Billy-Buddy: An AI-Powered Solution for Cyberbullying, Detection, Prevention and Victim Support

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***Abstract*—Cyberbullying, a significant issue among teenagers, involves online harassment such as spreading rumours, making threats, posting sexual remarks, sharing personal information, or using hate speech, leading to severe consequences like reduced self-esteem, suicidal ideation, and emotional distress. To combat this, we have proposed a feature in our website called "Billy " a chatbot offering instant support, guidance, and the anonymous reporting of perpetrators to cybercrime authorities, safeguarding the victim's privacy and promoting swift action.Our platform also analyzes cybercrime data to highlight areas with high incidents, allowing law enforcement to focus on "red alert" zones while providing users with tips and defensive tactics. Additionally, we foster a supportive community where individuals affected by cyberbullying can anonymously share experiences, engage in Q&A sessions, and connect for mutual support.**

By combining technology with community support, our platform aims to provide real-time assistance, improve cybercrime monitoring, and create a safer online environment.

***Index Terms*—Cyberbullying, Sentiment Analysis, Anonymous Reporting, Mental Health Support, AI-based Detection, User Safety, Real-time Assistance**

I. INTRODUCTION

Cyberbullying, especially among teenagers, has become a major issue in the digital age, involving harmful behaviours like spreading rumours, threats, or hate speech on social media. This often leads to severe psychological effects such as anxiety, depression, and even suicidal thoughts.

Our website offers a comprehensive solution to address this problem. At its core is "Billy", an empathetic chatbot that provides immediate emotional support while maintaining the victim's anonymity. Billy not only comforts but also gathers evidence of bullying incidents, which is securely reported to cybercrime authorities, keeping the victim's identity protected.

Additionally, the platform tracks cyber-crime statistics in real time, identifying high-risk areas (red-alert zones) for targeted interventions by authorities.

To empower users, we offer tips and defence tactics on how to stay safe online. The platform also fosters a community of survivors, allowing victims to connect, share experiences through Q&A sessions, and learn from each other in a safe, anonymous space.

With its multi-faceted approach—emotional support, secure reporting, data-driven tracking, education, and community building—our platform aims to prevent and reduce cyberbullying while offering meaningful help to victims.

II. MOTIVATION

Cyberbullying is a pressing issue in today's digital era, especially among teenagers who are active on social media platforms. Observing its devastating impact on victims—ranging from emotional distress and depression to extreme consequences like suicidal ideation—motivated us to tackle this problem.

The growing prevalence of cyberbullying, coupled with its anonymity and rapid spread, creates an urgent need for innovative solutions. Many victims feel helpless and isolated, unsure where to turn for support, while perpetrators often evade accountability. This gap in effective intervention and awareness inspired us to create a solution that provides immediate, anonymous assistance while ensuring justice and protection.

Additionally, the emotional toll cyberbullying takes on victims and their families further strengthened our resolve to contribute positively to society. By developing a platform that not only provides support

but also helps the authorities track cybercrime patterns, we aim to foster a safer digital environment. Our project also seeks to empower victims and communities by facilitating shared experiences and collective learning. Providing actionable tips, promoting awareness, and building a supportive network can bring lasting change. Ultimately, the goal is to create an ecosystem where everyone feels safe, supported, and educated about combating cyberbullying effectively.

III. OBJECTIVES

- Based on the observations and research gaps identified in the literature survey, the following specific objectives have been formulated:
- Use the chatbot "Billy" to offer instant, compassionate support to victims of cyberbullying.
- Protect victims' identities while enabling them to report cyberbullying incidents to the cybercrime department.
- Track and monitor cyberbullying incidents geographically to help law enforcement focus on high-risk areas.
- Create a platform where victims can connect, share experiences, and learn coping strategies from others who have faced cyberbullying.
- Provide tips, educational materials, and defence tactics to empower individuals to protect themselves from online harassment.
- Collect data on cyberbullying incidents to identify trends and help policymakers address the issue proactively.
- Implement AI-powered filters to help users identify and block malicious messages or profiles.
- Generate periodic reports and visual dashboards to showcase the impact and trends of cyberbullying incidents to stakeholders.
- Organize virtual workshops and awareness campaigns to educate the public about the dangers of cyberbullying.
- Integrate features that allow parents and guardians to access educational resources about cyberbullying prevention.
- Enable victims to upload screenshots or evidence of cyberbullying incidents securely for use in reporting or legal action.

IV. METHODOLOG

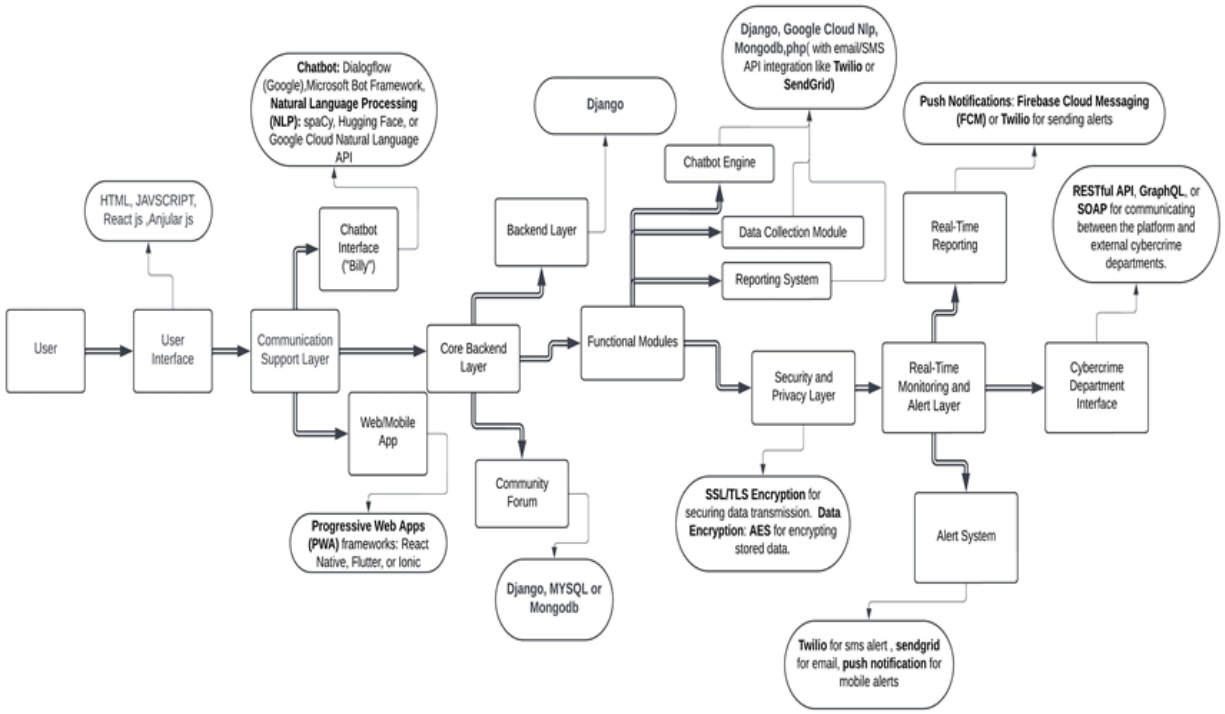

Figure-1:Billy-Buddy against cyberbullying architecture

This architecture outlines a secure and efficient cybercrime monitoring and alert platform. Users interact through a dynamic interface built with technologies like HTML, JavaScript, and React.js, supported by a Communication Support Layer connecting to the backend. The Core Backend Layer, developed with Django and supported by MySQL or MongoDB, powers essential functionalities, including data collection, reporting, and a community forum.

A chatbot, utilising AI tools like Dialogflow and spaCy for NLP, offers interactive user support. A Real-Time Monitoring and Alert Layer detects threats, sends alerts, and communicates with external cybercrime departments via APIs such as RESTful or GraphQL. Security is ensured with SSL/TLS encryption for data transmission and AES for storage. Notifications are managed through Firebase Cloud Messaging (FCM) or Twilio for SMS, email, and push alerts. Additionally, Progressive Web Apps (PWAs) enhance accessibility, ensuring robust, modular, and privacy-focused cybercrime management.

A. User Interface (UI):

The system offers a user-friendly web or mobile application built with technologies like HTML, JavaScript, React.js, or Angular.js, ensuring an interactive and seamless user experience.

B. Communication Support Layer:

This layer facilitates smooth communication between the user interface and core functionalities, including chatbot interactions.

C. Chatbot Interface (Billy):

The AI-powered chatbot uses Natural Language Processing (NLP) frameworks like Dialogflow, spaCy, Hugging Face, or Google Cloud NLP to understand and respond to user inputs effectively.

D. Backend Layer:

Built with Node.js and Express, the backend handles business logic, processes user requests, and interacts with APIs to perform core tasks.

E. Core Backend & Functional Modules:

The backend coordinates with key modules, including:

F. Data Collection Module**:** Processes and manages user data.

G. Reporting System: Generates insightful reports from collected data.

H. Security & Privacy Layer:

Data security is ensured through SSL/TLS encryption for transmission and AES encryption for storage, protecting sensitive user information.

I. Real-Time Monitoring & Alert System:

A dedicated layer monitors activities and triggers alerts for cybercrime-related events or system issues. Notifications are sent via SMS (Twilio), email (SendGrid), or push notifications (Firebase Cloud Messaging).

J. Real-Time Reporting & Cybercrime Interface:

Real-time reports are generated and shared with cybercrime departments through RESTful APIs or GraphQL to support timely intervention.

K. Community Forum:

A platform powered by Node.js and databases like MySQL or MongoDB where users can share experiences and seek support.

L. Progressive Web Apps (PWA):

To enhance mobile responsiveness, the system employs frameworks like React Native, Flutter, or Ionic, offering a mobile-first user experience.

V. LEARNT DECISIONS

The Billy Buddy project centered on creating a secure and empathetic platform for victims of cyberbullying, leading to key decisions in its design. Integrating the chatbot “Billy” with a context-aware AI model ensured compassionate support tailored to user needs. Prioritizing anonymity and robust encryption addressed the sensitive nature of user data while enabling safe reporting to cybercrime departments. These choices reinforced the project’s mission to empower victims with a secure and non-judgmental environment to seek help.

A user-first approach shaped further decisions, emphasizing education and prevention alongside immediate support. Features like multilingual support and real-time de-escalation strategies enhanced accessibility and responsiveness. The inclusion of data collection tools to identify cyberbullying trends reflected a proactive commitment to combating the issue at its root. Collaborations with social media platforms for content moderation and resources for legal aid rounded out the project’s holistic approach, making it a comprehensive tool for addressing online harassment.

VI. CONCLUSION

The Cyberbullying Support Platform represents a significant step forward in addressing the pressing

issue of online harassment. By leveraging advanced AI technologies for sentiment analysis and abuse detection, the platform provides real-time interventions to protect users from cyberbullying. Its anonymous reporting mechanism, combined with access to mental health professionals and support networks, ensures that victims receive timely assistance while maintaining their privacy. Educational resources further empower users by fostering awareness and responsible digital behavior, contributing to a more harmonious online environment.

The platform's modular and scalable design allows it to evolve with the changing landscape of digital communication. Its inclusivity, through multilingual support and user-friendly interfaces, makes it accessible to diverse demographics, including those in vulnerable communities. Rigorous testing, robust security measures, and continuous updates ensure that the platform remains reliable, secure, and effective in combating cyberbullying. By addressing both immediate needs and long-term resilience, the platform offers a comprehensive solution to a complex problem.

In conclusion, the Cyberbullying Support Platform is more than a technological tool; it is a catalyst for change in the fight against online harassment. By blending technology with empathy, it empowers individuals, fosters mental well-being, and promotes safer interactions, paving the way for a more inclusive and respectful digital world.

VII. COMPARISON

Artificial Intelligence-Driven Cyberbullying Detection: A Survey of Current Techniques. Vs Billy-Buddy: An AI-Powered Solution for Cyberbullying Detection, Prevention and Victim Support.

A. Problem Scope

1. Survey Paper Abstract: Focuses on detecting and preventing cyberbullying content using deep learning. It explores the technical aspect of identifying abusive language, leveraging neural networks to capture semantic and grammatical nuances. The primary goal is to review existing methodologies for detecting harmful content and propose areas for further research.

2. Billy Buddy Abstract: Broadens the scope to include both detection and support systems. It addresses not only the technical detection of harmful behaviour but also provides **real-time victim support**, anonymous reporting, community-building initiatives, and crime monitoring. The focus extends beyond detection to encompass victim well-being and creating a safer digital environment.

B. Solution Approach

1. Survey Paper Abstract:Emphasises using deep learning models to identify and mitigate abusive language. The approach is primarily technical, aiming to improve the accuracy and effectiveness of detecting cyberbullying content.

2. Billy Buddy Abstract: Integrates AI-driven chatbot assistance ("Billy") alongside a comprehensive platform for reporting offenders, analysing cybercrime data, and fostering a supportive community. The solution involves real-world applications like immediate victim assistance, data analytics for crime prevention, and community interactions, which go beyond just detection.

C. Features and Functionality

1. Survey Paper Abstract: Centres on reviewing and improving methodologies for detecting cyberbullying content using deep learning techniques. There is no mention of victim support, crime reporting, or community involvement.

2. Billy Buddy Abstract**:** Introduces several new functionalities:

3. "Billy" Chatbot**:** Provides instant victim support, collects evidence, and facilitates anonymous reporting.

4. Crime Analysis: Uses data to identify "red alert" zones with high incidents of cyberbullying, allowing law enforcement to take targeted actions.

5. Tips and Tactics: Educates users on navigating online spaces safely.

6. Community Forum: Connects victims to share experiences, engage in Q&A, and build resilience.

7. Anonymity Focus: Prioritizes user privacy while fostering a supportive environment.

VIII. IMPACT ON USERS

A. Survey Paper Abstract: Primarily impacts the technical landscape by suggesting advancements in AI-based detection of harmful content, with indirect benefits for users through improved platform moderation.

B. Billy Buddy Abstract: Directly impacts users' well-being and safety, offering an all-encompassing

approach that includes real-time support, crime prevention, and community empowerment, thus addressing the problem holistically.

Directly impacts users' well-being and safety, offering an all-encompassing approach that includes real-time support, crime prevention, and community empowerment, thus addressing the problem holistically.

C. Improvements in Billy Buddy

1. Victim-Centric Approach**:** Adds immediate support and anonymous reporting mechanisms to protect victims and encourage action.
2. Comprehensive Features: Combines AI for content detection with victim assistance, education, and community building.
3. Data-Driven Insights: Introduces a system to identify and address high-risk areas, aiding law enforcement in targeted interventions.
4. User Empowerment: Provides tools, tips, and a forum to foster a safer and more supportive online environment.
5. Practical Application: Moves beyond theoretical and technical discussions to a real-world solution aimed at combating cyberbullying on multiple levels.

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