Reporting and Counselling of Cybercrime using Intelligent Chatbot and Geolocation

Rushabh Mehta[1], Deep Gosalia[2], Devesh Surve[3], Vivek Gawande[4]

[1,2,3,4]*Student, Dept. of Computer Engineering, Shah and Anchor Kutchhi Engineering College, Mumbai, India*

Abstract: Cybercrime is still a huge issue in India. Even today, once a cybercrime happens, there is no easy way to report it to the concerned authorities. The current procedure of reporting cybercrime is to send an email to the cyber cell near your location regarding what kind of crime happened, when it happened, and other details followed by sending proof via mail. There is no way to check the current status of the complaint or to physically visit the Cyber cell. We strive to build a system/application in which one can report cybercrime systematically and easily which would also help in the management of the reported complaints. This system would also drastically reduce the response time from the Investigating Department once a complaint is submitted. Such a system is the need of the hour with the increasing number of cyberbullying cases.

Keywords: Cybercrime, Cyberbullying, Reporting, Geolocation, Chatbot.

1. Introduction

Cybercrime in India has been evolving rapidly in the 21st century. The Information Technology Act, 2000, passed by the Parliament of India in May 2000, had aimed to curb cybercrimes and to provide a legal framework for e-commerce transactions. In 2001, India and United States had set up an India-US cyber security forum as part of a counter-terrorism dialogue. Cybercrime cases in India, registered under the IT Act, increased at a rate of 300 percent between 2011 and 2014. With the number of Internet subscribers increasing rapidly, the threat of cybercrime becomes even more potent. In 2015, there were 11,592 cases of cybercrime registered in India. These however, accounted for only for a fraction of total cybercrimes committed. The main reason for which was the fact that there is no awareness regarding how to report a cybercrime among the masses. A lot of cybercrimes go unreported due to the lack of knowledge about cybercrime and cyber security and the lack of a proper infrastructure for an easy and hassle free way for the end user to report cybercrime.

2. Literature review

A. Delivering cognitive behavior therapy to young adults with symptoms of depression and anxiety

Here, the Authors have developed a chatbot, namely, Woebot which is an automated conversational agent designed to deliver CBT in the format of brief, daily conversations and mood tracking. We can say here that conversational agents appear to be a feasible, engaging, and effective way to deliver Cognitive Behavioral Therapy (CBT).

B. Designing module E-complaint system based on geotagging and geofencing

This report makes the use of GPS (Global Positioning System) sensor available in cellular phones to determine the location of the user. The complaint is automatically assigned to the nearest cell based using geofencing. GPS determines one's position based on signals received from the satellite smartphone. In other words, the satellite transmits the signal identifier, position and timestamp of the device to the Cyber Cell. Using GPS, the public can provide coordinates where problems related to public service place. Based on the location of complaint, Cyber cell will be assigned.

C. End user cybercrime reporting

Here, the authors have reviewed various relevant literatures, which predominantly focus on the reasons that contribute to the underreporting of cybercrimes. Cybercrime reporting is crucial because it can provide a multitude of data such as the prevalence of cybercrimes, the types and nature of the cybercrimes present, and the various resulting types of loss or harm (e.g., financial, psychological, emotional).

D. A survey of cybercrime in India

This paper presents a brief overview of cyber criminals and crime with its evolution, types, case study, preventive measures and the department working to combat this crime.

E. The Application of Levenshtein's algorithm in the examination of the question bank similarity

To solve the problem of fake complaints we use Levenshtein's algorithm to compare the current complaint with the previous one. This paper presents the application of Levenshtein's algorithm in the examination of the question bank similarity.

F. Impacts of cyberbullying to today's generation

Here the authors aimed to examine the impact of cyberbullying in the 21st century generation, how social media and technology contributes to rising cases of cyberbullying. The paper concludes that it is real that rapid growth of technology is affecting youth of today and on the form of cyberbullying the cases are raising daily. The survey reflected that people are

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275

being harassed and get affected emotionally, physically and socially. The study revealed that campaigns should be regularly made to make internet users aware cyber bullies and to educate them on ways to safely use the internet in order to avoid being followed and hacked by bullies.

3. Proposed system

A. Objectives

- Create an application for hassle-free reporting of cybercrimes.
- Provide a way to register complaints, upload proof and provide details about the incident.
- Provide counselling to the victim using an Intelligent Chatbot.
- Automatically assign the complaint to the nearest cyber cell based on the user's location.

B. Methodology used

"CyberGuard" uses an object-oriented approach in its implementation. We have used the Ionic Framework for the implementation of this application. Each page of the application is a separate class which contains its own variables, data, and methods. Each class has its own template and stylesheet for structuring and styling the page. The application is divided into multiple classes and they are integrated together in a single module.

We have also used Angular Service providers which abstract various functionality like connecting to the database, camera plugins, etc. This increased code reusability throughout our application. We have also made use of various API's and plugins for different functionalities such as phone verification, geolocation, mail service, text to speech, and speech to text.

4. System overview

The application was built using the Ionic Framework and Firebase tools like Fire store for database, authentication for login and registration. We have also used speech to text and text to speech for voice based login and registration of complaints. The virtual assistant was implemented using Google's Dialog Flow API which was trained to answer basic user queries on cybercrime.
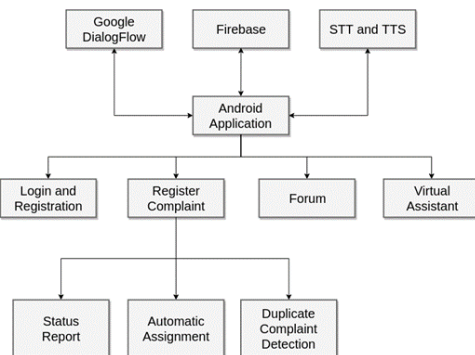

Fig. 1.   Architecture Diagram of our system

5. Implementation

A. Register/login using text to speech and verification using OTP

For the disabled people using our application, we've added an interactive way of logging into our application. The application asks the user whether he/she needs voice assistance. If the user says "Yes" then the application prompts the user to speak one of the following options: "1. Login, 2. Register, 3. Emergency Call". The user can accordingly login to our application using Voice.
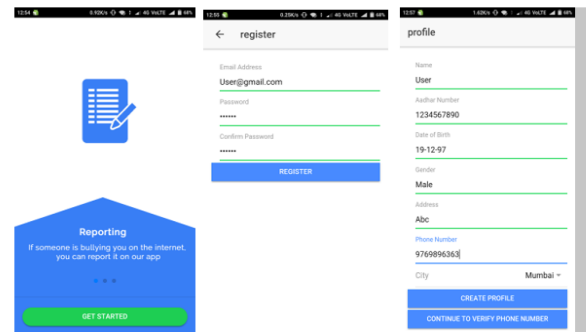

Fig. 2. Register/Login

B. Complaint registration

The user registers a complaint by selecting the type of complaint from the given options or entering it in case the type isn't found. He/She then uploads proof regarding the incident. The uploaded proof can be of multiple types such as audio, video, images, links, and a description of the complaint which can even be entered via speaking into the phone.
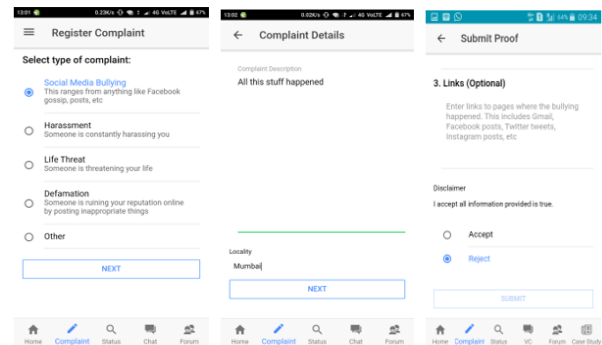

Fig. 3. Compliant registration

C. Status report

Once the complaint is submitted, it is verified by the investigator. If the complaint is found to be genuine then a summary report containing the description, the uploaded proofs, details of the investigator assigned to it and the status of the complaint is generated. This will help the user keep a track of the progress of the complaint. The user is also given an option to chat with the investigator in our application.
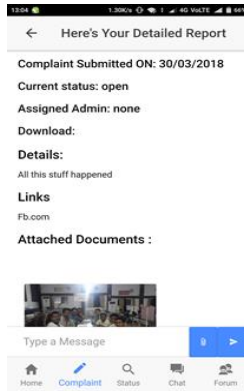
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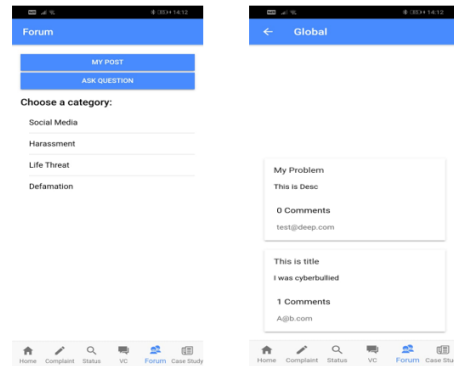
276

Fig. 4. Status report

Fig. 5. Forum

D. Duplicate complaint detection by Levenshtein's Algorithm

Our application uses the Levenshtein's Algorithm for detecting duplicate complaints, thus eliminating redundant complaints from being submitted again and again. In information theory, linguistics and computer science, the Levenshtein distance is a string metric for measuring the difference between two sequences. Informally, the Levenshtein distance between two words is the minimum number of single-character edits (insertions, deletions or substitutions) required to change one word into the other. It is named after the Soviet mathematician Vladimir Levenshtein, who considered this distance in 1965. Levenshtein distance may also be referred to as edit distance, although that term may also denote a larger family of distance metrics. It is closely related to pairwise string alignments.

E. Automatic assignment to Investigator based on location of the complaint

Our Application provides automatic assignment of Complaints to Investigators i.e. the Complaint entered by the user gets automatically assigned to the nearest cyber cell via the user's GPS location. If the user has his/her GPS disabled then he can also enter his location manually by selecting state and city. Based on this, the complaint would be assigned automatically.

F. Virtual Assistant for answering user queries

We have used Google's DialogFlow to create a Virtual Assistant that can answer the user's queries related to cybercrime. The virtual assistant can also help a user navigate through our application. Chatbot can also describe various cybercrime laws, or emergency helpline number if asked.

G. Forum

Forum section is categorized with respect to type of complaints. User can post his query, doubts in the forum. Other users can see their posts and check if someone has posted a similar query.

6. Results and analysis

Earlier there was no well-defined method for reporting of cybercrimes, hence a lot of complaints were not even being registered. We have created a well-defined 3 step process for reporting of cybercrimes. Our virtual assistant can answer basic queries that a user has regarding cybercrimes this reduces the load on cyber cell department so they can focus on solving important crimes. If anyone is feeling suicidal, then he can call on our emergency number and we can save life. Our application can easily be scaled due to use of Firebase for storing complaint data. It can be horizontally scaled very easily as and when the demand increases. We've also provided interactive voice based login so that disabled people can use application without any hassle.

Table 1
Analysis of submitted complaints

Number of complaints submitted	Number of complaints assigned correctly to Investigator	Number of complaints assigned that couldn't be assigned correctly
700	694	6

Table 2
Analysis of queries

Number of queries asked by user	Number of queries answered correctly	Number of queries answered incorrectly
400	347	53

Table 3
Analysis of duplicate complaints

Number of test cases of duplicate complaints submitted	Number of complaints identified as duplicate	Number of complaints that couldn't be assigned as duplicate
300	258	42

7. Conclusion

This paper presented the implementation of reporting and counselling of cybercrime using intelligent chatbot and geolocation.

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