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## Entire Document

Chapter 1 INTRODUCTION This chapter provides an introduction to the concept of cyberbullying with the scope and objectives of the project. The arrival of the internet has led to the widespread use of social media platforms like Facebook, Twitter, Instagram, and WhatsApp as the primary means of commu- nication. Messaging has become an essential tool in almost all sectors, including education, business, and socialization. However, it has also created new possibili- ties for harmful activities. Evidence suggests that messaging can give rise to an issue known as cyberbullying. Cyberbullying refers to the intentional use of messaging on social networking ser- vices to cause emotional, mental, or even physical harm to others. It can lead to psy- chological problems such as loneliness, low self-esteem, social anxiety, depression, and even suicide. Reports indicate that around 36% of Indian children are affected by cyberbullying. As the occurrence of cyberbullying continues to increase, it is vi- tal to study effective ways to detect and prevent it in real time. Blocking messages alone is insufficient in preventing such incidents. Instead, monitoring, processing, and analyzing text messages in real-time is necessary to make informed decisions and prevent harm to victims. Due to the aforementioned issues, several studies have been conducted to ex- plore effective techniques for detecting cyberbullying. While manual detection is the most accurate method, it is rarely employed due to the significant time and resource requirements. Therefore, the importance of developing an automatic cyberbullying detection system has increased. Although considerable research has been conducted on cyberbullying detection systems, it remains a pressing concern, and current approaches still have limitations, especially when dealing with large volumes of data. Various types of social network- ing services (SNS) can represent different forms or patterns of data. A supervised machine-learning approach can be applied to address cyberbullying from various perspectives. Our primary objective is to develop a classification model that can pre- dict text messages and prevent cyberbullying in real time. The detection process is automated, with the abusive language being quickly identified and a warning mes- sage displayed to the user who used the abusive language. 1
Cyber Bullying Detection and Prevention in Web Chat Application using SVM 1.1 SCOPE : 1. The System only focuses on the English language. 2. The system can recognize only proper and formal text. 1.2 OBJECTIVES: 1. The system will detect and prevent the cyberbullying event to deteriorate. 2. Web chat application will be used by people for safer and more secure com- munication with their friends. 3. Cyberbullying leads to an increase in stress and anger in a person, Being a vic- tim of cyberbullying also affected student's grades and hence if peoples use our system they will live a healthy social life. Dept. of Information Technology Engineering Page 2
Chapter 2 LITERATURE REVIEW This chapter discusses the literature review for the project. Cyberbullying is an act of threatening, harassing, or bullying someone through modern ways of communicating with each other and with anybody/everybody in the world via social media apps/sites. Cyberbullying is not just limited to creating a fake identity and publishing/posting some embarrassing photo or video, or unpleasant rumors about someone but also giving them threats. The impacts of cyberbullying on social media are horrifying, sometimes leading to the death of some unfortunate victims. The behavior of the victims also changes due to this, which affects their Emotions, self-confidence, and a sense of fear is also seen in such people. Al-Garadi et al. [1]

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comprehensively reviewed cyberbullying prediction models and identified the main issues related to the construction of cyberbullying predic- tion models in social media. The paper provides insights into the overall process for cyberbullying detection and

mainly focuses on feature selection algorithms and the use of various machine learning algorithms for the prediction of cyberbullying behavior. The authors found that SVM was an effective and efficient algorithm for developing cyberbullying detection models. The model was trained using data con- taining cyberbullying extracted from a social network site. The paper reviews four as- pects of detecting cyberbullying messages using machine learning approaches: data collection, feature engineering, construction of cyberbullying detection models, and evaluation of constructed cyberbullying detection models. Shutonu Mitra et al. [2] The research paper proposes a conceptual framework for detecting and preventing cyberbullying on social media. The framework consists of three modules, namely the User Interaction module, the Decision-making module, and the Analysis module. The User Interaction module is responsible for collecting data from users, while the Decision-making module analyses the collected data and makes decisions based on the analysis. Finally, the Analysis module is responsible for processing the data and generating reports. The framework utilizes various machine learning algorithms to analyze and detect cyberbullying behavior on social media. The research paper aims to provide an effective solution for preventing cyberbully- ing in social media using machine learning algorithms. In recent years, several studies have been conducted on the analysis, detection, 3

Cyber Bullying Detection and Prevention in Web Chat Application using SVM and prevention of online bullying using text-mining techniques for classifying con- versations. One of these studies was conducted by John Hani et al. [3], where they proposed a classification model to detect and prevent social media bullying using neural networks and SVM. They collected their dataset from Kaggle and divided their proposed model into three major steps: 1. Pre-processing Steps: • Lowering Text • Tokenization • Stop words • Word correction 2. Feature Extraction: • Tokenization • Lowering Text 3. Classification: • SVM (Support Vector Machine) and NN classifiers were used for classifi- cation. The combination of features with an SVM classifier for predicting the class labels produced the best results. The experiments showed the models ability to detect In- sult and Hate content in text. The f1- score of the Insult and Hate class label showed a high score respectively 95.4 [4]. The Support Vector Machine achieved the highest accuracy i.e. 71.25%, while Naive Bayes achieved 52.70% accuracy. The SVM algo- rithm achieved the highest precision value i.e. 71%, while NB achieved 52% preci- sion. Also, SVM has achieved higher recall and f-score values than Naive Bayes [5]. In recent years, various studies have been conducted to explore the effective- ness of different machine-learning algorithms in detecting cyberbullying using text data from social media platforms. Karthik [6] used multi-classifiers such as Naïve Bayes, JRip, J48, and SMO with YouTube comments. Similarly, Vinita [7] employed LDA to extract features and used the weighted term frequency-inverse document fre- quency (TF-IDF) function to improve the classification with datasets from Kongre- gate, Slashdot, and MySpace. Homa [8] utilized the Support Vector Machines classi- fier with datasets from Instagram. The proposed project involves building a system using Python and Django frame- works to detect cyberbullying in live conversations. The first step is to search and download the required dataset, which will be pre-processed and used to train the model. Support Vector Machine will be used to generate the model. A web-based ap- plication will be created using the Django framework, and the generated model will be applied to live conversations to determine whether the messages are instances of cyberbullying or not. Dept. of Information Technology Engineering Page 4

Cyber Bullying Detection and Prevention in Web Chat Application using SVM 2.1 EXISTING SYSTEM This chapter gives an overview of the existing systems that are developed to detect cyberbullying. Figure 2.1 shows the interface of the "ReThink" keyboard, which is the keyboard that detects bullying words and gives an alert to the user who has typed it. Figure 2.1: Existing System "ReThink Before The Damage is Done" is an innovative and patented technology that effectively detects if the word that user has entered is cyberbullying or not and stops online hate before the damage is done. This keyboard shows the popup/alert if someone typed offensive words. It suggests clearing that message and rethink about it, but the user also has the option to choose "OK" and continue chatting. The next chapter discusses the work done related to cyberbullying issues. Dept. of Information Technology Engineering Page 5

Cyber Bullying Detection and Prevention in Web Chat Application using SVM 2.2 RELATED WORK DONE There are a few applications that are developed to detect cyberbullying, Bully Alert and the Bull Stop application are two of them which are discussed in this chapter. Bull Stop Bull Stop application is a mobile application developed for Android devices as part of a Ph.D. study at the University of Aston, United Kingdom (Salawu, 2020). The ap- plication is designed to help young people combat cyberbullying proactively, with its target audience being children aged 13 and above. The application works by using a deep learning-based algorithm to analyze messages and flag any offensive con- tent such as cyberbullying, abuse, or insults. For this application, if the application detects some offensive content in the user's social media account, it will automati- cally delete the messages to prevent them from reaching the user. Bull Stop applica- tion also allows users to block other users' social media from the application directly. This application currently only works on Twitter's social media accounts with plans for Facebook and Instagram in the future. This application's advantage is that it is easy to set up and will automatically delete the cyberbullying content just by run- ning this application in the background. Another advantage of this application will also be that this application does not allow parents to monitor their children's social media accounts to help preserve the user's social media account privacy. However, the disadvantage of this application is that it does not show the messages that are deleted, which could delete a message accidentally if the algorithm flagged the mes- sages wrongly. Another disadvantage of this application is that the user won't see the cyberbullying context as the message will be deleted before it reaches the user. Bully Alert Bully Alert application is a mobile application developed by CU Cyber Safety Lab as a research project for the University of Colorado Boulder (Lab 2018). Bully Alert ap- plication is designed for Android and can be downloaded from Google Play Store. Anyone can use this application to observe another person's social media account to get a notification from their user's profile. This application, as of now, can only be used for an Instagram account. To use this application, the user must input the user's Instagram profile name in the application. After that, the application will start observing the Instagram profile inputted into the application and then send a notifi- cation if a cyberbullying case is happening on that Instagram profile. The advantage of using this application is that it is easy to use and only requires the profile name of the person's Instagram to start observing the profile movement. The disadvantage of this application is that it can only be used if the user knows the user's Instagram profile name and the warning message does not inform the user to who that message is being sent. Dept. of Information Technology Engineering Page 6

Chapter 3 SYSTEM'S PROPOSED ARCHITECTURE This chapter states the problem definition, methodology, and block diagram of the system. 3.1 PROBLEM DEFINITION : Cyberbullying is intentional actions performed by an individual or a group of peo- ple via digital communication methods such as sending messages and posting com- ments against a victim. The System will detect cyberbullying in web chat application by using a Support Vector machine [1]. 3.2 METHODOLOGY : 1. User Interaction: • The user can interact with the system using a Graphical User Interface (GUI). • The user is required to enter their Username and the name of the chat- room they wish to join. 2. Entering the Chatroom: • After entering the valid details, the user gains access to the specified cha- troom. • The user can engage in conversations with other members present in the chatroom. 3. Toxicity Detection: • The system incorporates a machine learning model to detect the toxicity of messages within the chatroom. • The system analyzes each message to determine if it contains any ele- ments of cyberbullying. 7
 • If a message is identified as cyberbullying, the system alerts the user and provides information about the type of cyberbullying involved. By following this methodology, users can effectively interact with the chat appli- cation, join specific chatrooms, and be alerted about any instances of cyberbullying detected within the messages. 3.3 BLOCK DIAGRAM Supervised classification machine learning algorithms, such as Support vector Ma- chine and TfidfVectorizer Technique, are being used to automatically detect cyber- bullying in live chat. The dominance of the SVM algorithm and TfidfVectorizer Tech- nique is that they calculate the probabilities for each class. To apply cyberbullying detection model, referred to a conceptual framework from [2], shown in Figure 3.1 Dept. of Information Technology Engineering Page 8
 Figure 3.1: Block Diagram This project includes the following modules: 1. User Interaction Module: The User Interaction Module facilitates the interaction between the user and the system. It is the user interface of the chat application that allows users to chat with others in a chatroom. It consists of the User Profile and Messaging functions. 2. Analysis Module: This module involves collecting the dataset, performing data pre-processing, and converting it using a vectorizer technique. The testing and training datasets are divided, and the algorithm is initialized. The features and labels are then fitted into the algorithm, and the model is saved to the system after being pre- dicted with accuracy. The messages from the chatroom are passed to the saved trained SVM model for classification as a bully or not. 3. Decision-Making Module: Dept. of Information Technology Engineering Page 9
 This module involves alerting the user if they are bullying others. Based on the prediction by the machine learning model, a chat message is classified as bul- lying or not, and a warning is displayed to the user. If the chat text is classified as not bullying, then no need to send an alert. The warning message is as fol- lows: Warning: This message may be bullying! Category: Age Stay respectful and kind. Cyberbullying will not be tolerated. Dept. of Information Technology Engineering Page 10
Chapter 4 SPECIFIC REQUIREMENTS This chapter specifies the Hardware and Software requirements of the project with the required dataset. 4.1 HARDWARE REQUIREMENT • Computer System with RAM: 4GB or 8GB • HDD Space: 500GB or 1TB 4.2 SOFTWARE REQUIREMENT • Operating System • Visual Studio Code • Jupyter Notebook 4.3 TOOLS AND TECHNOLOGIES USED • Django Web Framework: The core framework used for developing the web chat application is Django. Django provides a solid foundation for building web applications, offering fea- tures such as routing, request handling, authentication, and session manage- ment. It allows for easy data handling, model deployment, and user interface design. • Python Programming Language: Python is the primary programming language used in developing the web chat application. Python's simplicity, readability, and extensive libraries made it an ideal choice for implementing various functionalities, including data process- ing, machine learning, and integration with Django. • Natural Language Processing (NLP) Libraries: 11
 To analyze and process the textual content of chat messages, we utilized NLP libraries in Python. Some of the key NLP libraries we used include NLTK (Nat- ural Language Toolkit), and scikit-learn. These libraries provided a wide range of functionalities, such as tokenization, text preprocessing, feature extraction, and text classification. • Support Vector Machine (SVM): We have employed the Support Vector Machine algorithm, available in scikit- learn, for text classification. SVM is a powerful machine learning algorithm that can effectively classify text data based on learned patterns and features. It played a crucial role in determining whether a chat message was classified as cyberbullying or not. • HTML, CSS, and JavaScript: To create an engaging and user-friendly interface, web technologies such as HTML, CSS, and JavaScript are used. These front-end technologies are used to design and implement the chat interface, handle user interactions, and display real-time feedback on the classification results. 4.4 DATASET USED • Cyberbullying Classification Dataset from Kaggle As this chapter has given the overall view of the various system-specific require- ment, tools, and technologies used for developing the system, the next chapter illus- trates the high-level design of the system. Dept. of Information Technology Engineering Page 12

Chapter 5 HIGH-LEVEL DESIGN OF PROJECT UML DIAGRAM : This chapter gives the high-level design of the project i.e. UML diagrams: Use Case diagram, Activity diagram, and Sequence diagram. 5.1 USE CASE DIAGRAM Figure 5.1: Use Case Diagram The use case diagram illustrates the application's usage flow for the two actors: The user and System. The User initiates the process by logging into the system us- 13
Cyber Bullying Detection and Prevention in Web Chat Application using SVM ing their credentials. Upon successful login, the User can join a chatroom to engage with other members. Real-time messages from the chatroom are then passed on to the System for further processing and check whether the messages contain cyber- bullying content or not. If a message contains cyberbullying, then the System alerts the user that stop cyberbullying. 5.2 ACTIVITY DIAGRAM Figure 5.2: Activity Diagram The activity diagram shows the activity phase that is happening in the applica- tion. There are two attributes of the application User and System. To start using the application, the user has to provide the credentials like username and name of the chatroom. Then the user will join the chatroom. The real-time messages from chat will get passed to the system. It will check if the message is cyberbullying or not, if the message is bullied, the system will warn the user. Dept. of Information Technology Engineering Page 14
Cyber Bullying Detection and Prevention in Web Chat Application using SVM 5.3 SEQUENCE DIAGRAM Figure 5.3: Sequence Diagram The sequence diagram shows the sequence of actions/activities that are happen- ing in the application. The User is an actor in the system. The user interacts with the system by using GUI. To start chatting the user has to provide credentials such as username and name of the chatroom he/she wants to join, After that he/she will be able to join the chatroom and start a conversation with group members. The real- time messages from chat will get passed to the system. It will check if the message is cyberbullying or not, if the message is bullied, the system will notify the user. The UML diagrams were discussed in this chapter which gives the high-level de- sign of the project. In the next chapter project flow, information on the dataset, per- formance parameters of the machine learning model, and efficiency issues of the system are discussed. Dept. of Information Technology Engineering Page 15
Chapter 6 EXPERIMENTAL SETUP / SIMULATION This chapter focuses on the experimental setup by giving the project flow, informa- tion about the dataset being used performance parameters, and efficiency issues. 6.1 PROJECT FLOW This project will be developed using Python, ML, and web technology. 1. The cyberbullying classification dataset is taken from Kaggle which is used to train the model. 2. The data from the dataset is preprocessed, then the cleaned data is passed to the SVM model for training purposes. The SVM model trains the data and saves the model, hence there is no need to train the model again. 3. The real-time message from the chat application is passed to the function which generates the result based on custom inputs, and alerts the user if he/she is bullying others. The message is preprocessed before passing it to that func- tion. 4. For the frontend purpose the chat application is developed with the Django web framework. The users can join the chatroom by using the credentials like username and the name of the chatroom. If the credentials are valid the user will be redirected to the chatroom he/she wants to enter. Now the user will be able to join the group or chatroom and start chatting with other members of the chatroom. 5. If the message is cyberbullying or offensive it will alert the user to stop cyber- bullying. 16
Cyber Bullying Detection and Prevention in Web Chat Application using SVM 6.2 DATASET About the dataset The dataset used for this project consists of more than 47,000 tweets that have been labeled according to the class of cyberbullying. It provides valuable insights into the prevalence and impact of cyberbullying in the context of social media usage. The dataset includes information related to various categories, such as age, ethnicity, gender, religion, and other types of cyberbullying. The collection of this dataset was motivated by the increasing usage of social me- dia platforms across all age groups and the corresponding rise in cyberbullying inci- dents. Furthermore, the dataset takes into account the unique challenges posed by

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the COVID-19 pandemic, such as widespread school closures, increased screen time, and reduced face-to-face social interaction, which have further amplified the risk of cyberbullying.

The statistics derived from the dataset are quite concerning. Accord- ing to the data, approximately 36.5% of middle and high school students have re- ported experiencing cyberbullying, while a staggering 87% have observed instances of cyberbullying. These incidents have been linked to adverse effects on mental health, academic performance, and even thoughts of self-harm. The utilization of this dataset within the project enabled a comprehensive anal- ysis of the factors contributing to cyberbullying and provided insights into potential strategies for prevention and intervention. Figure 6.1: Dataset Dept. of Information Technology Engineering Page 17

Cyber Bullying Detection and Prevention in Web Chat Application using SVM 6.3 PERFORMANCE PARAMETER Accuracy The accuracy of a machine learning classification algorithm is one way to measure how often the algorithm classifies a data point correctly [9]. To evaluate the effectiveness of our approach, we employed the Support Vector Machine (SVM) algorithm to train a machine learning model on the dataset. The SVM model was utilized to classify instances of cyberbullying based on various fea- tures such as age, ethnicity, gender, religion, and other relevant factors. The Accuracy of Cyberbullying Classification Dataset using SVM is 83%. This ac- curacy rate reflects the percentage of correctly classified instances of cyberbullying, which demonstrates the model's ability to discern between different classes of cyber- bullying accurately. The 83% accuracy rate obtained by the SVM model indicates its efficacy in classifying instances of cyberbullying within the given dataset. Figure 6.2: Accuracy Dept. of Information Technology Engineering Page 18
Cyber Bullying Detection and Prevention in Web Chat Application using SVM 6.4 EFFICIENCY ISSUES 1. HUMAN DATA CHARACTERISTICS In [1], Human behavior is dynamic. Knowing when online users change their way of committing cyberbullying is an important component in updating the prediction model with such changes. The Model will be able to predict the cyberbullying words which are there in the dataset. 2. LANGUAGE DYNAMICS Language is changing, and the new style of speaking is being evolved very fastly, particularly among the young generation. New slang is regularly inte- grated into the language culture. If the user will use another word other than the dataset, the model will not be able to recognize it. Overall, the experimental setup is discussed in this chapter. The next chapter gives an overview of the result and evaluation metrics that are used to evaluate the system. Dept. of Information Technology Engineering Page 19
Chapter 7 RESULTS AND EVALUATION Experimental results, Test cases, Working Modules of the project, and cost analysis for the development of the system are discussed in this chapter. 7.1 EXPERIMENTAL RESULTS The project aims to promote peace and contribute to society through the use of ma- chine learning, a trending, and emerging technology. The system is designed to de- tect and prevent abusive conversations during live chats. To achieve this, a Support Vector Machine algorithm is used to detect abusive words. The combination of ma- chine learning and Python is used to train and test the model, resulting in high ac- curacy. The model includes features that can identify abusive words and categorize them in various types such as age, gender, ethnicity, religion, etc., and then effec- tively send the alert to the person and prevent cyberbullying. The below two points shows the experimental results of the model in the form of classification report and classification report metrics. Classification Report Figure 7.1 shows the classification report of the machine learning model where 0 to 5 are the cyberbullying type which is encoded from the types of cyberbullying such as age, ethnicity, gender, religion, other cyberbullying, and not cyberbullying. The ac- curacy of the SVM model is 83%. The classification report also shows the precision, recall, and f1-score values for each cyberbullying type. 20
Cyber Bullying Detection and Prevention in Web Chat Application using SVM Figure 7.1: Classification Report Classification Report Metrics Figure 7.2: Classification Report Metrics Dept. of Information Technology Engineering Page 21
Cyber Bullying Detection and Prevention in Web Chat Application using SVM The bar plot above illustrates, in Figure 7.2, the classification report metrics, in- cluding precision, recall, and F1-score, for each label. The x-axis represents the dif- ferent classification labels, such as age, ethnicity, gender, not_cyberbullying, other_cyberbullying, and religion. The y-axis represents the scores in percentage (%), indicating the per- formance of the model. The blue bars indicate the precision scores, which measure the proportion of cor- rectly predicted positive instances for each label. The orange bars represent the re- call scores, which measure the proportion of correctly predicted positive instances out of all actual positive instances for each label. The green bars represent the F1- scores, which provide a balanced measure of precision and recall. From the graph, It can be observed that there is varying performance of the model across different labels. The model achieves higher precision for certain labels, such as 'age' and 'gender', indicating accurate predictions of positive instances. On the other hand, labels like 'ethnicity' and 'religion' show lower precision scores, suggest- ing a higher proportion of false positive predictions. In terms of recall, the model demonstrates higher performance for labels like 'gender' and 'not_cyberbullying', achieving a greater ability to identify actual posi- tive instances. However, labels such as 'ethnicity' and 'other_cyberbullying' exhibit lower recall scores, indicating a higher proportion of false negatives. Dept. of Information Technology Engineering Page 22
Cyber Bullying Detection and Prevention in Web Chat Application using SVM 7.2 TEST CASES Table 7.1 shows the test cases with the expected and actual results and status if that test case has passed or failed. Table 7.1: Test Cases Sr. No Test Cases Expected Result Actual Result Status (Pass/Fail) 1 User can join the chatroom User should be able to join the chatroom if the credentials are valid. User can join the chatroom if credentials are valid. Pass 2 System is alerting the user If the message sent by the user is bullied, then the system should alert the user. System alerts the user if he/she is bullying others. Pass 3 Valid Non- Cyberbullying Message The message is identified as non-cyberbullying and categorized accordingly. If the message is non-cyberbullying sometimes the system categorizes it into other_cyberbullying type. Fail 4 Valid Cyberbullying Message The message is identified as cyberbullying and categorized into relevant types. If the message is cyberbullying it categorizes it into relevant types. Pass Dept. of Information Technology Engineering Page 23

Cyber Bullying Detection and Prevention in Web Chat Application using SVM 7.3 WORKING MODULES The current chapter points out the graphical user interface of the system. Figure 7.3 depicts the chatroom and Figure 7.4 depicts the chat containing cyberbullying and alert by the system. 7.3.1 User Interface 1. Chatroom Below figure depicts the interface of the chatroom. Multiple users can join the chatroom. There are 3 users, User 1, User 2, and User 3 in the chatroom namely "Information Technology". Figure 7.3: Chatroom Dept. of Information Technology Engineering Page 24
Cyber Bullying Detection and Prevention in Web Chat Application using SVM 2. Cyberbullying Detection Below figure depicts the interface of the chatroom where User 2 has sent a mes- sage which is bullied, hence the system alerts the user and gives the type of cyberbullying. Figure 7.4: Cyberbullying Detection Dept. of Information Technology Engineering Page 25
Cyber Bullying Detection and Prevention in Web Chat Application using SVM 7.3.2 Django Administration Figure 7.5 and Figure 7.6 shows the Django administration interface. One of the key features of the Django web framework that is utilized in our web chat application is Django administration. Django administration provides a built-in, customizable administrative interface that allows administrators to manage various aspects of the application. 1. Message Object • The administration interface allowed administrators to access a list of messages in a particular chat room. They could browse through the mes- sages to review their content, timestamp, and other relevant information. This functionality provided an overview of the conversations taking place within the chat application. Figure 7.5 shows the message object from the Django Administration interface. Figure 7.5: Message Object Dept. of Information Technology Engineering Page 26
Cyber Bullying Detection and Prevention in Web Chat Application using SVM 2. Room Object The administration interface provided a dedicated section for managing the Room objects. This allowed administrators to perform the following tasks: • Create Rooms: Administrators could create new chat rooms directly from the administration panel. They could specify the room's name, descrip- tion, and any other relevant details. This feature simplified the process of adding new chat rooms to the application. • Update Room Details: The administration interface allowed administra- tors to modify the details of existing chat rooms. They could edit the room's name, description, or any other associated attributes. This flex- ibility enabled administrators to keep the room information up to date. • Delete Rooms: Administrators could delete chat rooms when necessary. The administration panel provided a straightforward way to remove rooms that were no longer needed. This helped maintain a streamlined and or- ganized chat environment. Figure 7.6 shows the room object from the Django Administration interface. Figure 7.6: Room Object Dept. of Information Technology Engineering Page 27
Cyber Bullying Detection and Prevention in Web Chat Application using SVM 7.4 COST ANALYSIS COCOMO Model (COnstructive COst MOdel) The COCOMO (COnstructive COst MOdel) is a widely used software cost estimation model developed by Barry Boehm in the late 1970s. It provides a framework for es- timating the effort, cost, and schedule of software development projects based on various parameters. The model is based on the assumption that several factors in- fluence the cost and effort required to develop software. Semi-detached COCOMO model The Semi-detached COCOMO model, a classification within the COCOMO frame- work, is used to estimate the effort, cost, and schedule of moderately complex soft- ware projects • Predefined Values : a1=3, a2=1.12, b=2.5 , b2=0.35 where, a1, a2, b, and b2 are the constants for each group of software products. • Lines of Code (LOC) = 1372 • KLOC = 1.372 Where KLOc is the estimated size of the software product indi- cated in Kilo Lines of Code. • Effort: Effort = a1 ∗ (1.374) a2 = 3 ∗ (1.374) 1.12 = 4.275 • Tdev: It is the estimated time to develop the software, expressed in months. Tdev = b ∗ (E f f or t) b2 = 2.5 ∗ (4.275) 0.35 = 4.156 months • Here, We have assumed Rs.20,000 salary per engineer. Therefore, Total Cost = 20000 ∗ 4.156 = 83,120 Total Cost = Rs.83,120 From the above illustration, if the salary per engineer is considered as Rs.20000, the total cost of the project is Rs.83120. The next chapter gives the overview of the weekly planning and schedule of the project throughout the year. Dept. of Information Technology Engineering Page 28
Chapter 8 PROJECT PLANNING This chapter gives the weekly planning of the project and the schedule of each task. Table 8.1: Task Schedule Sr. No. Weeks Tasks 1 Week 1 1 Sept to 5 Sept Literature Survey. 2 Week 2 6 Sept to 12 Sept Literature Survey. 3 Week 3 13 Sept to 19 Sept Discussed two project topics and one of them was finalized. 4 Week 4 20 Sept to 26 Sept Functionalities and approach towards the project were discussed. 5 Week 5 27 Sept to 3 Oct Prepared Presentation on Review 1 and discussed the dataset and block diagram of the system along with the scope and objectives of the project. 6 Week 6 4 Oct to 10 Oct Changes according to the suggestion from the Review-I presentation. 7 Week 7 11 Oct to 17 Oct Gathering more information on detailing of project. 8 Week 8 18 Oct to 24 Oct Identified the technology stack required to develop project. 9 Week 9 25 Oct to 31 Oct Discussion on Experimental Setup. 10 Week 10 1 Nov to 7 Nov Prepared the UML Diagrams. Continued on next page 29

Cyber Bullying Detection and Prevention in Web Chat Application using SVM Table 8.1 – Continued from previous page Sr. No. Weeks Tasks 11 Week 11 8 Nov to 14 Nov Delivered Project Review-II. Discussed the experimental setup and UML diagrams. 12 Week 12 15 Nov to 21 Nov Shown stage-I report to guide and made suggested changes. 13 Week 13 22 Nov to 28 Nov Appeared for the project phase-I exam. 14 Week 14 29 Nov to 5 Dec Submitted stage-I Report. 15 Week 15 6 Dec to 12 Dec Started learning required technology. 16 Week 16 13 Dec to 19 Dec Learning required technology. 17 Week 17 20 Dec to 26 Dec Working on frontend part of chat application 18 Week 18 27 Dec to 2 Jan Working on frontend part of chat application. 19 Week 19 3 Jan to 9 Jan Working on frontend part of chat application. 20 Week 20 10 Jan to 16 Jan Shown and discussed the frontend Part of the chat application. 21 Week 21 17 Jan to 23 Jan Working on backend part of chat application. 22 Week 22 24 Jan to 30 Jan Working on backend part of chat application. 23 Week 23 31 Jan to 6 Feb demonstrated the chat application to guide and made some minor changes. 24 Week 24 7 Feb to 13 Feb Discussion on Project Review-III with guide. Shown the working chat application. 25 Week 25 14 Feb to 20 Feb Made changes in Review-III presentation suggested by guide. 26 Week 26 21 Feb to 27 Feb Delivered project Review-III. 27 Week 27 28 Feb to 6 Mar Made changes suggested in Review-III. Continued on next page Dept. of Information Technology Engineering Page 30
Cyber Bullying Detection and Prevention in Web Chat Application using SVM Table 8.1 – Continued from previous page Sr. No. Weeks Tasks 28 Week 28 7 Mar to 13 Mar Working on machine learning module. 29 Week 29 14 Mar to 20 Mar Working on machine learning module. 30 Week 30 21 Mar to 27 Mar Shown the ML module to guide. 31 Week 31 28 Mar to 4 April Review-IV Demonstrated chat application and Machine learning module. 32 Week 32 5 April to 11 April Integrated Machine Learning module with chat application and carried out testing of the system by giving various inputs. . 33 Week 33 12 April to 18 April Final testing and review the overall project. 34 Week 34 19 April to 25 April Shown and demonstrated the finalized project to guide and proceeded with Research paper publication. 36 Week 35 26 April to 2 May Working on the project report. 36 Week 35 3 May to 10 May Created the project report as per the guidelines. Dept. of Information Technology Engineering Page 31
Chapter 9 CONCLUSION This chapter concludes the project. The web chat application will provide a safe and secure platform for the users to connect with people. The machine learning model integrated with the chat applica- tion will detect the toxicity of a chat, if it is bad, it can flag a message and ban users. Hence users will be able to live and maintain their healthy social life. 32
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