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Abstract In the everchanging world, technology holds up a very big space and is presently infused into almost every sector. And a vast portion of this technological world is influenced by social media. This very impact of social media is not limited within the current boundary of its domination rather it's expanding with each passing day. With this growing influence, although it's playing a significant role into bringing this world in a more closely defined arena, it is also attracting a huge number of illicit activities in the name of cyberbullying and scamming. Holding up with this trend, people are sharing more and more of their personal details which includes personal identity, their bank accounts a lot more. In a nutshell, social media is like an open book into the life of a person which does leave some loopholes open for the people to take advantage and use it in their favor. Accessing this book, these cyber-criminals get to use the precious information and use it for blackmailing and bullying only for the purpose of fulfilling their illicit demands which puts the targeted person on a loosely constructed pedestal. As per statistics, it is responsible for the loss of hundreds and thousands of teenagers every year as they suffer from insecurity and stress due to the fear of their personal or private data being leaked. Machine Intelligence plays a key part in mitigating the concept of cyberbullying in social media with respect to personal details and statements given by the users. Several machine learning techniques have been utilized and researched for the same and this chapter focuses on highlighting all the procedures currently used to limit cyberbullying in this area.

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1 Introduction

Social Media is the at the pinnacle of the success achieved in the field of technology and science. Connecting the people miles apart from across the world in one single platform that allows the user base to share information in the visual, text and audio format is no less than a fiction if narrated to someone from the 1900s. Every success has its own share of downsides as well and so is the scenario with the evolving technological based world. Cyberbullying is at a constant rise and it is at an uphill with the passing of time and the evolution of this virtual mini world [1]. Several hundreds of papers have already been published illustrating the role of social media as a tool of making the lives of people across the world easier, simpler and richer and side by side highlighting its fair share of drawbacks. And when the topic of concern is social media, the keyword “Cyberbullying” is also not alien to us. Although this paper is also going to shed light on the usage and snags of social media, its main pivot would be to exemplify how machine learning has been a key tool in confronting cyberbullying by a large margin and how crucially it has been used utilized in bringing down the iniquitous and wicked cases of bullying happening online alongside unveiling the monstrous personalities behind the scenes [2]. At this stage it is very crucial to pinpoint the issue of cyberbullying and the ways of dealing as with the onset of the COVID-19 with the rise of covid cases across the world, there has been a sheer peek rises in cases of cyberbullying across the different social media platforms. Just after the restrictions implemented during the COVID-19 period, cyberbullying has increased by 70% in just a few months, according to the LIght, a group that monitors online harassment. According to recent studies, while school bullying drastically decreased during the COVID-19 pandemic, cyberbullying remained quite steady. Thus, Cyberbullying is a phenomenon which is going in hands to hands with the evolution of technology and which is increasing every then and now with the rise of greater dependency on social media platforms. Mentionable is that although with the advent of technology, criminal cases based on online increased drastically, several tools to counter these cases of harassments, crime and threat also showed up which did wonders in attenuating cyberbullying and striking a fear across the hearts of the bullies sitting behind their computers with a mask on. Machine Learning has helped dealing with this huge influx of cyberbullying by creating models of algorithm which assists the developers in filtering out the troll profiles, predicting future cyberattacks, locate and spot the bully and bringing the victim to justice.

This chapter is assembled in an order where Sect. 2 describes what Cyberbullying is followed by Sect. 3 which talks about the influx of Cyberbullying mainly during the pandemic. Section 4 provides an introduction to who these bullies are and how do they end up indulging themselves in cyberbullying. Section 5 states regarding the impact of cyberbullying on the victims and how their life gets affected due to it. Section 6 is divided into 3 sub branches where we introduce machine learning, talk about the types of machine learning in Sect. 6.1, followed by the impact and use of machine learning in Sect. 6.2 eventually followed by how machine learning models are assisting in combating cyberbullying in Sect. 6.3.

2 Cyberbullying

Bullying that is committed across online platforms is known as cyberbullying. Social media, services based on texting and gaming platforms are all potential venues for cyberbullying to take place. It is a pattern of behavior mainly targeted to bully, terrify, mortify and infuriate the victims solely earmarked on the basis of selfish personal reasons. This sort of bullying sometimes coexists both in public and online as well. However, it is mentionable that cyberbullying does leave a digital trail behind which is basically a record that can be informative, handy and may offer practical proof to put an end to the abuse [3]. It has been a while since cyberbullying has been a constant part of the virtual world on which teenagers spend most of their time on. On whichever platforms there is a presence of even a mild amount of audience, cyberbullying makes it base and puts a footnote of its trace be it gaming industry, social media platforms or different blog sites. Online harassment doesn't only include threats, abuse and blackmails committed over texts, but it also includes using a false identity to send salacious messages to others on that person's behalf, body shaming next to the comment sections of the pictures posted online etc. [3]. Even though cyberbullying has been prevalent for a long while, the pandemic has made the conditions worse. Barreto attested that teens' greater reach of access to the Internet along with newer electronic gadgets and feasibly lax online activity monitoring are all contributing factors contributing to the rise in cyberbullying. She also concluded, "Within the discipline of psychology, the study has varied on its viewpoint on the link and interaction between cyberbullying and traditional bullying. Because cyberbullies can remain anonymous, bullying can happen at any time. This makes cyberbullying a potentially greater and more dangerous kind of hostility than the regular traditional bullying [4].

3 Upsurge in Cyberbullying

From the start of the pandemic in the year of 2020, as the classes conducted in the educational institutions shifted online, the rise in the cases of cyber bullying exponentially surged. As the daily activities which were on a perpetual basis regulated offline, a sudden shift in their administration being done online set a whole new path for bullying to make its own new pavement. Not only educational affairs but the civil, commercial, healthcare activities also made their new base on the virtual peripheral. And in the recent scenario of sudden shift online, it was observed that the students who are prone to bullying are more likely to indulge themselves in cyber bullying. A rigorous strenuous torment on these teenagers enrages them to seek out vengeance motivated by their constant need of approval which they fail to receive in person. So, rather they choose to sit in front of computers wearing mask hidden from the world with an aim to look for reprisal as a retort to the constant bullying they received which goes on feeding their due ego. As per school counselor

Anna Weddington, the pandemic along with the increased remote activities has made more room for an increase in cyberbullying cases. Due to the movement of social groups from the offline to the virtual platform, the students sometimes come across communicating with people who are total strangers to them who they don't see in person on a daily basis nor they have any picture to prove the identity or the camera on. So these social media platforms opens a pathway for these bullies to get access to certain pictures of the users posted online and some website links of which these bullies make an illicit use and even before the victims come to contemplate the situation of what's going to happen, they already get themselves prone to dangerous circumstances [5].

Speaking about the virtual platforms, Zoom has already come under the hit list for the neoteric disruption of random strangers who went on hacking virtual business meetings with indecent and despicable words. A record number of reports were received by the New York City DOE that documented the abuse and security breach across the Zoom platform by innumerable clients which resulted in DOE taking away the permission for the usage of Zoom. Boredom during the pandemic situation while residing at home also fueled up many teenagers to engage themselves in some sort of bullying. They took this up as a sort of entertainment. There were also reports as per the parents of Asian American children who disclosed instances of their kids being mistreated on the basis of their skin color and race and looking down upon the Chinese kids referring to the origin of virus to China calling it as "The China Virus" or "The Asian Virus". Attacks on them also surged as the news of the virus being called the China virus circulated online. The more this sort of news circulated, the more Asian kids became victim to the new attacks. There was also an efflux of tweets and posts targeting Asian kids demanding a ban upon them which affected the emotional and mental health scenario of these Asian kids sidelining them to long lasting depression [6].

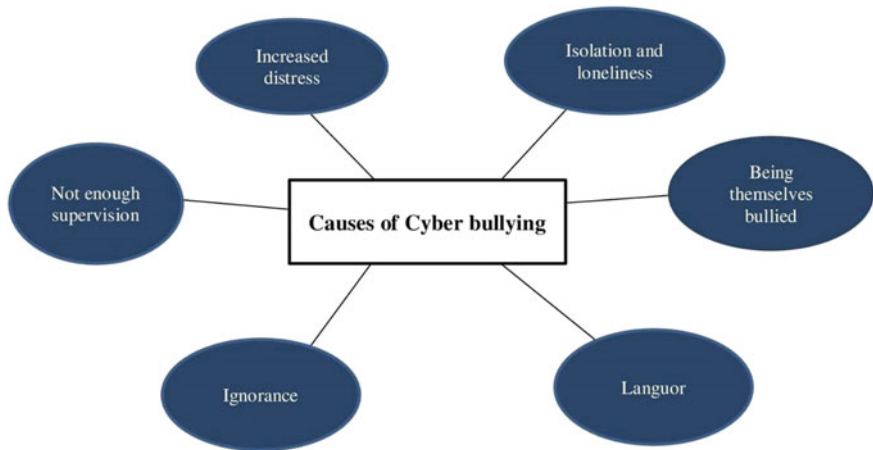
According to Center for Disease Control (2017), 20.2% of the high school students are bullied on school property and a whopping 15.5% of them are the victims of cyberbullying [7]. The percentage of individuals experiencing cyberbullying at some point of time in their lifetime have almost doubled from 18 to 34% from the period of 2007–2016 which is on a constant increase as the years go by [2].

4 Who Are These Bullies and What Causes Them to Get into Cyberbullying?

- **Increased distress:** Increased schoolwork pressure, social pressure, family pressure stresses some teenagers up and to release their stress, they end up indulging themselves in activities ending up harming others.
- **Isolation and Loneliness:** Often times, many teenagers suffer from problems of isolation and depression. Some do not feel close to family members at home, others have deteriorating bonds within close friends' group and some have dating

issues. To cope up with these, these teenagers end up lashing out their anger by getting themselves involved in cyberbullying.

- **Not enough supervision:** A number of parents are not able to look after their kids due to their increased work pressure. So, these kids not getting the due attention from their guardian end up wallowing in these activities out of curiosity and improper supervision.
- **Ignorance:** Some of the teenagers feel outcasted and isolated from certain friend groups which motivates them to seek revenge through the means of threatening and frightening other people online.
- **Being themselves bullied:** Number of cyberbullies are themselves victim of intense bullying in school premises. Not being able to stand against them publicly, they sort out other ways to seek vengeance and to malign and disparage the bullies so they look up after social media platforms in order to frighten the bullies thus earning the title of cyberbullies themselves.
- **Languor:** Boredom and a monotonous routine is one of another factors which motivates some teenagers to yield to their temptations and curiosity of exploring and scaring off other people. They do it out of entertainment purpose not knowing its far reaching effects on the other side of the computer.



5 Impact of Cyberbullying

With time, Cyberbullying has become an international health concern. Profusion of correlational studies have shown that there is a direct connection of cyberbullying with the mental and emotional health of teenagers. Smallest of the things help teenagers carving their future but in the same mannerism, these things can break them down and push them into an everlasting haunted future. This is the reason why bullying but mainly cyberbullying can be such a threat to the life of these adolescents

[8]. According to Anna Weddington who is a school counselor at Anderson Elementary in New Hanover County, Cyberbullying has some long-term effects which is not only limited to breaking their self esteem but is also linked to altering their overall viewpoint of approaching different relationships and can negatively switch their idea of the world being a safe place for them. She also proclaimed that bullying of this sort creates a certain kind of negative friction among a group of friends and the victims tend to perceive themselves isolated and an outcast. It creates a sense of trepidation and unease for them to visiting school so they end up going to the premise with the horror of being made fun again or being ostracized by those online bullies. This results in their overall grades dropping and affects not only their institutional life but creates a change in their eating, communicating and sleeping patterns as well [5].

6 Machine Learning

Machine Learning is a branch of Artificial Intelligence and Computer Science that mainly anchors on the usage of data and algorithms to predict and imitate the way humans learn with a view to increasing its accuracy. It allows software applications to become more accurate at predicting outcomes without being actually programmed to do so, rather by estimation with the assistance of data and algorithms [9, 10].

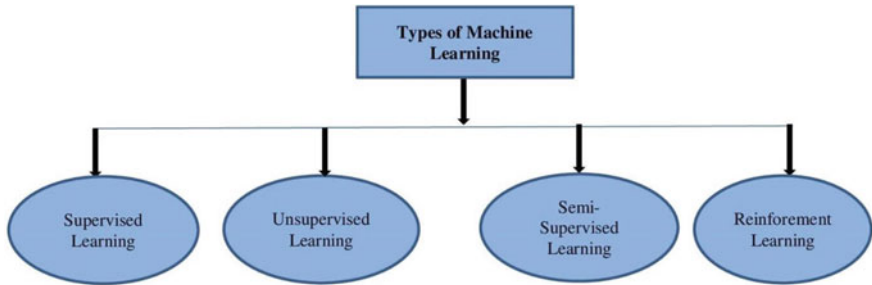
Machine Learning, a revolutionary part of Artificial Intelligence is a significant tool whose usage is drastically increasing with the passage of time. It not only predicts the overall trends applying algorithms but rather also gives enterprises and organizations the scope to dig out customer behavior and patterns of operation. It also supports the booming of new products and services targeted on customer interests and similar sort of patterns. Most of the renowned companies around the world be it Facebook, Google, Amazon, Alibaba, Microsoft, Uber, Netflix, Amazon Prime etc. have made Machine Learning a pivot of their main operations and all their activities are centered around the data retrieved through the application of machine learning. It has surged out as a very significant differentiator in case of competition between commercial organizations in terms of extracting profits [9, 10].

The usage of machine learning is frequent, perennial and quotidian in most of the technologies and applications we use. One of the most common examples is Recommendation Engines. Other common uses of MI include spam filtering, fraud detection, business process automation (BPA), malware threat detection etc.

Mostly, technological advancements based out of storage and processing power have advanced the surge of smart tools carried out solely on the dependency of Machine Learning. Netflix's recommendation engine is one example associated to it. Other than that, Tesla, the electric car company of the Richest person in the world, Elon Musk derives its self-driving capability solely by its dependency on statistical methods and algorithms. These statistical methods and algorithms help uncovering key insights which aids in recognizing patterns [9, 10].

6.1 Types of Machine Learning

Machine Learning is mainly categorized on the basis of how an algorithm works, approaches on recognizing patterns and making predictions. It is classified into 4 categories namely supervised learning, unsupervised learning, semi-supervised learning and reinforcement learning. The type of algorithm which have to be used is chosen by the data scientists based on the kind of data they want to predict [9].



Supervised Learning: The type of data in which both the input and output is specified is known as Supervised learning. In this category of machine learning, the algorithm is supplied with labeled data and the variables are also defined. The output is already predetermined in this type of machine learning [9].

Unsupervised learning: The type of data in which the input and output is not clearly specified is known as unsupervised learning. In this scenario, the output is not predetermined and the algorithm is trained on data which is not labeled. Instead, in this type of machine learning the algorithm sorts out and scans through data to look for meaningful connections and patterns [9].

Semi-supervised learning: Semi supervised learning is a type of machine learning which is an amalgamation of both supervised and unsupervised learning. The algorithm can be infused by the data scientists which is mainly labeled training data but in this aspect of machine learning, the model has the freedom to choose and develop its own contemplation of the data itself [9].

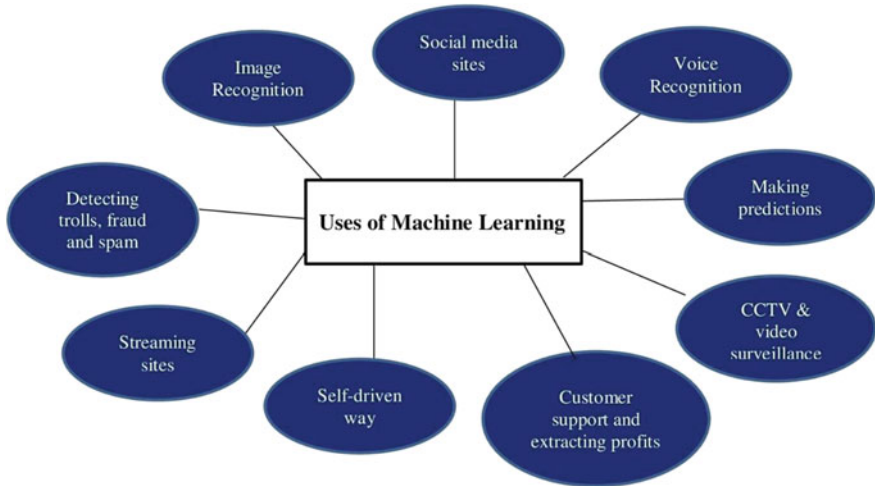
Reinforcement learning: Reinforcement learning is a type of machine learning in which the machine has to complete a step-by-step process in order to get the task done obliging to a certain set of rules. The algorithm is programmed to complete a task and it's given a list of positive and negative cues based on which the machine conducts the task. The process which will be followed to accomplish the task is mostly decided by the algorithm itself [9].

6.2 *Uses and Impacts of Machine Learning*

Knowingly or unknowingly, the use of machine learning technology has been injected into most of the things we do in our everyday life and most of the software applications we use. Starting from the mega mammoth companies to smallest of companies in nook corners of the world, machine learning models has been implemented in every sort of chore to filter out suspicious activities and extract profits by understanding customer interests. Starting from social media platforms, automobile industries, mobile phone industries, gaming industries, transport to commercial services, every industry is making use of machine learning tools in this decade and its operation is only at a peek rise. Some of the common most uses of machine learning are described below:

- **Image Recognition:** The feature of image recognition itself is developed and shape using machine learning. With the usage of machine learning, image recognition technology was made possible which is able to predict output for each pixel in an image. Face lock in cellphones, face scan in airports are some of the examples of it [11].
- **Social Media Sites:** Giant social networking sites starting from Facebook, Instagram, Twitter, Snapchat all of them are making use of machine learning technology for improving search suggestions and recommendations. Various product advertisements are also done predicting the areas of interests of the user, thus carving a better-looking news feed [11].
- **Voice Recognition:** Voice recognition is now part of most of the smart devices being developed be it mobile phones, personal computers, tablets or smart TVs. This technology helps extracting data faster just by supplying voice input. Alexa, Siri etc. all are the fruits of this machine learning technology [11].
- **Making Predictions:** Video predictions on YouTube, product advertisements across newsfeed, movie and series prediction in Netflix and Amazon prime by sorting out a pattern applying algorithms and scanning the due data is part of machine learning as well [11].
- **CCTV and Video Surveillance:** CCTV cameras are across every nook and corner of the world. The technology detecting slight suspicious movements in the activities of a suspect, finding out criminals passing through places and detecting their previous track records matching with the facial muscles of the person is all an accomplishment of machine learning [11].
- **For customer support and extracting profits:** Companies are now making use of machine learning to extract data regarding customer interests and making predictions on their likings and disliking for a specific product are monitored closely using this technology. This helps the companies and organizations to make better suggestions across websites to the customers which is also a plus point for these companies financially [11].
- **Self-Driven Cars:** Self driven cars like Tesla are making use of machine learning to analyze and detect traffic, pedestrians, sharp turns, objects in road, animals etc. for better self-driving experience [11].

- **Streaming Sites:** Streaming sites like Netflix, Amazon Prime make the use of these platforms for the clients swift and easier by taking feedbacks, detecting and contemplating the patterns of choices of each client to suggest better movies and dramas in future [11].
- **Detecting trolls, fraud and spam:** Detecting trolls, fake ids, bullies, spam messages and filtering them out have been easier since the advent of machine learning technology thus bringing down cyberbullying and cyberstalking by bounds [11].



6.3 Utilization of Machine Learning in Combating Cyberbullying

The methods stated beneath are varieties of machine learning models implemented to counter and detect cyberbullying under various circumstances. These models of machine learning are already in use across the world and are a key factor in combating cyberbullying and bringing its negative aspects down by a large margin. The methods mentioned here mostly work on the basis of classification where the messages are distinctly judged and classified as a part of cyberbullying or not. The models mainly include the specialized configuration of language features in respect to supervised learning. These are designed incorporating specifically targeted features based on the topics which are known as being prone and common most scenarios to bullying. Rest of the features used are static, social structure features, features which are based on the association rule techniques, sentiment features and vulgar language expansion using string similarity. Machine learning has been applied into different contexts to extract the base concept behind bullying across online platforms. The data available in the virtual world is scanned and the posts, tweets where the victims or other audience talk about their personal experiences are looked after and carefully

studied to detect the similar sorts of pattern across platforms for finding out matched traces of cyberbullying. These machine learning models help in scrutinizing and inspecting various psychological issues surrounding the motive and conceptualization regarding bullying. These documentations achieved through the application of machine learning tools contribute in yielding new insights on contemplating the root of cyberbullying and figuring out new features to detect its presence [12–22]

- A proposed method keeps on learning new language indicators which is repetitive and acts as a pattern of bully performed by prevailing bullies across platforms. It is related to query expansion to seek out information retrieval. The whole focus of query expansion is to propound a set of keywords which are correlated and are used on a repeated basis. A number of approaches are used in this regard [23]. For instances,
 - Mahendiran et al. [24] introduced a method solely on the basis of probabilistic soft logic to outgrow a glossary which uses more than one indicators.
 - Massoudi et al. [25] put forward a method which uses temporal information along with co-occurrence with a goal of expanding the query.
 - Another statistical language model was established with an aim of query expansion introduced by Lavrenko et al. [26].

This approach is based on the idea of providing weak indicators of varieties of forms of cyberbullying which includes specific vocabulary used in messages involving cases of bullying. The algorithm then generalizes from these weak indicators to detect possible instances of bullying across the scanned data. The commonest form of vocabulary used by the bullies are discovered by the algorithm which extracts new vocabulary of those involved in bullying. This feedback loop then iterates repeatedly until the algorithm succeeds sorting out a constant score set of scores based on how much the model regards each user to be a bully.

- In tackling the snags of email-based cyberstalking, a model has been developed which includes machine learning, statistical analysis, email forensics and text mining in order to detect and tackle cyberstalking prevailing across emails. This sort of monitoring system framework works on the criteria that it is able to detect and filter cyberstalking mails. It not only verifies and tries to evaluate the issue with the anonymous message but also reevaluates and tries to locate the address of the stalker and extracts necessary information relating to the source. This framework is not only limited to the filtering of these spam mails but rather it enables in manual email evidence collection which assists the authorities to investigate and locate the stalker in order to continue legal proceedings against these bullies [27, 28].
- Of all the social media sites, the platform with the greatest number of cyberbullying cases is Instagram. The most popular social networking site with a large user base only next to Twitter and Facebook faces a tremendous number of issues regarding cyberbullying. Be it spam texts or spam comments under the pictures, the bots and the spam IDs are prevalent on a very large scale. Based on the recent survey published by the anti-bullying charity Ditch the Label reviewed that 42% of the

youth among 10,000 people within a age group of 12–25 found Instagram to be the platform where they were victims of cyberbullying the most. Next comes Facebook at 37% and Twitter at 9%. On a mission to combat this big prevailing phenomenon, Instagram became the first social media platform to make use of machine learning as a tool to eliminate abusive language across its platform. To counter this issue, Instagram announced their strategy of integrating machine learning algorithm to detect the potential cyberbullies, block and eliminate them from the platform. It is making use of DeepText which is the identical machine learning algorithm used by Facebook in the June of 2016 in order to combat their share of cyberbullying concerns. DeepText is a sort of deep learning-based text understanding engine which is able to contemplate thousands of posts per second with near human level accuracy [29]. It makes use of word embeddings to assist the model to understand the distinct way in which the humans make use of language. Its framework is based on functioning like a human brain using deductive reasoning to understand sentences used in varying contexts [29]. Using this algorithm enabled Instagram to cut down its bots, internet trolls with an aim to gain followers or selling their products and other suspected fake ids posting spam comments or hateful texts [29].

- Apart from DeepText, Instagram is also utilizing machine learning for text and image recognition. It is highly assisting the developers of the platform to detect bullying in any sort of mannerism be it video, photo or caption. Instagram also introduced the “bullying filter” to conceal abusive comments. Apart from this making use of the machine learning algorithm the platform can now scan for threats against the user base appearing in posted photos [30].
- Another model of machine learning which is developed and is use in the current world scenario behind which the main idea is that each of all trolling profiles are directly or indirectly followed up by the real profile of the bully hiding behind the trolling one. This estimation is based upon the fact that every troller wants to stay up to date regarding the activities that surrounds his/her fake profile. It is possible to establish a correlation between the characteristic text, structure of sentence making, a repetitive method or idea behind the tweet by utilizing this machine learning technology. Twitter is already making use of this very technology to filter out, differ and seek out the fake profile, correlating this fake profile with the real profile of the user and hunting them down. This technology also scans through the text and content, tries to find existing similarities between the targeted abusive or bully content with the same characteristics shared which are tweeted by the other distinct profile of the user. It is very evident that the troller may change his/her writing style but making co-relations and connecting the dots among the different characteristics shared by the user profile, the followers and the following they share, the tweets they like etc. helps the algorithm to create connections and detect the bully. The preferred time of tweeting or messaging is also another significant point that helps in figuring out the troll and so does help the language and geolocation. Finally, the device through which they usually put out the tweet i.e., their favorite twitter client be it computer, mobile phone or tablet helps create and understand the pattern of the troller [31].

7 Conclusion

Cyberbullying has been on a constant rise since the advent of technology. And with the influx of the usage of social networking sites among the teenagers, it has been on an uphill. The teenagers are the one who are the most vulnerable to online bullying. These bullies themselves are also teenagers from the same schools and colleges as of their victims and sometimes they are complete strangers unknown to the victim. So, cyberbullying can be specific or it can be randomly carried out just for the fun of teasing or frightening the strangers. Although the new products and models designed and developed utilizing machine learning algorithms are succoring detecting the troll and bully profiles, filtering them out and make these popular social networking sites free of bullies and less hateful, there is still a long way to go. None of the popular social platforms are 100% free of trolls and bullies, rather they are still far from it. But with the pace we are marching towards the future technologies and as new machine learning models are being implemented every passing day, the future is not afar where we will be rewarded with these sites free of any sorts of bullies and abuse. The process is hard and the threshold is very high, but it is quite clear that machine learning has made the job facile and brought down the threshold by a wide margin.

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