A PROJECT REPORT

ON

OPTIMIZATION OF UNMASKING CYBERBULIES ON TWITTER

Submitted to

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

For the partial fulfillment of the requirement for the degree of

BACHELOR OF TECHNOLOGY

IN

COMPUTER SCIENCE AND ENGINEERING

Submitted by

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

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Tirupathi – Chittoor Highway, P.Kothakota, Pakala – 517 112

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CERTIFICATE

This is to certify that the project report entitled **"OPTIMIZATION OF UNMASKING CYBERBULLIES ON TWITTER"** is being submitted by ***P.V.SUDHEER (184M1A0584), N.SIVA PRASAD (184M1A0576), V.ANIL KUMAR (184M1A05A7), AND V.GNAGESWAR (184M1A05B3)*** in partial fulfillment of the requirements for the award of Bachelor of Technology in COMPUTER SCIENCE AND ENGINEERING to the JNTUA, Ananthapuram. This Project report is a bonafide work carried out by them under my guidance and supervision. The results embodied in this project report have not been submitted to any other University or Institute for the award of any Degree or Diploma.

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DECLARATION

We hereby declare that the project report entitled **“OPTIMIZATION OF UNMASKING CYBERBULLIES ON TWITTER”** submitted to the Department of COMPUTER SCIENCE AND ENGINEERING, in partial fulfillment of requirements for the award of the degree of BACHELOR OF TECHNOLOGY in COMPUTER SCIENCE AND ENGNIEERING. This project is the result of our own effort and it has not been submitted to any other University or Institution for the award of degree.

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LIST OF FIGURES

LIST OF ABBREVATIONS

GDPR	:	General Data Protection Regulation
HTML	:	Hyper Text Transfer Protocol
JSP	:	Java Server Pages
CSS	:	Cascading Style Sheets
ODBC	:	Open Database Connectivity
JDBC	:	Java Database Connectivity
JVM	:	Java Virtual Machine
API	:	Application Programming Interface
GUI	:	Graphical User Interface

ABSTRACT

One of the most harmful consequences of social media is the rise of cyberbullying, which tends to be more sinister than traditional bullying, given that online records typically live on the Internet for quite a long time and are hard to control. In this article, we present a three-phase algorithm, called BullyNet, for detecting cyberbullies on Twitter social network. We exploit bullying tendencies by proposing a robust method for constructing a cyberbullying signed network (SN). We analyse tweets to determine their relation to cyberbullying while considering the context in which the tweets exist in order to optimize their bullying score. We also propose a centrality measure to detect cyberbullies from a cyberbullying SN and show that it outperforms other existing measures. We experiment on a data set of 5.6 million tweets, and our results show that the proposed approach can detect cyberbullies with high accuracy while being scalable with respect to the number of tweets.

CHAPTER 1

INTRODUCTION

Computer security (Also known as cyber security or IT Security) is information security as applied to computers and networks. The field covers all the processes and mechanisms by which computer-based equipment, information and services are protected from unintended or unauthorized access, change or destruction. Computer security also includes protection from unplanned events and natural disasters. Otherwise, in the computer industry, the term security -- or the phrase computer security -- refers to techniques for ensuring that data stored in a computercannot be read or compromised by any individuals without authorization. Most computer security measures involve data encryption and passwords. Data encryption is the translation of data into a form that is unintelligible without a deciphering mechanism. A password is a secret word or phrase that gives a user access to a particular program or system.

Diagram clearly explain the about the secure computing

WORKING CONDITIONS AND BASIC NEEDS IN THE SECURE COMPUTING:

If you don't take basic steps to protect your work computer, you put it and all the information on it at risk. You can potentially compromise the operation of other computers on your organization's network, or even the functioning of the network as a whole.

1. PHYSICAL SECURITY:

Technical measures like login passwords, anti-virus are essential. (More about those below) However, a secure physical space is the first and more important line of defense.

Is the place you keep your workplace computer secure enough to prevent theft or access to it while you are away? While the Security Department provides coverage across the Medical center, it only takes seconds to steal a computer, particularly a portable device like a laptop or a PDA. A computer should be secured like any other valuable possession when you are not present.

Human threats are not the only concern. Computers can be compromised by environmental mishaps (e.g., water, coffee) or physical trauma. Make sure the physical location of your computer takes account of those risks as well.

2. ACCESS PASSWORDS:

The University's networks and shared information systems are protected in part by login credentials (user-IDs and passwords). Access passwords are also an essential protection for personal computers in most circumstances. Offices are usually open and shared spaces, so physical access to computers cannot be completely controlled.

To protect your computer, you should consider setting passwords for particularly sensitive applications resident on the computer (e.g., data analysis software), if the software provides that capability.

3. PRYING EYE PROTECTION:

Because we deal with all facets of clinical, research, educational and administrative data here on the medical campus, it is important to do everything possible to minimize exposure of data to unauthorized individuals.

4. ANTI-VIRUS SOFTWARE:

Up-to-date, properly configured anti-virus software is essential. While we have server-side anti-virus software on our network computers, you still need it on the client side (your computer).

5. FIREWALLS:

Anti-virus products inspect files on your computer and in email. Firewall software and hardware monitor communications between your computer and the outside world. That is essential for any networked computer.

6. SOFTWARE UPDATES:

It is critical to keep software up to date, especially the operating system, anti-virus and anti-spyware, email and browser software. The newest versions will contain fixes for discovered vulnerabilities.

Almost all anti-virus have automatic update features (including SAV). Keeping the "signatures" (digital patterns) of malicious software detectors up-to-date is essential for these products to be effective.

7. KEEP SECURE BACKUPS:

Even if you take all these security steps, bad things can still happen. Be prepared for the worst by making backup copies of critical data, and keeping those backup copies in a separate, secure location. For example, use supplemental hard drives, CDs/DVDs, or flash drives to store critical, hard-to-replace data.

8. REPORT PROBLEMS:

If you believe that your computer or any data on it has been compromised, your should make a information security incident report. That is required by University policy for all data on our systems, and legally required for health, education, financial and any other kind of record containing identifiable personal information.

BENEFITS OF SECURE COMPUTING:

- **Protect yourself - Civil liability**:

  You may be held legally liable to compensate a third party should they experience financial damage or distress as a result of their personal data being stolen from you or leaked by you.

- **Protect your credibility Compliance**:

  You may require compliancy with the Data Protection Act, the FSA, SOX or other regulatory standards. Each of these bodies stipulates that certain measures be taken to protect the data on your network.

- **Protect your reputation – Spam:**

  A common use for infected systems is to join them to a botnet (a collection of infected machines which takes orders from a command server) and use them to send out spam. This spam can be traced back to you, your server could be blacklisted and you could be unable to send email.

- **Protect your income - Competitive advantage:**

  There are a number of “hackers-for-hire” advertising their services on the internet selling their skills in breaking into company’s servers to steal client databases, proprietary software, merger and acquisition information, personnel detailset al.

- **Protect your business – Blackmail**:

  A seldom-reported source of income for “hackers” is to·break into your server, change all your passwords and lock you out of it. The password is then sold back to you. Note: the “hackers” may implant a backdoor program on your server so that they can repeat the exercise at will.

- **Protect your investment - Free storage:**

  Your server’s harddrive space is used (or sold on) to house the hacker's video clips, music collections, pirated software or worse. Your server or computer then becomes continuously slow and your internet connection speeds deteriorate due to the number of people connecting to your server in order to download the offered wares.

WHAT IS A SOCIAL NETWORK?

Wikipedia defines a social network service as a service which “focuses on the building and verifying of online social networks for communities of people who share interests and activities, or who are interested in exploring the interests and activities of others, and which necessitates the use of software.”

A report published by OCLC provides the following definition of social networking sites: “Web sites primarily designed to facilitate interaction between users who share interests, attitudes and activities, such as Facebook, Mixi and MySpace.”

WHAT CAN SOCIAL NETWORKS BE USED FOR?

Social networks can provide a range of benefits to members of an organisation:

- **Support for learning**: Social networks can enhance informal learning and support social connections within groups of learners and with those involved in the support of learning.
- **Support for members of an organisation**: Social networks can potentially be used my all members of an organisation, and not just those involved in working with students. Social networks can help the development of communities of practice.
- **Engaging with others**: Passive use of social networks can provide valuable business intelligence and feedback on institutional services (although this may give rise to ethical concerns).
- **Ease of access to information and applications**: The ease of use of many social networking services can provide benefits to users by simplifying access to other tools

and applications. The Facebook Platform provides an example of how a social networking service can be used as an environment for other tools.

- **Common interface**: A possible benefit of social networks may be the common interface which spans work / social boundaries. Since such services are often used in a personal capacity the interface and the way the service works may be familiar, thus minimising training and support needed to exploit the services in a professional context. This can, however, also be a barrier to those who wish to have strict boundaries between work and social activities.

EXAMPLES OF SOCIAL NETWORKING SERVICES

Some examples of popular social networking services include:

- **Facebook**: Facebook is a social networking Web site that allows people to communicate with their friends and exchange information. In May 2007 Facebook launched the Facebook Platform which provides a framework for developers to create applications that interact with core Facebook features
- **MySpace**: MySpace is a social networking Web site offering an interactive, user-submitted network of friends, personal profiles, blogs and groups, commonly used for sharing photos, music and videos..
- **Ning**: An online platform for creating social Web sites and social networks aimed at users who want to create networks around specific interests or have limited technical skills.
- **Twitter**: Twitter is an example of a micro-blogging service. Twitter can be used in a variety of ways including sharing brief information with users and providing support for one’s peers.
- Note that this brief list of popular social networking services omits popular social sharing services such as Flickr and YouTube.

OPPORTUNITIES AND CHALLENGES

The popularity and ease of use of social networking services have excited institutions with their potential in a variety of areas. However effective use of social networking services poses a number of challenges for institutions including long-term sustainability of the services; user concerns over use of social tools in a work or study context; a variety of technical issues and legal issues such as copyright, privacy, accessibility; etc.

Institutions would be advised to consider carefully the implications before promoting significant use of such services.

CHAPTER 2

PROBLEMS AND SOLUTION OF THE PROJECT

2.1 EXISTING SYSTEM:

- Xu et al. used textual information to identify emotions in bullying traces, as opposed to determining whether or not a message was bullying.
- Singh et al. proposed a probabilistic socio-textual information fusion for cyberbullying detection. This fusion uses social network features derived from a 1.5 ego network and textual features, such as density of bad words and part-of-speech-tags.
- Cheng et al. proposed a novel method in identifying cyberbullies within a multimodal context. To understand cyberbullying, Kao et al. proposed a framework by studying social role detection. By using words and comments, temporal characteristics, and social information of a session as well as peer influence

DISADVANTAGES OF EXISTING SYSTEM:

- Although strict laws exist to punish cyberbullying, there are very less tools available to effectively combat cyberbullying. Social media platforms provide users with the option to self-report abusive behavior and content in addition to providing tools to deal with bullying.
- Mining social media networks to determine cyberbullies imposes several challenges and concerns.
- Most of the existing system techniques are more manual process that relies on human intervention and decision making
- The existing system manually classified them and then differentiate them to simple Naïve classification that uses sentiment analysis as a feature, their results were poor when compared to the manually classified Results.

2.2 PROPOSED SYSTEM:

- The objective of our solution is to identify the bullies from raw Twitter data based on the context as well as the contents in which the tweets exist. The aim of the present work is therefore to propose and experimentally evaluate an automated system, called BullyNet, which can able to filter unwanted messages from OSN user walls. We exploit text categorization techniques to automatically predict the bullying messages even with each short text message a set of categories based on its content.
- This project will reduce the drawback in the existing system, new software is developed in a user-friendly manner to satisfy and overcome the drawback. The defamation technique monitors every single post happens in this social media and every word will be administered by the automated system. Natural language processing technique combined with keyword matching algorithm ensures identifying defamed profiles and odd out and list them to admin user. In addition the admin has also have the option of blocking the user who makes cyberbulling.

ADVANTAGES OF PROPOSED SYSTEM:

- The proposed system shows us a Good accuracy which is better than existing systems. Our model will help people from the attacks of social media bullies.
- The proposed system instead of simply looking for patterns, and finding the bullies, it also has the option of block the bullies.
- The proposed system results will be more precise as compared to existing system.

CHAPTER 3

SYSTEM STUDY

FEASIBILITY STUDY

The feasibility of the project is analyzed in this phase and business proposal is put forth with a very general plan for the project and some cost estimates. During system analysis the feasibility study of the proposed system is to be carried out. This is to ensure that the proposed system is not a burden to the company. For feasibility analysis, some understanding of the major requirements for the system is essential.

Three key considerations involved in the feasibility analysis are

- ECONOMICAL FEASIBILITY
- TECHNICAL FEASIBILITY
- SOCIAL FEASIBILITY

3.1 ECONOMICAL FEASIBILITY

This study is carried out to check the economic impact that the system will have on the organization. The amount of fund that the company can pour into the research and development of the system is limited. The expenditures must be justified. Thus the developed system as well within the budget and this was achieved because most of the technologies used are freely available. Only the customized products had to be purchased.

3.2 TECHNICAL FEASIBILITY

This study is carried out to check the technical feasibility, that is, the technical requirements of the system. Any system developed must not have a high demand on the available technical resources. This will lead to high demands on the available technical resources. This will lead to high demands being placed on the client. The developed system must have a modest requirement, as only minimal or null changes are required for implementing this system.

3.3 SOCIAL FEASIBILITY

The aspect of study is to check the level of acceptance of the system by the user. This includes the process of training the user to use the system efficiently. The user must not feel threatened by the system, instead must accept it as a necessity. The level of acceptance by the users solely depends on the methods that are employed to educate the user about the system and to make him familiar with it. His level of confidence must be raised so that he is also able to make some constructive criticism, which is welcomed, as he is the final user of the system.

CHAPTER 4

SYSTEM ANALYSIS

HARDWARE REQUIREMENTS:

➢ System	:	Pentium i3 Processor
➢ Hard Disk	:	500 GB.
➢ Monitor	:	15’’ LED
➢ Input Devices	:	Keyboard, Mouse
➢ Ram	:	2 GB

SOFTWARE REQUIREMENTS:

➢ Operating system	:	Windows 10.
➢ Coding Language	:	JAVA.
➢ Tool	:	Netbeans 8.2
➢ Database	:	MYSQL

CHAPTER 5

SYSTEM DESIGN

MODULES:

- OSN System Construction Module
- Filtering process module
- Online setup assistant module
- Blocking process
- Admin module

MODULES DESCRIPTION:

OSN System Construction Module

- We create the Online Social Networking (OSN) system module in the first module. We built the system with the Online Social Networking System, Twitter, as a feature. Whereas this module is used for new user registrations, after which users can login using their authentication.
- Options are built after existing users can send messages privately and publicly. Users can also share their posts with other people. The user can search other users' profiles and public posts. Users can also accept and send friend requests in this module.
- The initial module is built with all of the basic features of Online Social Networking System modules to demonstrate and evaluate our system's features.
- The proposed framework for the BullyNet: Unmasking Cyberbullies on Social Networks is presented. In artificial intelligence, for example, the profiling process can be expressed as a learning problem that leverages users' prior knowledge. Rather than requiring the user to provide their profile, the system should frequently learn it.

Filtering Process Module:

We consider three major issues in defining the language for FRs specification that, in our opinion, should influence a message filtering decision. To begin with, in OSNs, as in real life, the same message can have different meanings and relevance depending on who writes it. As a result, FRs should enable users to impose constraints on message creators. Creators to whom a FR applies can be chosen using a variety of criteria, the most important of which is imposing conditions on the attributes of their profile. It is possible, for example, to define rules that apply only to young creators or creators with a specific religious/political viewpoint.Given the social network scenario, creators could also be identified using information from their social graph. This implies that the creators of the relationship(s) should be involved in stating conditions on the type, depth, and trust values of the relationship(s) in order to apply the specified rules.

Online setup assistant module:

This module addresses the issue of configuring cyberbullying words via an Online Setup Assistant (OSA) procedure. For each message, the administrator informs the system whether the message should be accepted or rejected as bullying language. The collection and processing of system decisions on an appropriate set of messages distributed across all classes enables the computation of customised thresholds representing the user attitude in accepting or rejecting specific contents.

Blocking Process module:

A Blocking mechanism is also included in our system to prevent messages from unwanted creators, regardless of their content. Blocking is managed directly by the system, which should be able to determine which users should be included in the blocking and when their retention in the blocking should end. The administrator has the option of manually blocking cyberbullying users. As a result, a user may be banned from a wall while still being able to post on other walls and cannot login to the system again.

Admin Module:

The admin manages all user information in this module, including posting comments in the user status box. Each unwanted message is accompanied by an alert from admin, which provides a location for posting and sharing on the respective user walls. And administrators can view blocked messages from users, as well as information about the user who used the blocked message. Admin can also enable extra features on their own page, such as user list, adding unwanted messages, updating unwanted messages, blocked users list, and finally filter performance graph. In this module, we also show the system's performance evaluation in the graph. The graph shows the number of normal tweets and the number of bullying tweets.

UML DIAGRAMS

UML stands for Unified Modeling Language. UML is a standardized general-purpose modeling language in the field of object-oriented software engineering. The standard is managed, and was created by, the Object Management Group.

The goal is for UML to become a common language for creating models of object oriented computer software. In its current form UML is comprised of two major components: a Meta-model and a notation. In the future, some form of method or process may also be added to; or associated with, UML.

The Unified Modeling Language is a standard language for specifying, Visualization, Constructing and documenting the artifacts of software system, as well as for business modeling and other non-software systems.

The UML represents a collection of best engineering practices that have proven successful in the modeling of large and complex systems.

The UML is a very important part of developing objects oriented software and the software development process. The UML uses mostly graphical notations to express the design of software projects.

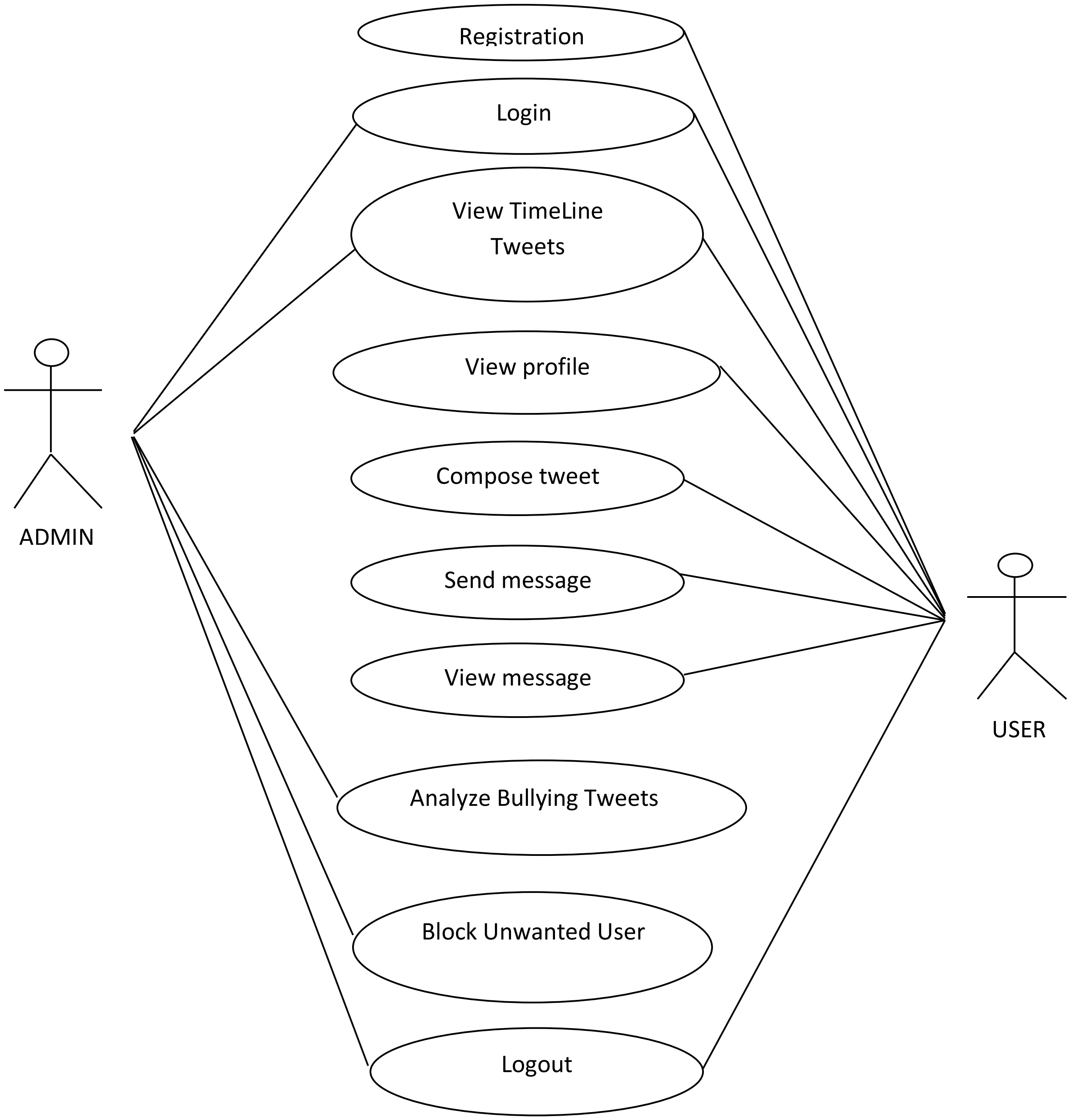
GOALS:

The Primary goals in the design of the UML are as follows:

1. Provide users a ready-to-use, expressive visual modeling Language so that they can develop and exchange meaningful models.
2. Provide extendibility and specialization mechanisms to extend the core concepts.
3. Be independent of particular programming languages and development process.
4. Provide a formal basis for understanding the modeling language.
5. Encourage the growth of OO tools market.
6. Support higher level development concepts such as collaborations, frameworks, patterns and components.
7. Integrate best practices.

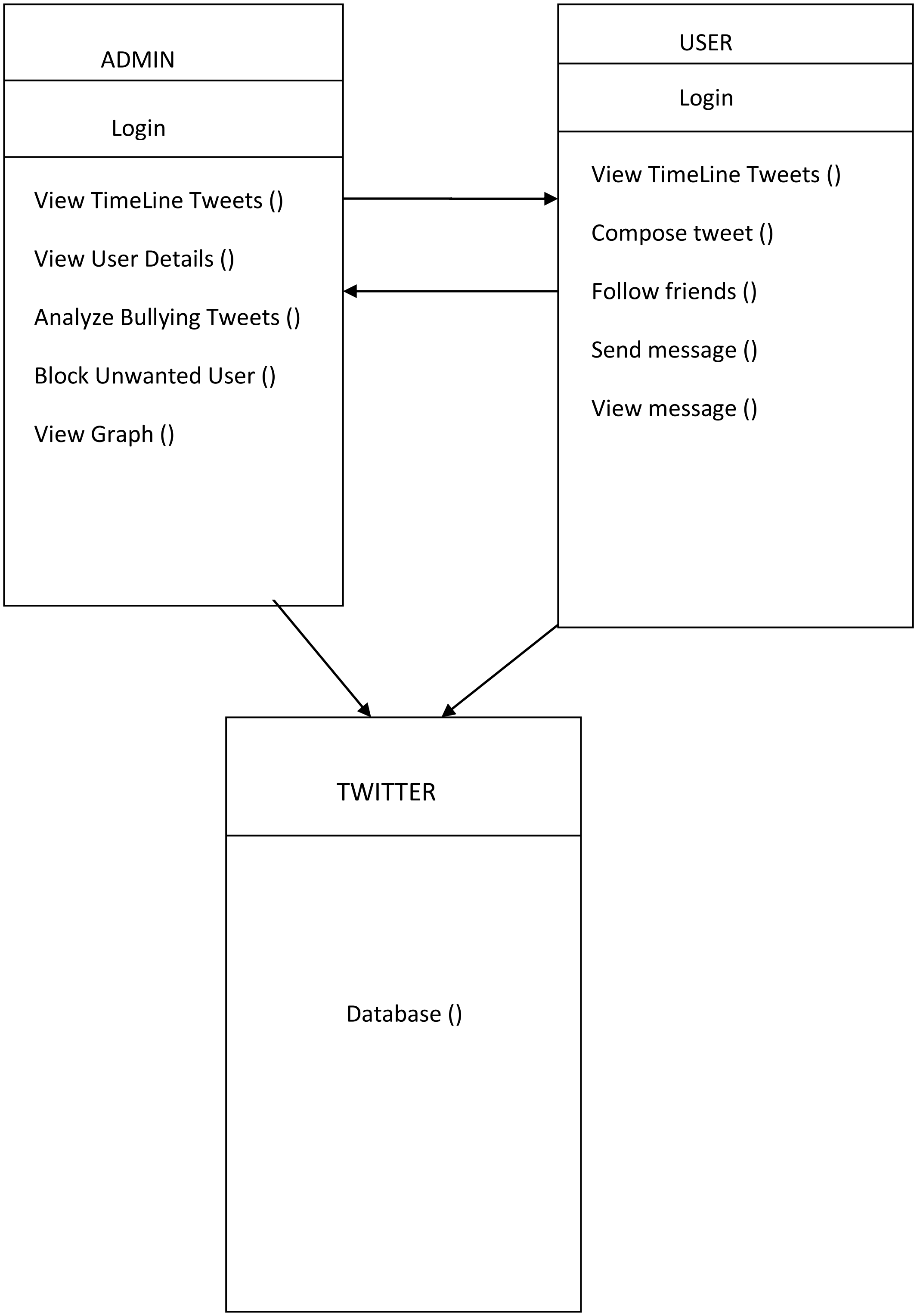
USE CASE DIAGRAM:

A use case diagram in the Unified Modeling Language (UML) is a type of behavioral diagram defined by and created from a Use-case analysis. Its purpose is to present a graphical overview of the functionality provided by a system in terms of actors, their goals (represented as use cases), and any dependencies between those use cases. The main purpose of a use case diagram is to show what system functions are performed for which actor. Roles of the actors in the system can be depicted.


Registration
Login
View TimeLine Tweets
View profile
Compose tweet
Send message
View message
Analyze Bullying Tweets
Block Unwanted User
Logout
ADMIN
USER

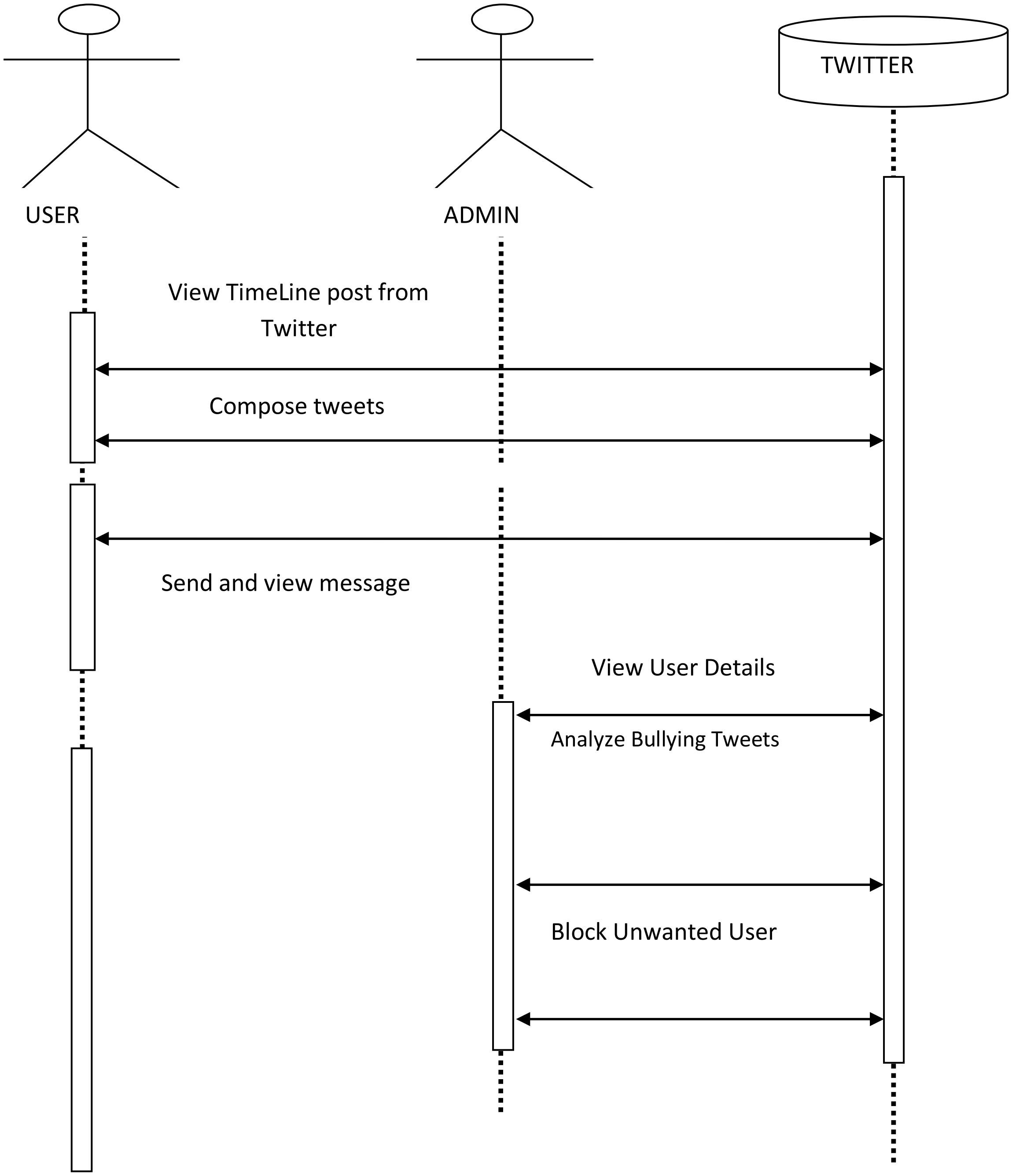
CLASS DIAGRAM:

In software engineering, a class diagram in the Unified Modeling Language (UML) is a type of static structure diagram that describes the structure of a system by showing the system's classes, their attributes, operations (or methods), and the relationships among the classes. It explains which class contains information


ADMIN
Login
View TimeLine Tweets ()
View User Details ()
Analyze Bullying Tweets ()
Block Unwanted User ()
View Graph ()
USER
Login
View TimeLine Tweets ()
Compose tweet ()
Follow friends ()
Send message ()
View message ()
TWITTER
Database ()

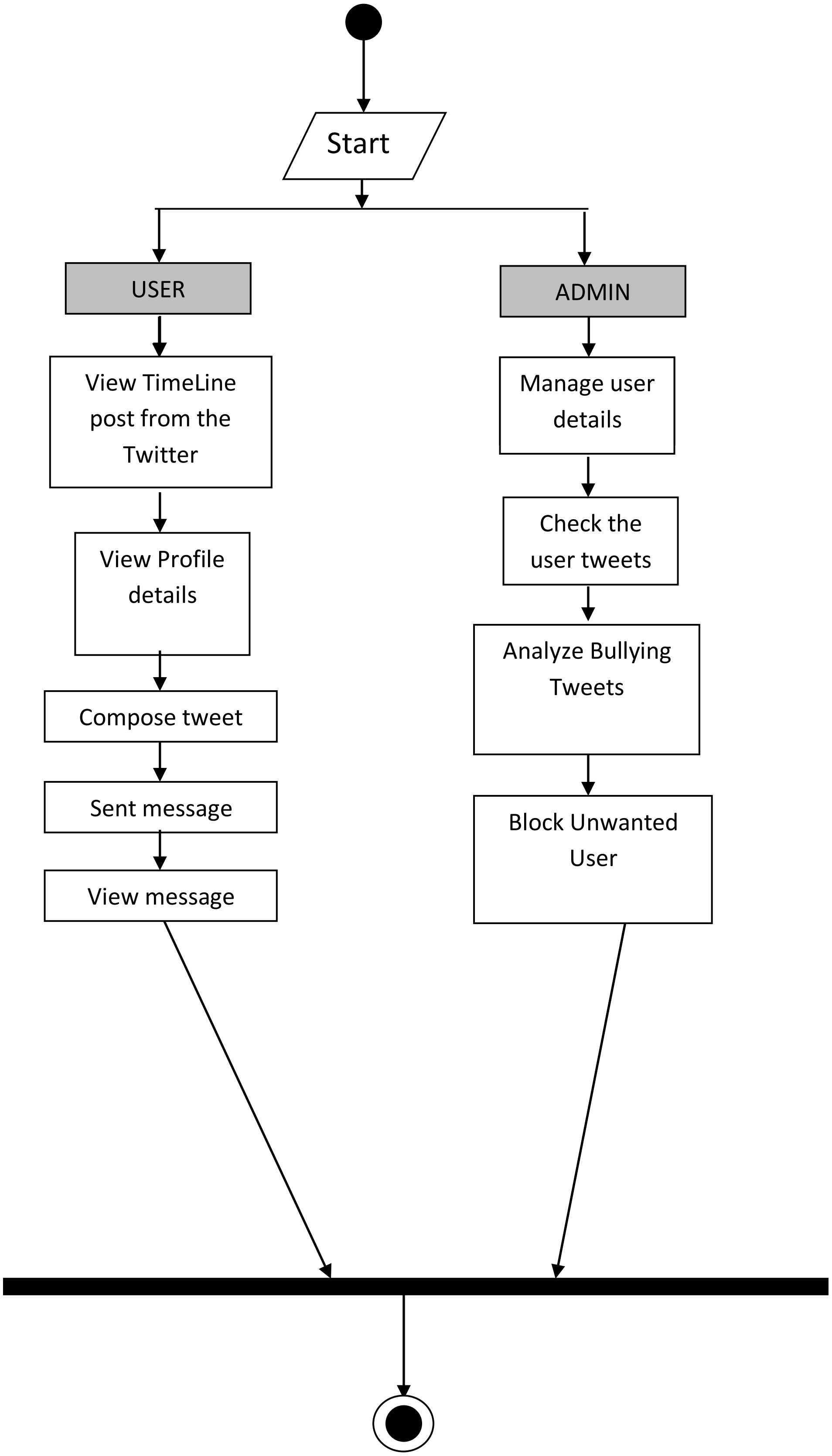
SEQUENCE DIAGRAM:

A sequence diagram in Unified Modeling Language (UML) is a kind of interaction diagram that shows how processes operate with one another and in what order. It is a construct of a Message Sequence Chart. Sequence diagrams are sometimes called event diagrams, event scenarios, and timing diagram.


TWITTER
USER
ADMIN
View TimeLine post from Twitter
Compose tweets
Send and view message
View User Details
Analyze Bullying Tweets
Block Unwanted User

ACTIVITY DIAGRAM:

Activity diagrams are graphical representations of workflows of stepwise activities and actions with support for choice, iteration and concurrency. In the Unified Modeling Language, activity diagrams can be used to describe the business and operational step-by-step workflows of components in a system. An activity diagram shows the overall flow of control.


Start
USER
ADMIN
View TimeLine post from the Twitter
View Profile details
Compose tweet
Sent message
View message
Manage user details
Check the user tweets
Analyze Bullying Tweets
Block Unwanted User

CHAPTER 6

SOFTWARE ENVIRONMENT

6.1 JAVA TECHNOLOGY

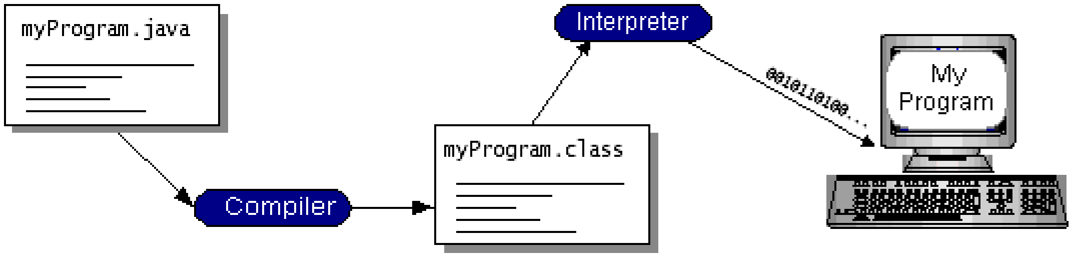
Java technology is both a programming language and a platform.

THE JAVA PROGRAMMING LANGUAGE

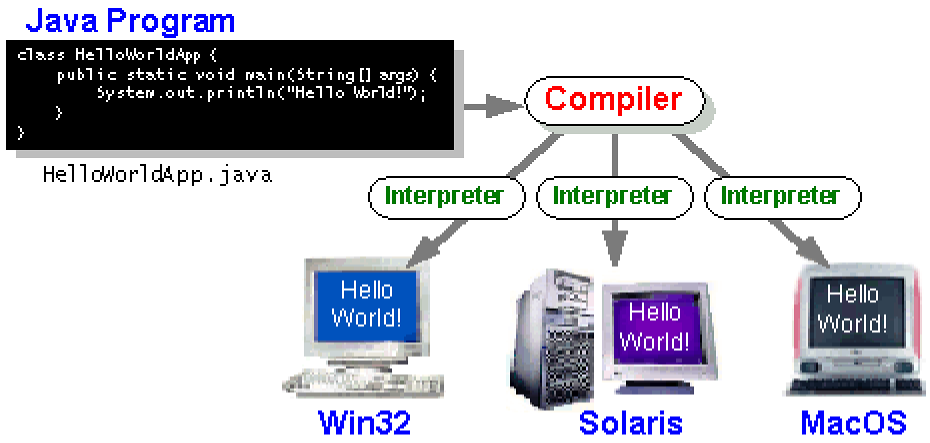
The Java programming language is a high-level language that can be characterized by all of the following buzzwords:

- Simple
- Architecture neutral
- Object oriented
- Portable
- Distributed
- High performance
- Interpreted
- Multithreaded
- Robust
- Dynamic
- Secure

With most programming languages, you either compile or interpret a program so that you can run it on your computer. The Java programming language is unusual in that a program is both compiled and interpreted. With the compiler, first you translate a program into an intermediate language called Java byte codes —the platform-independent codes interpreted by the interpreter on the Java platform. The interpreter parses and runs each Java byte code instruction on the computer. Compilation happens just once; interpretation occurs each time the program is executed. The following figure illustrates how this works.



You can think of Java byte codes as the machine code instructions for the Java Virtual Machine (Java VM). Every Java interpreter, whether it’s a development tool or a Web browser that can run applets, is an implementation of the Java VM. Java byte codes help make “write once, run anywhere” possible. You can compile your program into byte codes on any platform that has a Java compiler. The byte codes can then be run on any implementation of the Java VM. That means that as long as a computer has a Java VM, the same program written in the Java programming language can run on Windows 2000, a Solaris workstation, or on an iMac.



```
class HelloWorldApp {
    public static void main(String[] args) {
        System.out.println("Hello World!");
    }
}
```

The Java Platform

A platform is the hardware or software environment in which a program runs. We've already mentioned some of the most popular platforms like Windows 2000, Linux, Solaris, and MacOS. Most platforms can be described as a combination of the operating system and hardware. The Java platform differs from most other platforms in that it's a software-only platform that runs on top of other hardware-based platforms.

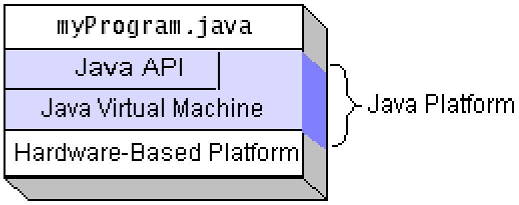
The Java platform has two components:

- The Java Virtual Machine (Java VM)
- The Java Application Programming Interface (Java API)

You've already been introduced to the Java VM. It's the base for the Java platform and is ported onto various hardware-based platforms.

The Java API is a large collection of ready-made software components that provide many useful capabilities, such as graphical user interface (GUI) widgets. The Java API is grouped into libraries of related classes and interfaces; these libraries are known as packages. The next section, What Can Java Technology Do? Highlights what functionality some of the packages in the Java API provide.

The following figure depicts a program that's running on the Java platform. As the figure shows, the Java API and the virtual machine insulate the program from the hardware.



Native code is code that after you compile it, the compiled code runs on a specific hardware platform. As a platform-independent environment, the Java platform can be a bit slower than native code. However, smart compilers, well-tuned interpreters, and just-in-time byte code compilers can bring performance close to that of native code without threatening portability.

WHAT CAN JAVA TECHNOLOGY DO?

The most common types of programs written in the Java programming language are applets and applications. If you've surfed the Web, you're probably already familiar with applets. An applet is a program that adheres to certain conventions that allow it to run within a Java-enabled browser.

However, the Java programming language is not just for writing cute, entertaining applets for the Web. The general-purpose, high-level Java programming language is also a powerful software platform. Using the generous API, you can write many types of programs.

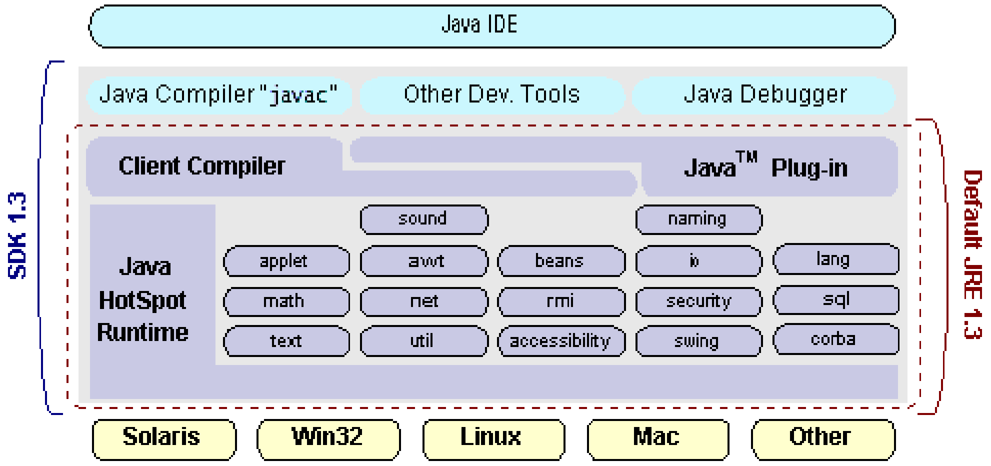
An application is a standalone program that runs directly on the Java platform. A special kind of application known as a server serves and supports clients on a network. Examples of servers are Web servers, proxy servers, mail servers, and print servers. Another specialized program is a servlet. A servlet can almost be thought of as an applet that runs on the server side. Java Servlets are a popular choice for building interactive web applications, replacing the use of CGI scripts. Servlets are similar to applets in that they are runtime extensions of applications. Instead of working in browsers, though, servlets run within Java Web servers, configuring or tailoring the server.

How does the API support all these kinds of programs? It does so with packages of software components that provides a wide range of functionality. Every full implementation of the Java platform gives you the following features:

- **The essentials**: Objects, strings, threads, numbers, input and output, data structures, system properties, date and time, and so on.
- **Applets**: The set of conventions used by applets.
- **Networking**: URLs, TCP (Transmission Control Protocol), UDP (User Data gram Protocol) sockets, and IP (Internet Protocol) addresses.

- **Internationalization**: Help for writing programs that can be localized for users worldwide. Programs can automatically adapt to specific locales and be displayed in the appropriate language.
- **Security**: Both low level and high level, including electronic signatures, public and private key management, access control, and certificates.
- **Software components**: Known as JavaBeans™, can plug into existing component architectures.
- **Object serialization**: Allows lightweight persistence and communication via Remote Method Invocation (RMI).
- **Java Database Connectivity (JDBC™)**: Provides uniform access to a wide range of relational databases.

The Java platform also has APIs for 2D and 3D graphics, accessibility, servers, collaboration, telephony, speech, animation, and more. The following figure depicts what is included in the Java 2 SDK.



HOW WILL JAVA TECHNOLOGY CHANGE MY LIFE?

We can’t promise you fame, fortune, or even a job if you learn the Java programming language. Still, it is likely to make your programs better and requires less effort than other languages. We believe that Java technology will help you do the following:

- **Get started quickly**: Although the Java programming language is a powerful object-oriented language, it’s easy to learn, especially for programmers already familiar with C or C++.
- **Write less code**: Comparisons of program metrics (class counts, method counts, and so on) suggest that a program written in the Java programming language can be four times smaller than the same program in C++.
- **Write better code**: The Java programming language encourages good coding practices, and its garbage collection helps you avoid memory leaks. Its object orientation, its JavaBeans component architecture, and its wide-ranging, easily extendible API let you reuse other people’s tested code and introduce fewer bugs.
- **Develop programs more quickly**: Your development time may be as much as twice as fast versus writing the same program in C++. Why? You write fewer lines of code and it is a simpler programming language than C++.
- **Avoid platform dependencies with 100% Pure Java**: You can keep your program portable by avoiding the use of libraries written in other languages. The 100% Pure Java^{TM}Product Certification Program has a repository of historical process manuals, white papers, brochures, and similar materials online.
- **Write once, run anywhere**: Because 100% Pure Java programs are compiled into machine-independent byte codes, they run consistently on any Java platform.
- **Distribute software more easily**: You can upgrade applets easily from a central server. Applets take advantage of the feature of allowing new classes to be loaded “on the fly,” without recompiling the entire program.

ODBC

Microsoft Open Database Connectivity (ODBC) is a standard programming interface for application developers and database systems providers. Before ODBC became a de facto standard for Windows programs to interface with database systems, programmers had to use proprietary languages for each database they wanted to connect to. Now, ODBC has made the choice of the database system almost irrelevant from a coding perspective, which is as it should be. Application developers have much more important things to worry about than the syntax that is needed to port their program from one database to another when business needs suddenly change.

Through the ODBC Administrator in Control Panel, you can specify the particular database that is associated with a data source that an ODBC application program is written to use. Think of an ODBC data source as a door with a name on it. Each door will lead you to a particular database. For example, the data source named Sales Figures might be a SQL Server database, whereas the Accounts Payable data source could refer to an Access database. The physical database referred to by a data source can reside anywhere on the LAN.

The ODBC system files are not installed on your system by Windows 95. Rather, they are installed when you setup a separate database application, such as SQL Server Client or Visual Basic 4.0. When the ODBC icon is installed in Control Panel, it uses a file called ODBCINST.DLL. It is also possible to administer your ODBC data sources through a stand-alone program called ODBCADM.EXE. There is a 16-bit and a 32-bit version of this program and each maintains a separate list of ODBC data sources.

From a programming perspective, the beauty of ODBC is that the application can be written to use the same set of function calls to interface with any data source, regardless of the database vendor. The source code of the application doesn't change whether it talks to Oracle or SQL Server. We only mention these two as an example. There are ODBC drivers available for several dozen popular database systems. Even Excel spreadsheets and plain text files can be turned into data sources. The operating system uses the Registry information written by ODBC Administrator to determine which low-level ODBC drivers are needed to talk to the data source (such as the interface to Oracle or SQL Server). The loading of the ODBC drivers is transparent to the ODBC application program. In a client/server environment, the ODBC API even handles many of the network issues for the application programmer.

The advantages of this scheme are so numerous that you are probably thinking there must be some catch. The only disadvantage of ODBC is that it isn't as efficient as talking directly to the native database interface. ODBC has had many detractors make the charge that it is too slow. Microsoft has always claimed that the critical factor in performance is the quality of the driver software that is used. In our humble opinion, this is true. The availability of good ODBC drivers has improved a great deal recently. And anyway, the criticism about performance is somewhat analogous to those who said that compilers would never match the speed of pure assembly language. Maybe not, but the compiler (or ODBC) gives you the opportunity to write cleaner programs, which means you finish sooner. Meanwhile, computers get faster every year.

JDBC

In an effort to set an independent database standard API for Java; Sun Microsystems developed Java Database Connectivity, or JDBC. JDBC offers a generic SQL database access mechanism that provides a consistent interface to a variety of RDBMSs. This consistent interface is achieved through the use of "plug-in" database connectivity modules, or drivers. If a database vendor wishes to have JDBC support, he or she must provide the driver for each platform that the database and Java run on.

To gain a wider acceptance of JDBC, Sun based JDBC's framework on ODBC. As you discovered earlier in this chapter, ODBC has widespread support on a variety of platforms. Basing JDBC on ODBC will allow vendors to bring JDBC drivers to market much faster than developing a completely new connectivity solution.

JDBC was announced in March of 1996. It was released for a 90 day public review that ended June 8, 1996. Because of user input, the final JDBC v1.0 specification was released soon after.

The remainder of this section will cover enough information about JDBC for you to know what it is about and how to use it effectively. This is by no means a complete overview of JDBC. That would fill an entire book.

JDBC Goals

Few software packages are designed without goals in mind. JDBC is one that, because of its many goals, drove the development of the API. These goals, in conjunction with early reviewer feedback, have finalized the JDBC class library into a solid framework for building database applications in Java.

The goals that were set for JDBC are important. They will give you some insight as to why certain classes and functionalities behave the way they do. The eight design goals for JDBC are as follows:

SQL Level API

The designers felt that their main goal was to define a SQL interface for Java. Although not the lowest database interface level possible, it is at a low enough level for higher-level tools and APIs to be created. Conversely, it is at a high enough level for application programmers to use it confidently. Attaining this goal allows for future tool vendors to “generate” JDBC code and to hide many of JDBC’s complexities from the end user.

1. **SQL Conformance**

SQL syntax varies as you move from database vendor to database vendor. In an effort to support a wide variety of vendors, JDBC will allow any query statement to be passed through it to the underlying database driver. This allows the connectivity module to handle non-standard functionality in a manner that is suitable for its users.

2. **JDBC must be implemental on top of common database interfaces**

The JDBC SQL API must “sit” on top of other common SQL level APIs. This goal allows JDBC to use existing ODBC level drivers by the use of a software interface. This interface would translate JDBC calls to ODBC and vice versa.

3. **Provide a Java interface that is consistent with the rest of the Java syste**

Because of Java’s acceptance in the user community thus far, the designers feel that they should not stray from the current design of the core Java system.

4. **Keep it simple**

This goal probably appears in all software design goal listings. JDBC is no exception. Sun felt that the design of JDBC should be very simple, allowing for only one method of completing a task per mechanism. Allowing duplicate functionality only serves to confuse the users of the API.

5. **Use strong, static typing wherever possible**

Strong typing allows for more error checking to be done at compile time; also, less error appear at runtime.

6. **Keep the common cases simple**

Because more often than not, the usual SQL calls used by the programmer are simple SELECT's, INSERT's, DELETE's and UPDATE's, these queries should be simple to perform with JDBC. However, more complex SQL statements should also be possible.

Finally we decided to proceed the implementation using JavaNetworking.

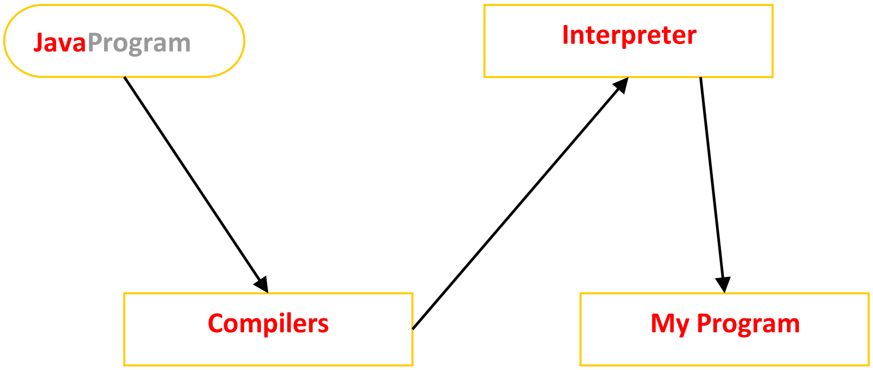
And for dynamically updating the cache table we go for MSAccess database.

Java ha two things: a programming language and a platform.
Java is a high-level programming language that is all of the following

Simple
Object-oriented
Distributed
Interpreted
Robust
Secure
Architecture-neutral
Portable
High-performance
multithreaded
Dynamic

Java is also unusual in that each Java program is both compiled and interpreted. With a compile you translate a Java program into an intermediate language called Java byte codes the platform-independent code instruction is passed and run on the computer.

Compilation happens just once; interpretation occurs each time the program is executed. The figure illustrates how this works.



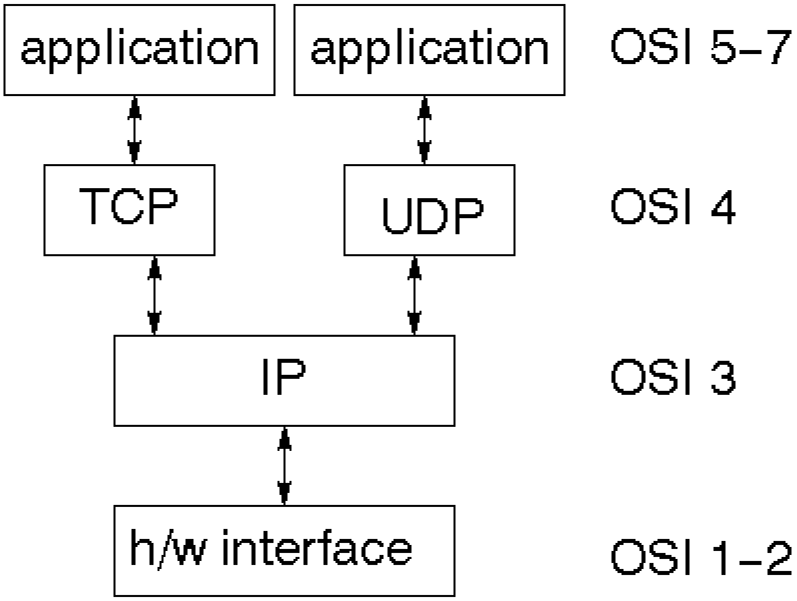
You can think of Java byte codes as the machine code instructions for the Java Virtual Machine (Java VM). Every Java interpreter, whether it's a Java development tool or a Web browser that can run Java applets, is an implementation of the Java VM. The Java VM can also be implemented in hardware.

Java byte codes help make "write once, run anywhere" possible. You can compile your Java program into byte codes on my platform that has a Java compiler. The byte codes can then be run any implementation of the Java VM. For example, the same Java program can run Windows NT, Solaris, and Macintosh.

6.2 NETWORKING:

TCP/IP stack:

The TCP/IP stack is shorter than the OSI one:



TCP is a connection-oriented protocol; UDP (User Datagram Protocol) is a connectionless protocol.

IP datagram’s:

The IP layer provides a connectionless and unreliable delivery system. It considers each datagram independently of the others. Any association between datagram must be supplied by the higher layers. The IP layer supplies a checksum that includes its own header. The header includes the source and destination addresses. The IP layer handles routing through an Internet. It is also responsible for breaking up large datagram into smaller ones for transmission and reassembling them at the other end.

UDP:

UDP is also connectionless and unreliable. What it adds to IP is a checksum for the contents of the datagram and port numbers. These are used to give a client/server model - see later.

TCP:

TCP supplies logic to give a reliable connection-oriented protocol above IP. It provides a virtual circuit that two processes can use to communicate.

Internet addresses:

In order to use a service, you must be able to find it. The Internet uses an address scheme for machines so that they can be located. The address is a 32 bit integer which gives the IP address. This encodes a network ID and more addressing. The network ID falls into various classes according to the size of the network address.

Network address:

Class A uses 8 bits for the network address with 24 bits left over for other addressing. Class B uses 16 bit network addressing. Class C uses 24 bit network addressing and class D uses all 32.

Subnet address:

Internally, the UNIX network is divided into sub networks. Building 11 is currently on one sub network and uses 10-bit addressing, allowing 1024 different hosts.

Host address:

8 bits are finally used for host addresses within our subnet. This places a limit of 256 machines that can be on the subnet.

Total address:

The 32 bit address is usually written as 4 integers separated by dots.

Port addresses:

A service exists on a host, and is identified by its port. This is a 16 bit number. To send a message to a server, you send it to the port for that service of the host that it is running on. This is not location transparency! Certain of these ports are "well known".

Sockets:

A socket is a data structure maintained by the system to handle network connections. A socket is created using the call socket. It returns an integer that is like a file descriptor. In fact, under Windows, this handle can be used with Read File and Write File functions.

```
#include <sys/types.h>
#include <sys/socket.h>
int socket(int family, int type, int protocol);
```

Here "family" will be AF_INET for IP communications, protocol will be zero, and type will depend on whether TCP or UDP is used. Two processes wishing to communicate over a network create a socket each. These are similar to two ends of a pipe - but the actual pipe does not yet exist.

JFree Chart:

JFreeChart is a free 100% Java chart library that makes it easy for developers to display professional quality charts in their applications. JFreeChart's extensive feature set includes:

A consistent and well-documented API, supporting a wide range of chart types;

A flexible design that is easy to extend, and targets both server-side and client-side applications;

Support for many output types, including Swing components, image files (including PNG and JPEG), and vector graphics file formats (including PDF, EPS and SVG);

JFreeChart is "open source" or, more specifically, free software. It is distributed under the terms of the GNU Lesser General Public Licence (LGPL), which permits use in proprietary applications.

1. Map Visualizations:

Charts showing values that relate to geographical areas. Some examples include: (a) population density in each state of the United States, (b) income per capita for each country in Europe, (c) life expectancy in each country of the world. The tasks in this project include:

Sourcing freely redistributable vector outlines for the countries of the world, states/provinces in particular countries (USA in particular, but also other areas);

Creating an appropriate dataset interface (plus default implementation), a rendered, and integrating this with the existing XYPlot class in JFreeChart;

Testing, documenting, testing some more, documenting some more.

2. Time Series Chart Interactivity:

Implement a new (to JFreeChart) feature for interactive time series charts --- to display a separate control that shows a small version of ALL the time series data, with a sliding "view" rectangle that allows you to select the subset of the time series data to display in the main chart.

3. Dashboards:

There is currently a lot of interest in dashboard displays. Create a flexible dashboard mechanism that supports a subset of JFreeChart chart types (dials, pies, thermometers, bars, and lines/time series) that can be delivered easily via both Java Web Start and an applet.

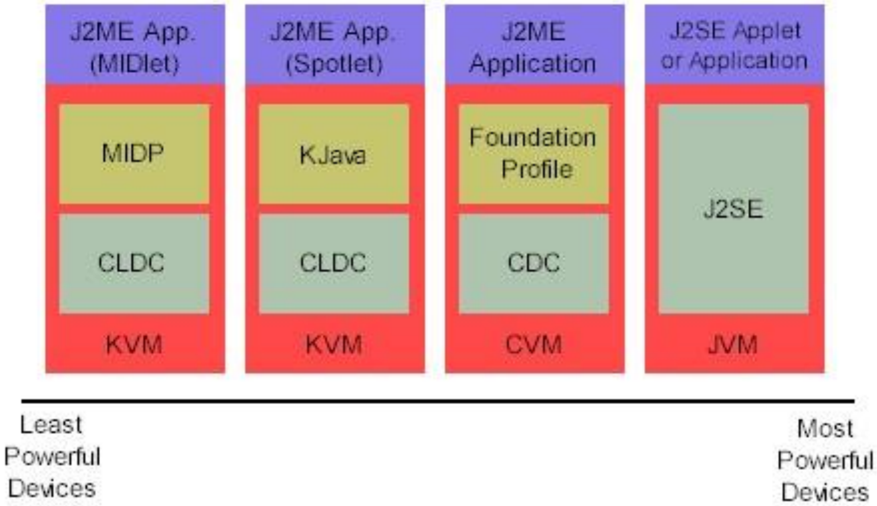
4. Property Editors:

The property editor mechanism in JFreeChart only handles a small subset of the properties that can be set for charts. Extend (or reimplement) this mechanism to provide greater end-user control over the appearance of the charts.

J2ME (Java 2 Micro edition):-

Sun Microsystems defines J2ME as "a highly optimized Java run-time environment targeting a wide range of consumer products, including pagers, cellular phones, screen-phones, digital set-top boxes and car navigation systems." Announced in June 1999 at the JavaOne Developer Conference, J2ME brings the cross-platform functionality of the Java language to smaller devices, allowing mobile wireless devices to share applications. With J2ME, Sun has adapted the Java platform for consumer products that incorporate or are based on small computing devices.

1. General J2ME architecture



J2ME uses configurations and profiles to customize the Java Runtime Environment (JRE). As a complete JRE, J2ME is comprised of a configuration, which determines the JVM used, and a profile, which defines the application by adding domain-specific classes. The configuration defines the basic run-time environment as a set of core classes and a specific JVM that run on specific types of devices. We'll discuss configurations in detail in the Theprofile defines the application; specifically, it adds domain-specific classes to the J2ME configuration to define certain uses for devices. We'll cover profiles in depth in the The following graphic depicts the relationship between the different virtual machines, configurations, and profiles. It also draws a parallel with the J2SE API and its Java virtual machine. While the J2SE virtual machine is generally referred to as a JVM, the J2ME virtual machines, KVM and CVM, are subsets of JVM. Both KVM and CVM can be thought of as a kind of Java virtual machine -- it's just that they are shrunken versions of the J2SE JVM and are specific to J2ME.

2.Developing J2ME applications

Introduction In this section, we will go over some considerations you need to keep in mind when developing applications for smaller devices. We'll take a look at the way the compiler is invoked when using J2SE to compile J2ME applications. Finally, we'll explore packaging and deployment and the role preverification plays in this process.

3.Design considerations for small devices

Developing applications for small devices requires you to keep certain strategies in mind during the design phase. It is best to strategically design an application for a small device before you begin coding. Correcting the code because you failed to consider all of the "gotchas" before developing the application can be a painful process. Here are some design strategies to consider:

* Keep it simple. Remove unnecessary features, possibly making those features a separate, secondary application.

* Smaller is better. This consideration should be a "no brainer" for all developers. Smaller applications use less memory on the device and require shorter installation times. Consider packaging your Java applications as compressed Java Archive (jar) files.

* Minimize run-time memory use. To minimize the amount of memory used at run time, use scalar types in place of object types. Also, do not depend on the garbage collector. You should manage the memory efficiently yourself by setting object references to null when you are finished with them. Another way to reduce run-time memory is to use lazy instantiation, only allocating objects on an as-needed basis. Other ways of reducing overall and peak memory use on small devices are to release resources quickly, reuse objects, and avoid exceptions.

4.Configurations overview

The configuration defines the basic run-time environment as a set of core classes and a specific JVM that run on specific types of devices. Currently, two configurations exist for J2ME, though others may be defined in the future:

* **Connected Limited Device Configuration (CLDC)** is used specifically with the KVM for 16-bit or 32-bit devices with limited amounts of memory. This is the configuration (and the virtual machine) used for developing small J2ME applications. Its size limitations make CLDC more interesting and challenging (from a development point of view) than CDC. CLDC is also the configuration that we will use for developing our drawing tool application. An example of a small wireless device running small applications is a Palm hand-held computer.

* **Connected Device Configuration (CDC)** is used with the C virtual machine (CVM) and is used for 32-bit architectures requiring more than 2 MB of memory. An example of such a device is a Net TV box.

5.J2ME profiles

WHAT IS A J2ME PROFILE?

As we mentioned earlier in this tutorial, a profile defines the type of device supported. The Mobile Information Device Profile (MIDP), for example, defines classes for cellular phones. It adds domain-specific classes to the J2ME configuration to define uses for similar devices. Two profiles have been defined for J2ME and are built upon CLDC: KJava and MIDP. Both KJava and MIDP are associated with CLDC and smaller devices. Profiles are built on top of configurations. Because profiles are specific to the size of the device (amount of memory) on which an application runs, certain profiles are associated with certain configurations.

A skeleton profile upon which you can create your own profile, the Foundation Profile, is available for CDC.

Profile 1: KJava

KJava is Sun's proprietary profile and contains the KJava API. The KJava profile is built on top of the CLDC configuration. The KJava virtual machine, KVM, accepts the same byte codes and class file format as the classic J2SE virtual machine. KJava contains a Sun-specific API that runs on the Palm OS. The KJava API has a great deal in common with the J2SE Abstract Windowing Toolkit (AWT). However, because it is not a standard J2ME package, its main package is com.sun.kjava. We'll learn more about the KJava API later in this tutorial when we develop some sample applications.

Profile 2: MIDP

MIDP is geared toward mobile devices such as cellular phones and pagers. The MIDP, like KJava, is built upon CLDC and provides a standard run-time environment that allows new applications and services to be deployed dynamically on end user devices. MIDP is a common, industry-standard profile for mobile devices that is not dependent on a specific vendor. It is a complete and supported foundation for mobile application

development. MIDP contains the following packages, the first three of which are core CLDC packages, plus three MIDP-specific packages.

* java.lang

* java.io

* java.util

* javax.microedition.io

* javax.microedition.lcdui

* javax.microedition.midlet

* javax.microedition.rms

MYSQL:

WHAT IS A DATABASE?

A database is a separate application that stores a collection of data. Each database has oneor more distinct APIs for creating, accessing, managing, searching and replicating the data itholds.

Other kinds of data stores can also be used, such as files on the file system or large hashtables in memory, but data fetching and writing would not be so fast and easy with those typeof systems.

Nowadays, we use relational database management systems (RDBMS) to store and managehuge volume of data. This is called relational database because all the data is stored intodifferent tables and relations are established using primary keys or other keys known asForeign Keys.

A Relational DataBase Management System (RDBMS) is a software that:

- Enables you to implement a database with tables, columns and indexes.
- Guarantees the Referential Integrity between rows of various tables.
- Updates the indexes automatically.
- Interprets an SQL Query and combines information from various tables.

RDBMS TERMINOLOGY

Before we proceed to explain the MySQL database system, let us revise a few definitionsrelated to the database.

- Database: A database is a collection of tables, with related data.
- Table: A table is a matrix with data. A table in a database looks like a simplespreadsheet.

- Column: One column (data element) contains data of one and the same kind, forexample the column postcode.
- Row: A row (= tuple, entry or record) is a group of related data. For example, thedata of one subscription.
- Redundancy: Storing data twice, redundantly to make the system faster.
- Primary Key: A primary key is unique. A key value cannot occur twice in one table.With a key, you can only find one row.
- Foreign Key: A foreign key is the linking pin between two tables
- Compound Key: A compound key (composite key) is a key that consists of multiplecolumns, because one column is not sufficiently unique.
- Index: An index in a database resembles an index at the back of a book.
- Referential Integrity: Referential Integrity makes sure that a foreign key valuealways points to an existing row.

MYSQL DATABASE

MySQL is a fast, easy-to-use RDBMS being used for many small and big businesses. MySQLis developed, marketed and supported by MySQL AB, which is a Swedish company. MySQL isbecoming so popular because of many good reasons:

- MySQL is released under an open-source license. So you have nothing to pay to useit.
- MySQL is a very powerful program in its own right. It handles a large subset of thefunctionality of the most expensive and powerful database packages.
- MySQL uses a standard form of the well-known SQL data language.
- MySQL works on many operating systems and with many languages including HP,PERL, C, C++, JAVA, etc.
- MySQL works very quickly and works well even with large data sets.
- MySQL is very friendly to PHP, the most appreciated language for web development.

- MySQL supports large databases, up to 50 million rows or more in a table. The defaultfile size limit for a table is 4GB, but you can increase this (if your operating systemcan handle it) to a theoretical limit of 8 million terabytes (TB).
- MySQL is customizable. The open-source GPL license allows programmers to modifythe MySQL software to fit their own specific environments.

MYSQL INTRODUCTION:

MySQL (pronounced "My Ess Cue Ell") is more than just "the world's most popularopen source database," as the developers at the MySQL AB corporation (http://www.mysql.com) claim. This modest-sized database has introduced millions of everydaycomputer users and amateur researchers to the world of powerful information systems.MySQL is a relatively recent entrant into the well-established area of relational databasemanagement systems (RDBMs), a concept invented by IBM researcher Edgar FrankCodd in 1970. Despite the arrival of newer types of data repositories over the past 35years, relational databases remain the workhorses of the information world. They permit users to represent sophisticated relationships between items of data and to calculatethese relationships with the speed needed to make decisions in modern organizations.It's impressive how you can go from design to implementation in just a few hours, andhow easily you can develop web applications to access terabytes of data and servethousands of web users per second.Whether you're offering products on a web site, conducting a scientific survey, or simply trying to provide useful data to your classroom, bike club, or religious organization,MySQL gets you started quickly and lets you scale up your services comfortably overtime. Its ease of installation and use led media analyst Clay Shirky to credit MySQLwith driving a whole new type of information system he calls "situated software"—custom software that can be easily designed and built for niche applications.In this book, we provide detailed instructions to help you set up MySQL and relatedsoftware. We'll teach you Structured Query Language (SQL), which is used to insert,retrieve, and manipulate data. We'll also provide a tutorial on database design, explainhow to configure MySQL for improved security, and offer you advanced hints on getting even more out of your data. In the last five chapters, we show how to interact withthe database using the PHP and Perl programming languages, and how to allow interaction with your data over the medium most people prefer these days: the Web.

WHY IS MYSQL SO POPULAR?

The MySQL development process focuses on offering a very efficient implementationof the features most people need. This means that MySQL still has fewer features thanits chief open source competitor, PostgreSQL, or the commercial database engines.Nevertheless, the skills you get from this book will serve you well on any platform.Many database management systems—even open source ones—preceded MySQL.Why has MySQL been the choice for so many beginners and small sites, and now forsome heavyweight database users in government and industry? We can suggest a fewfactors:

SIZE AND SPEED

MySQL can run on very modest hardware and puts very little strain on systemresources; many small users serve up information to their organizations by runningMySQL on modest desktop systems. The speed with which it can retrieve information has made it a longstanding favorite of web administrators.Over the past few years, MySQL AB has addressed the need of larger sites by addingfeatures that necessarily slow down retrieval, but its modular design lets you ignorethe advanced features and maintain the suppleness and speed for which MySQLis famous.

EASE OF INSTALLATION

Partly because MySQL is small and fast, it works the way most people want straight“out of the box.” It can be installed without a lot of difficult and sophisticatedconfiguration. Now that many Linux distributions include MySQL, installationcan be almost automatic.

RESPONSIVENESS TO COMMUNITY

With a few hundred employees scattered around the globe, MySQL AB is a veryflexible organization that keeps constant tabs on user needs. At its conferences,lead developers get out in front and make themselves available to everyone with agripe or a new idea. There are also local MySQL user groups in almost every majorcity. This responsiveness is helped by the fact that

MySQL is open and free; anysufficiently skilled programmer can look at the program code to find and perhapshelp in fixing problems.

MySQL actually has a dual-license approach: if you want to build your own product around it, you pay MySQL AB a license fee. If you just want to use MySQL toserve your own data, you don't have to pay the license fee. MySQL also offerstechnical support, as do numerous other companies and consultants, some of themprobably near you.

EASY INTERFACE TO OTHER SOFTWARE

It is easy to use MySQL as part of a larger software system. For example, you canwrite programs that can interact directly with a MySQL database. Most majorprogramming languages have libraries of functions for use with MySQL; these include C, PHP, Perl, Python, Ruby, and the Microsoft .NET languages. MySQL alsosupports the Open Database Connectivity (ODBC) standard, making it accessibleeven when MySQL-specific functionality isn't available.

CHAPTER 7

PROGRAM CODE

Admin Home:

```
<!DOCTYPE HTML>
<html>
    <head>
        <title>Optimization of Unmasking Cyberbullies on Twitter</title>
        <meta http-equiv="Content-Type" content="text/html; charset=utf-8" />
        <link rel="stylesheet" href="css/style.css" type="text/css" media="all" />
        <meta name="viewport" content="width=device-width, initial-scale=1, maximum-
scale=1">
        <script src="js/jquery.js"></script>
    </head>
    <%
    if (request.getParameter("Success") != null) {
    %>
    <script>alert('Login Success');</script>
    <%          }
    %>
    <body>
        <div class="header">
            <div class="wrap">
                <div class="clear"></div>
            </div>
        </div>
        <div id="primary-navindex">
            <div class="wrap">
                <div class="nav">
```

```
<ul class="navigation">
   <li class="active">
      <a href="Admin_Home.jsp">
         <span class="menu-mid" style="color: red">Home</span>
      </a>
   </li>
   <li>
      <a href="user_details.jsp">
         <span class="menu-mid">User Details</span>
      </a>
   </li>
   <li>
      <a href="user_tweets.jsp">
         <span class="menu-mid">User Tweets</span>
      </a>
   </li>
   <li>
      <a href="bullying_tweets.jsp">
         <span class="menu-mid">Bullying Tweets</span>
      </a>
   </li>
   <li>
      <a href="add_bullyingwords.jsp">
         <span class="menu-mid">Add Bullying Words</span>
      </a>
   </li>
   <li>
      <a href="blocked_users.jsp">
         <span class="menu-mid">Blocked Users</span>
      </a>
   </li>
```

```
                <li>
                    <a href="graph.jsp">
                        <span class="menu-mid">Graph</span>
                    </a>
                </li>
                <li>
                    <a href="index.jsp">
                        <span class="menu-mid">Logout</span>
                    </a>
                </li>
                <div class="clear"></div>
            </ul>
        </div>
    </div>
</div>
<script type="text/javascript">
    $(".navigation li").hover(
            function () {
                $(this).addClass("nav-hover");
            },
            function () {
                $(this).removeClass("nav-hover");
            }
    );
</script>
<!-- Domain Blurb -->
<div class="blue-bar">
    <div class="wrap">
        <div class="domain-name">
            <h2>Optimization of Unmasking Cyberbullies on Twitter</h2>
        </div>
```

```
  </div>
  <div class="clear"></div>
</div>
<script type="text/javascript">
  $(document).ready(function () {
    $('#field_domains-input').textboxValueToggle('Buy a Domain name...');
  });
  $.fn.textboxValueToggle = function (defaultText) {
    $(this).focus(function () {
      if ($(this).val() === defaultText) {
        $(this).val('').removeClass('optionalField');
      }
    }).blur(function () {
      if ($(this).val() === '') {
        $(this).addClass('optionalField').val(defaultText);
      }
    });
  }
</script>
<div class="content">
  <div class="wrap">
    <div class="grids">
      <center><h3>Welcome Admin!</h3></center>
      <img src="img/adminhome.jpg" width="1100" height="550" />
      <div class="clear"></div>
    </div>
  </div>
</div>
<div class="footer">
  <div class="footer-bottom">
    <div class="wrap">
```

```
                    <div class="copy-right">
                        <p>© 2022</p>
                    </div>
                </div>
            </div>
        </div>
    </body>
</html>
```

Admin Login:

```
<!DOCTYPE HTML>
<html>
    <head>
        <title>Optimization of Unmasking Cyberbullies on Twitter</title>
        <meta http-equiv="Content-Type" content="text/html; charset=utf-8" />
        <link rel="stylesheet" href="css/style.css" type="text/css" media="all" />
        <meta name="viewport" content="width=device-width, initial-scale=1, maximum-scale=1">
        <script src="js/jquery.js"></script>
    </head>
    <%
        if (request.getParameter("Failed") != null) {
    %>
    <script>alert('Login Failed');</script>
    <%          }
    %>
    <body>
        <div class="header">
            <div class="wrap">
                <div class="clear"></div>
            </div>
        </div>
        <div id="primary-navindex">
            <div class="wrap">
                <div class="nav">
                    <ul class="navigation">
                        <li class="active">
                            <a href="index.jsp">
                                <span class="menu-mid">Home</span>
                            </a>
                        </li>
                        <li>
                            <a href="User_login.jsp">
                                <span class="menu-mid">User</span>
                            </a>
                        </li>
                        <li>
                            <a href="Admin_login.jsp">
                                <span class="menu-mid" style="color: red">Admin</span>
                            </a>
                        </li>
                        <div class="clear"></div>
                    </ul>
                </div>
            </div>
        </div>
        <script type="text/javascript">
            $(".navigation li").hover(
                    function () {
                        $(this).addClass("nav-hover");
                    },
                    function () {
                        $(this).removeClass("nav-hover");
                    }
            );
        </script>
        <!-- Domain Blurb -->
        <div class="blue-bar">
            <div class="wrap">
                <div class="domain-name">
                    <h2>Optimization of Unmasking Cyberbullies on Twitter</h2>
                </div>
            </div>
            <div class="clear"></div>
        </div>
        <script type="text/javascript">
            $(document).ready(function () {
                $('#field_domains-input').textboxValueToggle('Buy a Domain name...');
            });
            $.fn.textboxValueToggle = function (defaultText) {
                $(this).focus(function () {
                    if ($(this).val() === defaultText) {
                        $(this).val('').removeClass('optionalField');
                    }
                }).blur(function () {
                    if ($(this).val() === '') {
                        $(this).addClass('optionalField').val(defaultText);
                    }
                });
            }
        </script>
        <script type="text/javascript">
```

```
      $(".navigation li").hover(
          function () {
            $(this).addClass("nav-hover");
          },
          function () {
            $(this).removeClass("nav-hover");
          }
      );
    </script>
    <div class="bulk-domain">
      <div class="content">
        <div class="wrap">
          <center><h3>Admin Login</h3></center>
          <div class="login_form">
            <div class="login_form_left">
              <img src="img/admin1.jpg" width="400" height="300" >
            </div>
            <div class="login_form_right">
              <form action="admin" method="post">
                <table>
                  <tbody>
                    <tr>
                      <td>
                        <div>
                          <label>E-Mail <span class="astrix">*</span></label>
                          <input type="text" name="name" placeholder="Enter Your Email" required="">
                        </div>
                        <div>
                          <label>Password <span class="astrix">*</span></label>
                          <input type="password" name="pass" placeholder="Enter Your Password" required="">
```

```
                                                </div>
                                            </td>
                                        </tr>
                                        <tr>
                                            <td>
                                                <input    name="Checkout"    type="submit"    class="uiButton" value="Login">
                                            </td>
                                        </tr>
                                    </tbody>
                                </table>
                            </form>
                        </div>
                        <div class="clear"></div>
                    </div>
                </div>
            </div>
        </div>
        <div class="footer">
            <div class="footer-bottom">
                <div class="wrap">
                    <div class="copy-right">
                        <p>© 2022</p>
                    </div>
                </div>
            </div>
        </div>
    </body>
</html>
```

USER LOGIN:

```
<!DOCTYPE HTML>
<html>
   <head>
      <title>Optimization of Unmasking Cyberbullies on Twitter</title>
      <meta http-equiv="Content-Type" content="text/html; charset=utf-8" />
      <link rel="stylesheet" href="css/style.css" type="text/css" media="all" />
      <meta name="viewport" content="width=device-width, initial-scale=1, maximum-scale=1">
      <script src="js/jquery.js"></script>
   </head>
   <%
      if (request.getParameter("Failed") != null) {
   %>
   <script>alert('Login Failed');</script>
   <%         }
   %>
   <%
      if (request.getParameter("Register_Success") != null) {
   %>
   <script>alert('Registration Success');</script>
   <%         }
   %>
   <body>
      <div class="header">
         <div class="wrap">
            <div class="clear"></div>
         </div>
      </div>
      <div id="primary-navindex">
```

```
    <div class="wrap">
        <div class="nav">
            <ul class="navigation">
                <li class="active">
                    <a href="index.jsp">
                        <span class="menu-mid">Home</span>
                    </a>
                </li>
                <li>
                    <a href="User_login.jsp">
                        <span class="menu-mid" style="color: red">User</span>
                    </a>
                </li>
                <li>
                    <a href="Admin_login.jsp">
                        <span class="menu-mid">Admin</span>
                    </a>
                </li>
                <div class="clear"></div>
            </ul>
        </div>
    </div>
</div>
<script type="text/javascript">
    $(".navigation li").hover(
            function () {
                $(this).addClass("nav-hover");
            },
            function () {
                $(this).removeClass("nav-hover");
            }
```

```
  );
</script>
<!-- Domain Blurb -->
<div class="blue-bar">
  <div class="wrap">
    <div class="domain-name">
      <h2>Optimization of Unmasking Cyberbullies on Twitter</h2>
    </div>
  </div>
  <div class="clear"></div>
</div>
<script type="text/javascript">
  $(document).ready(function () {
    $('#field_domains-input').textboxValueToggle('Buy a Domain name...');
  });
  $.fn.textboxValueToggle = function (defaultText) {
    $(this).focus(function () {
      if ($(this).val() === defaultText) {
        $(this).val('').removeClass('optionalField');
      }
    }).blur(function () {
      if ($(this).val() === '') {
        $(this).addClass('optionalField').val(defaultText);
      }
    });
  }
</script>
<script type="text/javascript">
  $(".navigation li").hover(
      function () {
        $(this).addClass("nav-hover");
```

```
            },
            function () {
                $(this).removeClass("nav-hover");
            }
    );
</script>
<div class="bulk-domain">
    <div class="content">
        <div class="wrap">
            <center><h3>User Login</h3></center>
            <div class="login_form">
                <div class="login_form_left">
                    <img src="img/userlogin.jpg" width="400" height="300" >
                </div>
                <div class="login_form_right">
                    <form action="user_signin.jsp" method="post">
                        <table>
                            <tbody>
                                <tr>
                                    <td>
                                        <div>
                                            <label>E-Mail <span class="astrix">*</span></label>
                                            <input type="email" name="email" placeholder="Enter Your Email" required="">
                                        </div>
                                        <div>
                                            <label>Password <span class="astrix">*</span></label>
                                            <input type="password" name="pass" placeholder="Enter Your Password" required="">
                                        </div>
                                    </td>
                                </tr>
```

```
                                        <tr>
                                            <td>
                                                <input name="Checkout" type="submit" class="uiButton" value="Login">&nbsp;&nbsp;&nbsp;
                                                <a href="user_signup.jsp">Register!</a>
                                            </td>
                                        </tr>
                                    </tbody>
                                </table>
                            </form>
                        </div>
                        <div class="clear"></div>
                    </div>
                </div>
            </div>
        </div>
        <div class="footer">
            <div class="footer-bottom">
                <div class="wrap">
                    <div class="copy-right">
                        <p>© 2022</p>
                    </div>
                </div>
            </div>
        </div>
    </body>
</html>
```

CHAPTER 8

SYSTEM TESTING

The purpose of testing is to discover errors. Testing is the process of trying to discover every conceivable fault or weakness in a work product. It provides a way to check the functionality of components, sub- assemblies, assemblies and/or a finished product It is the process of exercising software with the intent of ensuring that the

Software system meets its requirements and user expectations and does not fail in an unacceptable manner. There are various types of test. Each test type addresses a specific testing requirement.

TYPES OF TESTS

Unit testing:

Unit testing involves the design of test cases that validate that the internal program logic is functioning properly, and that program inputs produce valid outputs. All decision branches and internal code flow should be validated. It is the testing of individual software units of the application .it is done after the completion of an individual unit before integration. This is a structural testing, that relies on knowledge of its construction and is invasive. Unit tests perform basic tests at component level and test a specific business process, application, and/or system configuration. Unit tests ensure that each unique path of a business process performs accurately to the documented specifications and contains clearly defined inputs and expected results.

Integration testing:

Integration tests are designed to test integrated software components to determine if they actually run as one program. Testing is event driven and is more concerned with the basic outcome of screens or fields. Integration tests demonstrate that although the components were individually satisfaction, as shown by successfully unit testing, the combination of components is correct and consistent. Integration testing is specifically aimed at exposing the problems that arise from the combination of components.

Functional test:

Functional tests provide systematic demonstrations that functions tested are available as specified by the business and technical requirements, system documentation, and user manuals.

Functional testing is centered on the following items:

Valid Input : identified classes of valid input must be accepted.

Invalid Input : identified classes of invalid input must be rejected.

Functions : identified functions must be exercised.

Output : identified classes of application outputs must be exercised.

Systems/Procedures: interfacing systems or procedures must be invoked.

Organization and preparation of functional tests is focused on requirements, key functions, or special test cases. In addition, systematic coverage pertaining to identify Business process flows; data fields, predefined processes, and successive processes must be considered for testing. Before functional testing is complete, additional tests are identified and the effective value of current tests is determined.

System Test:

System testing ensures that the entire integrated software system meets requirements. It tests a configuration to ensure known and predictable results. An example of system testing is the configuration oriented system integration test. System testing is based on process descriptions and flows, emphasizing pre-driven process links and integration points.

White box testing:

White Box Testing is a testing in which in which the software tester has knowledge of the inner workings, structure and language of the software, or at least its purpose. It is purpose. It is used to test areas that cannot be reached from a black box level.

Black Box Testing:

Black Box Testing is testing the software without any knowledge of the inner workings, structure or language of the module being tested. Black box tests, as most other kinds of tests, must be written from a definitive source document, such as specification or requirements document, such as specification or requirements document. It is a testing in which the software under test is treated, as a black box .you cannot "see" into it. The test provides inputs and responds to outputs without considering how the software works.

6.1 UNIT TESTING:

Unit testing is usually conducted as part of a combined code and unit test phase of the software lifecycle, although it is not uncommon for coding and unit testing to be conducted as two distinct phases.

Test strategy and approach

Field testing will be performed manually and functional tests will be written in detail.

Test objectives

- All field entries must work properly.
- Pages must be activated from the identified link.
- The entry screen, messages and responses must not be delayed.

Features to be tested

- Verify that the entries are of the correct format
- No duplicate entries should be allowed
- All links should take the user to the correct page.

6.2 Integration Testing

Software integration testing is the incremental integration testing of two or more integrated software components on a single platform to produce failures caused by interface defects.

The task of the integration test is to check that components or software applications, e.g. components in a software system or – one step up – software applications at the company level – interact without error.

Test Results: All the test cases mentioned above passed successfully. No defects encountered.

6.3 Acceptance Testing

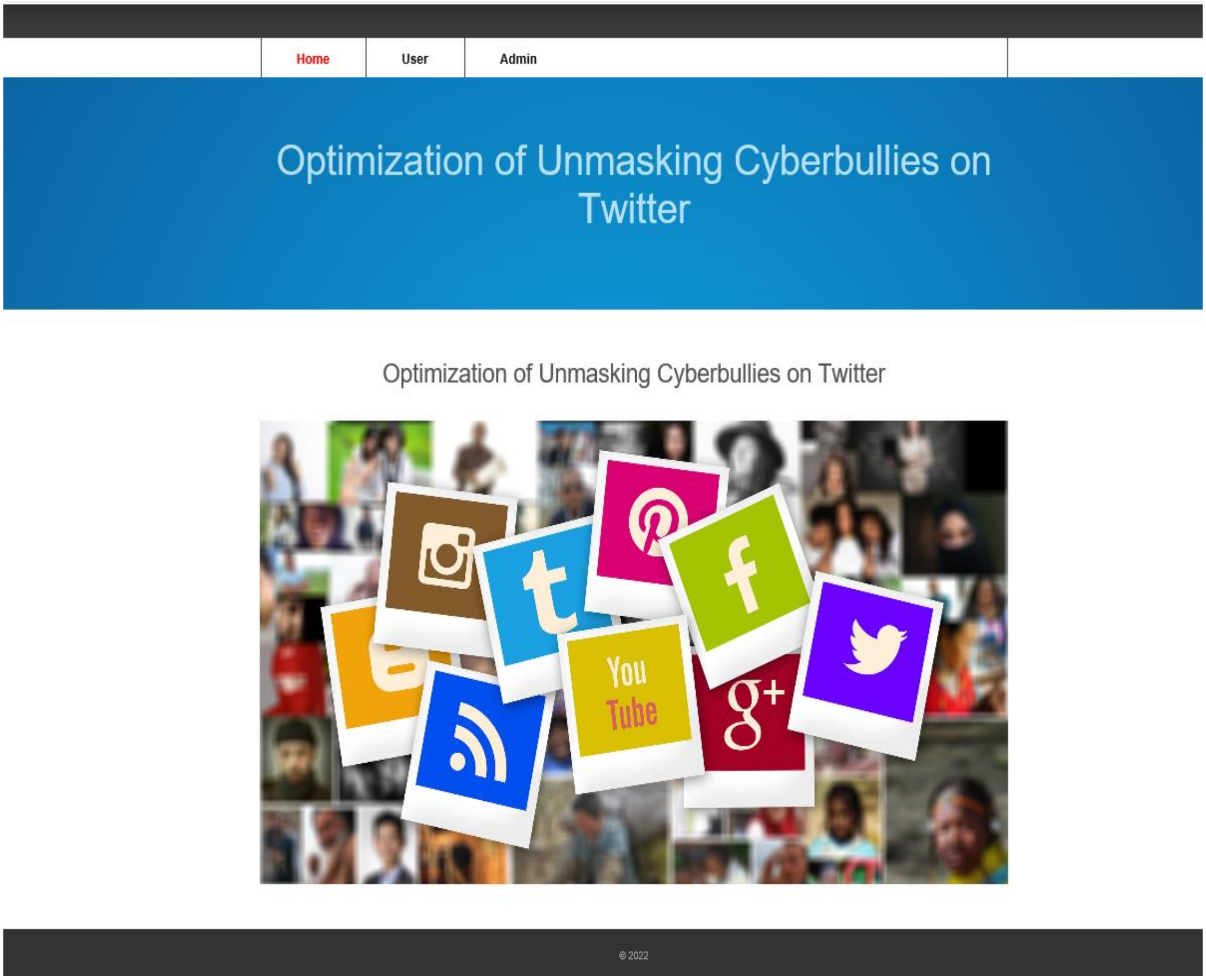
User Acceptance Testing is a critical phase of any project and requires significant participation by the end user. It also ensures that the system meets the functional requirements.

Test Results: All the test cases mentioned above passed successfully. No defects encountered.

Chapter 9

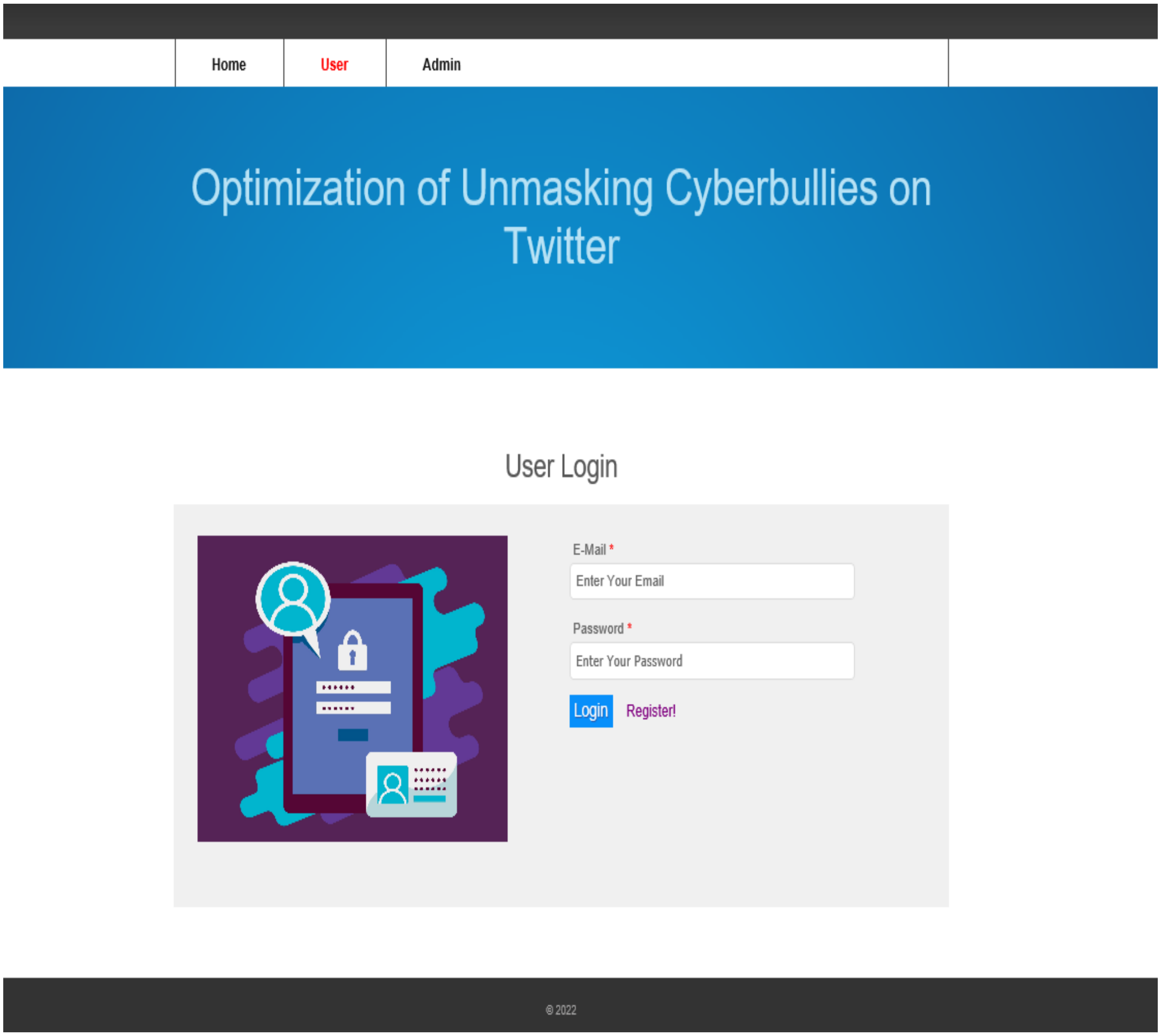
OUTPUT SCREENS

9.1.HOME :



Home
User
Admin
Optimization of Unmasking Cyberbullies on Twitter
Optimization of Unmasking Cyberbullies on Twitter
You Tube
g+
© 2022

9.2 USER LOGIN:



Optimization of Unmasking Cyberbullies on Twitter

User Login

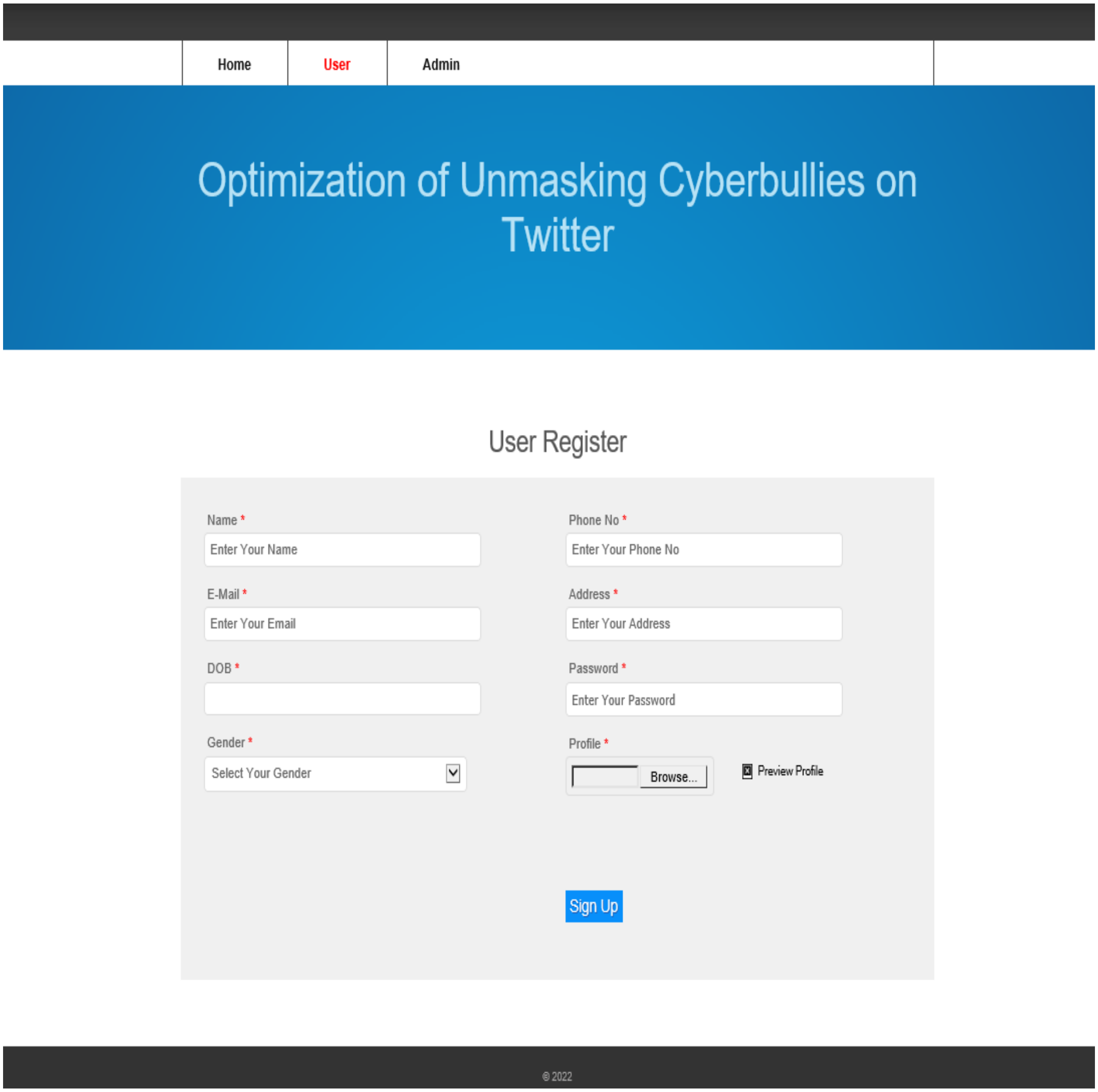
E-Mail *

Enter Your Email

Password *

Enter Your Password

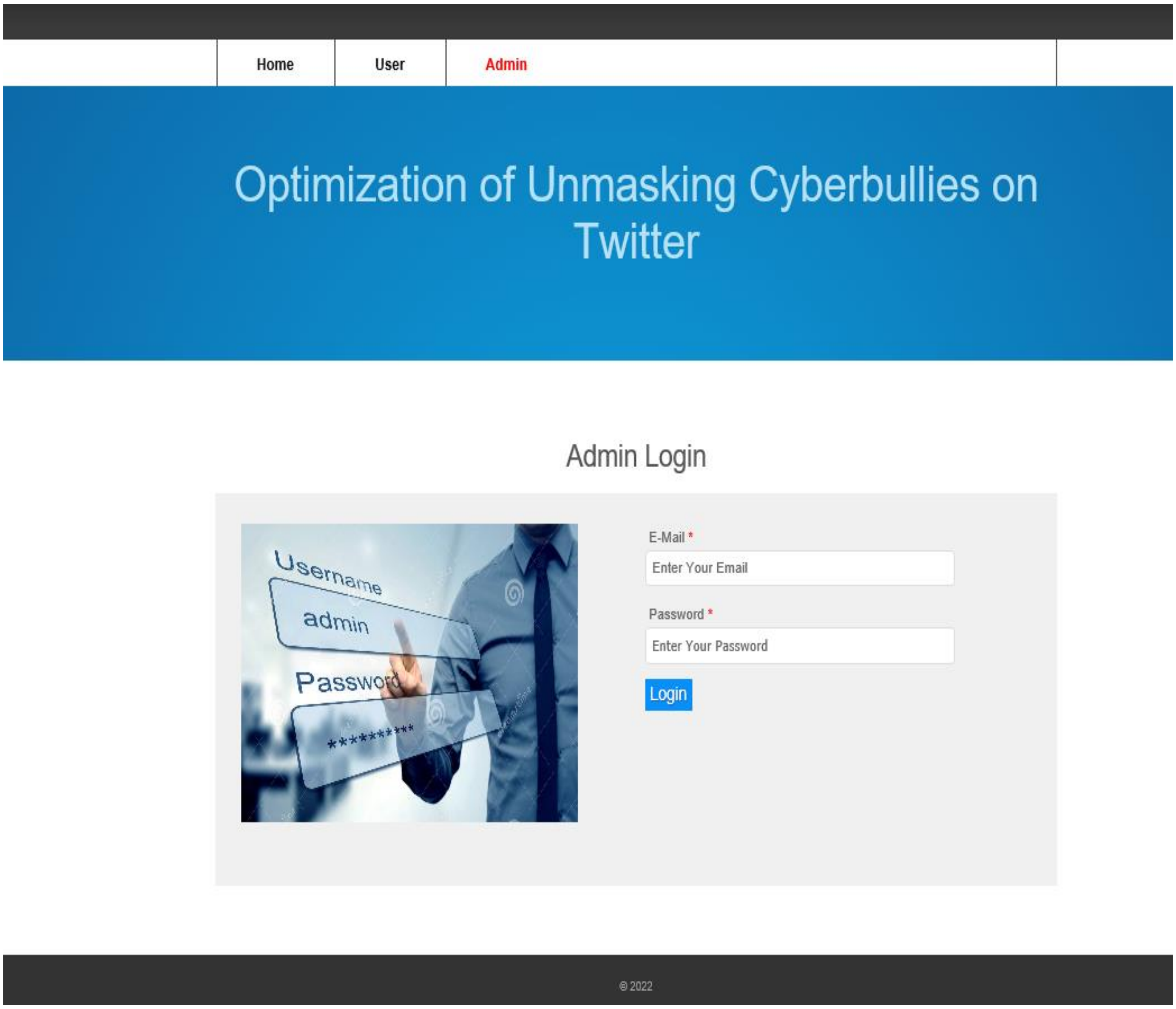
9.3 USER REGISTER:



Optimization of Unmasking Cyberbullies on Twitter

User Register

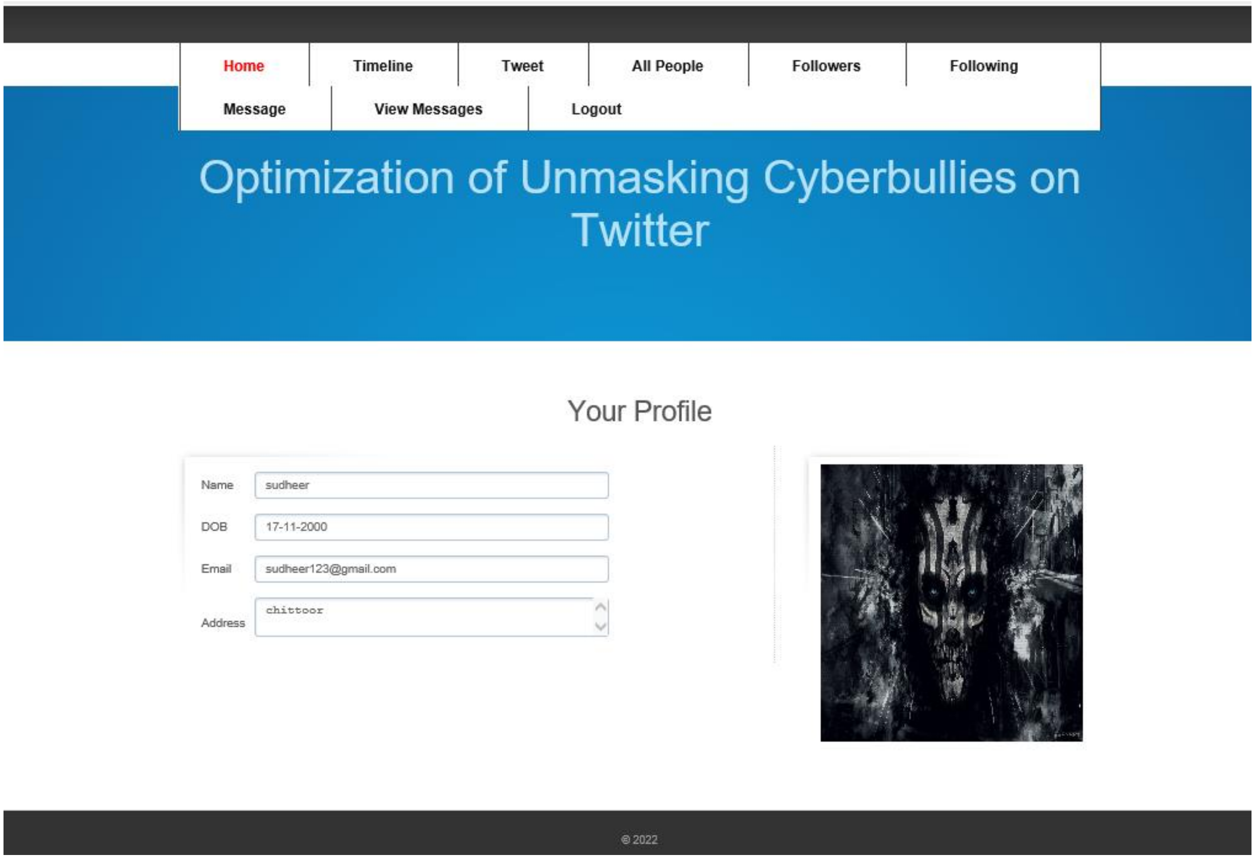
9.4 ADMIN LOGIN:



Optimization of Unmasking Cyberbullies on Twitter

Admin Login

9.5 PROFILE:

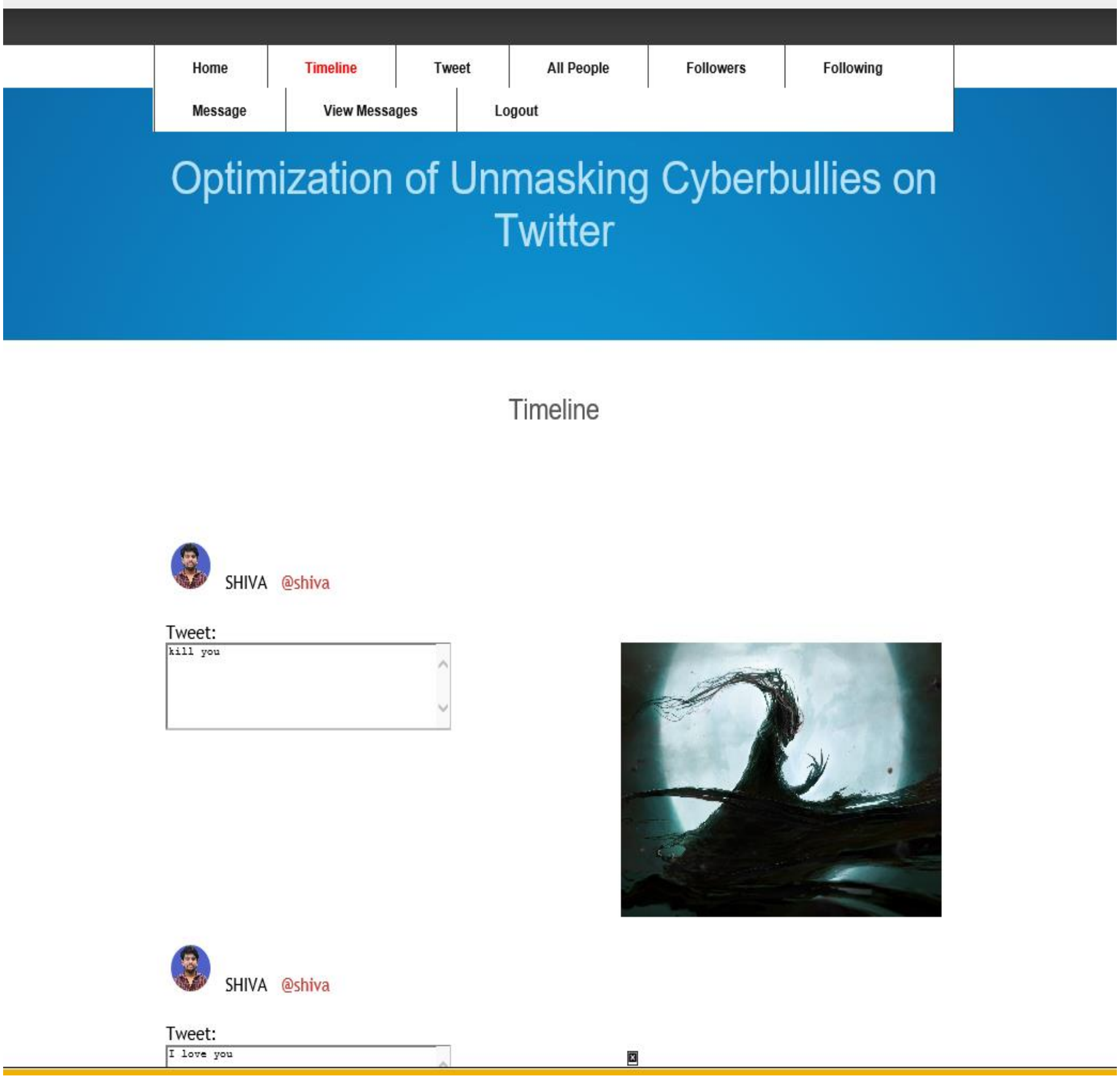


Optimization of Unmasking Cyberbullies on Twitter

Your Profile

Name: sudheer
DOB: 17-11-2000
Email: sudheer123@gmail.com
Address: chittoor

9.6 TIME LINE:



Optimization of Unmasking Cyberbullies on Twitter

Timeline

SHIVA @shiva

Tweet:

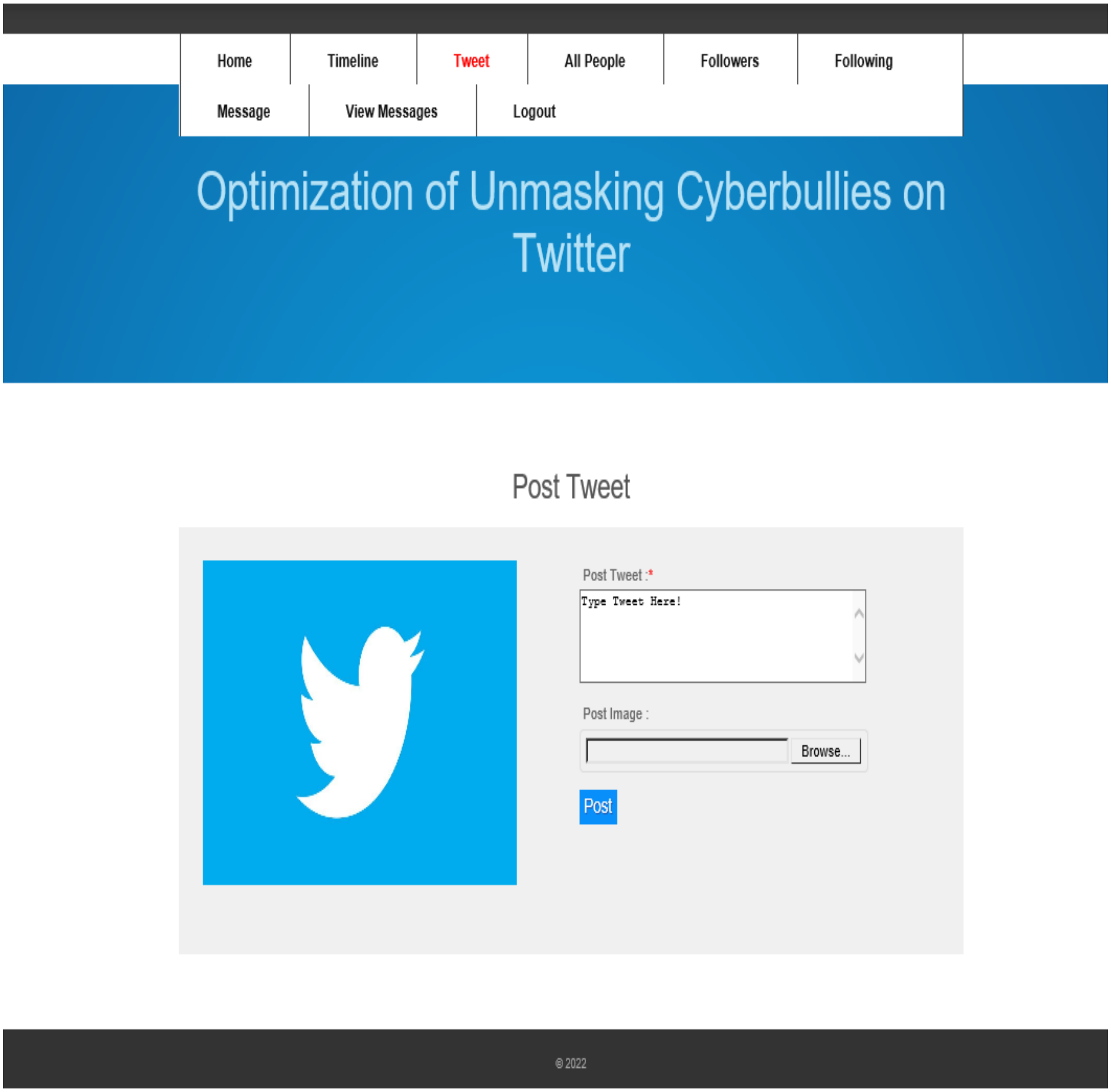
kill you

SHIVA @shiva

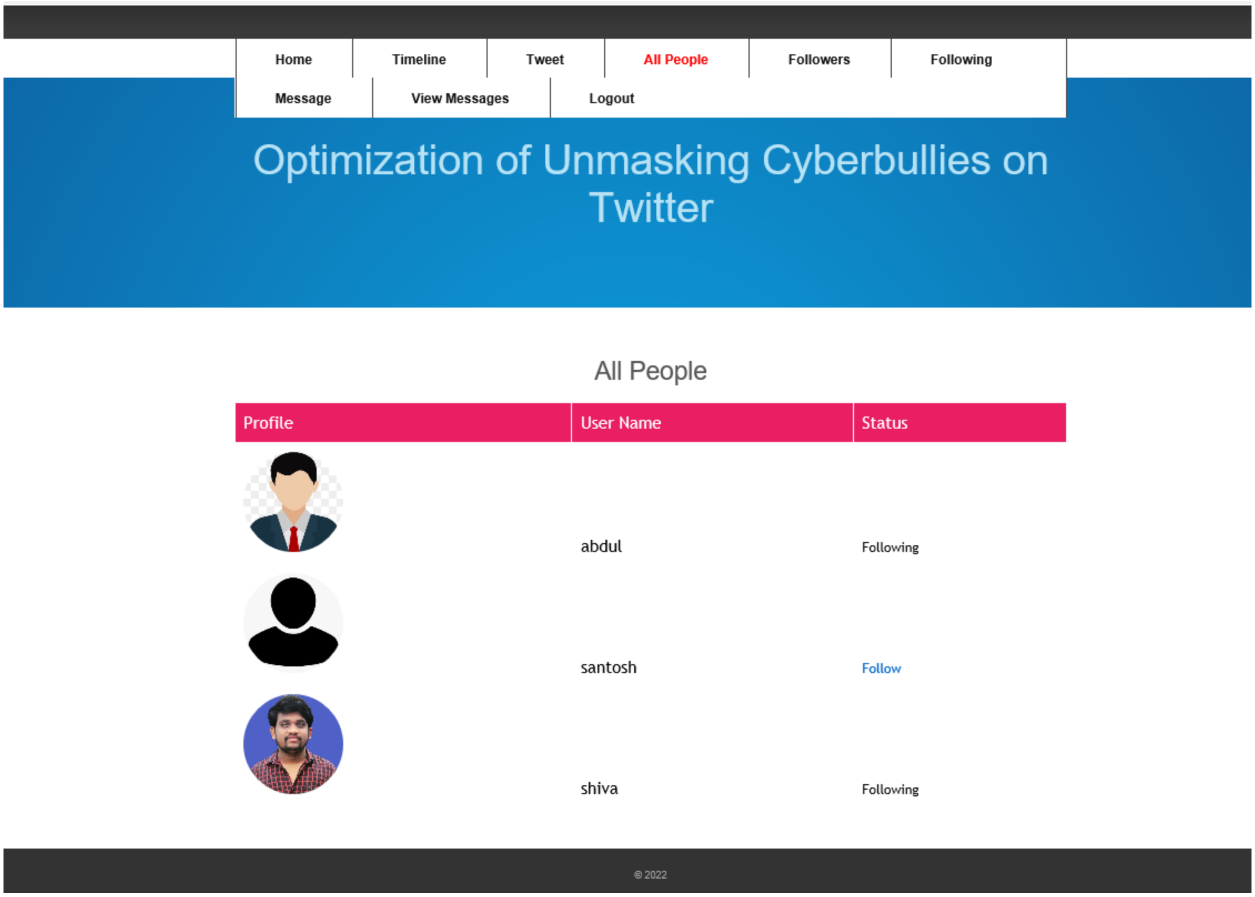
Tweet:

I love you

9.7 TWEETS:


Home
Timeline
Tweet
All People
Followers
Following
Message
View Messages
Logout
Optimization of Unmasking Cyberbullies on Twitter
Post Tweet
Post Tweet :*
Type Tweet Here!
Post Image :
Browse...
Post
© 2022

9.8 ALL PEOPLE:



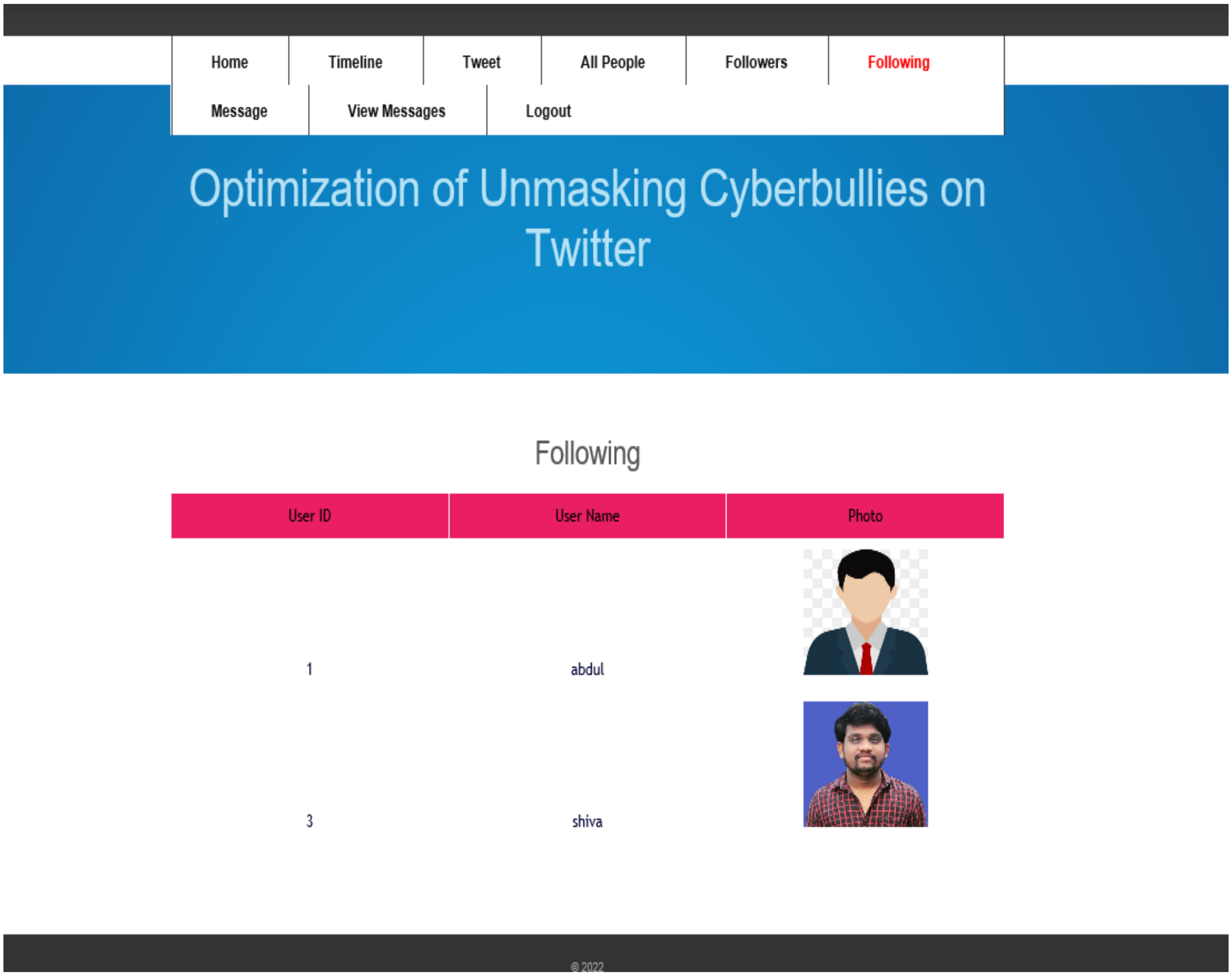
Optimization of Unmasking Cyberbullies on Twitter

All People

Profile	User Name	Status
	abdul	Following
	santosh	Follow
	shiva	Following

© 2022

9.9 FOLLOWING:



Optimization of Unmasking Cyberbullies on Twitter

Following

User ID	User Name	Photo
1	abdul	
3	shiva	

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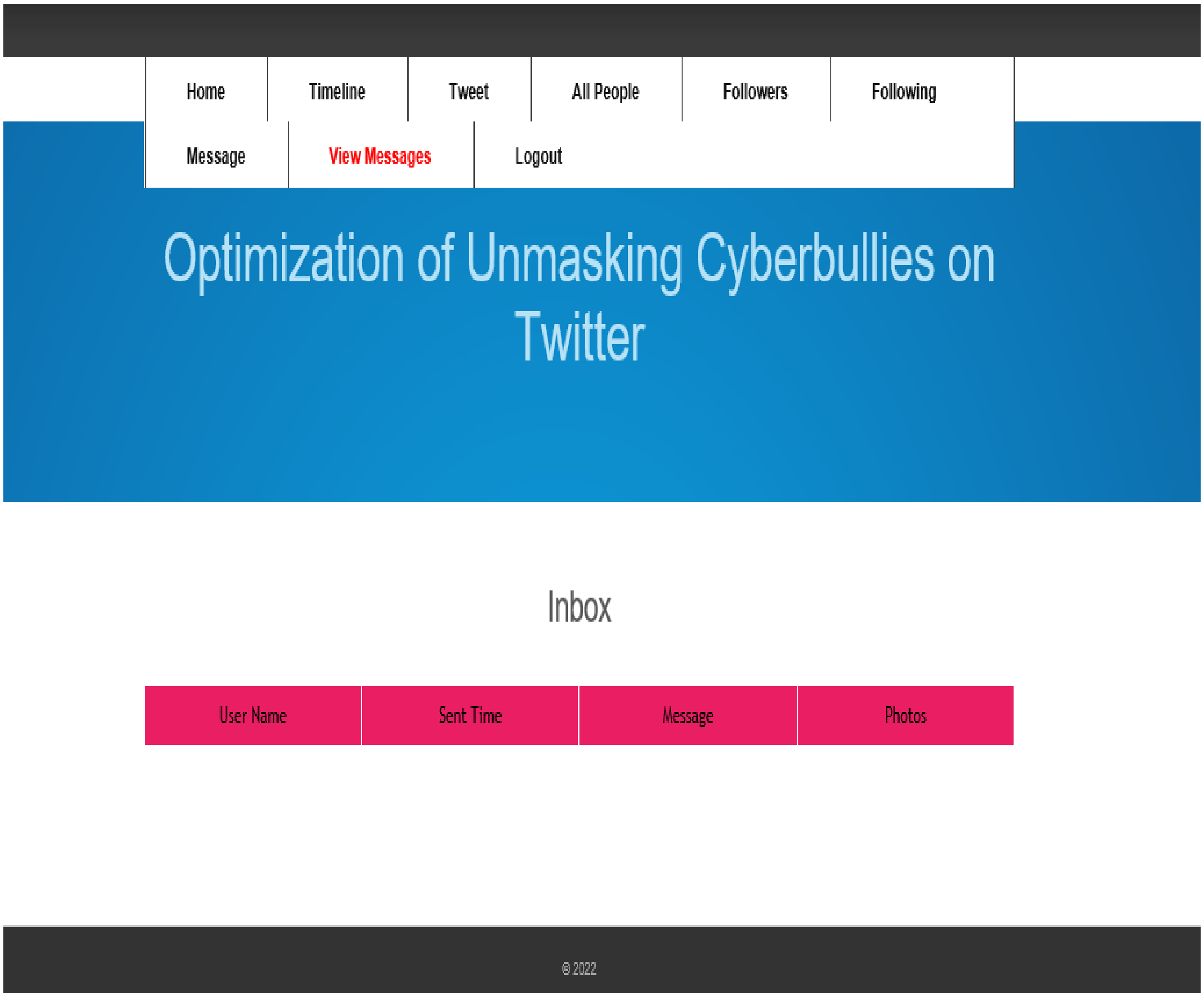
9.10 MESSAGE:



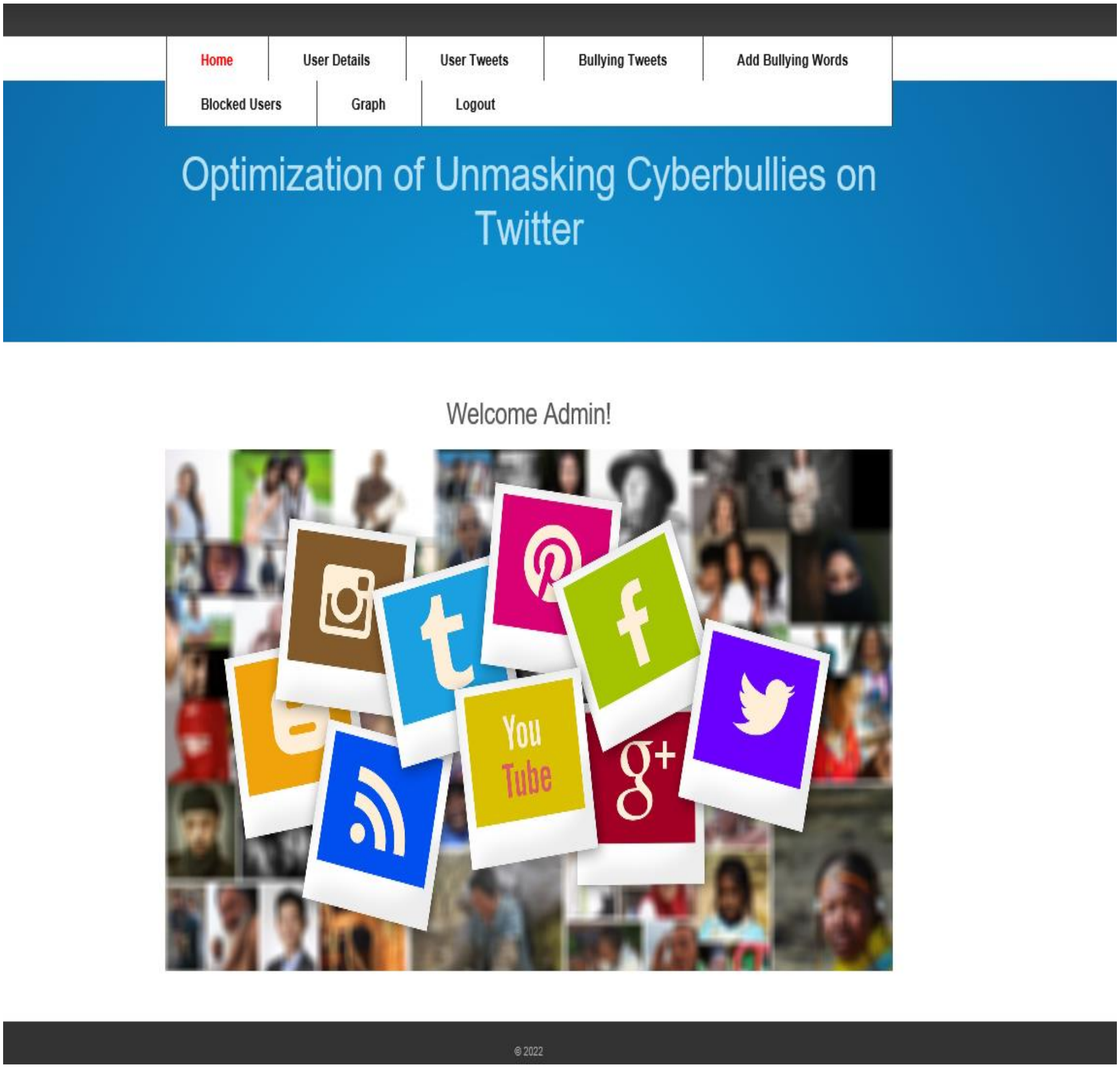
Optimization of Unmasking Cyberbullies on Twitter

Inbox

User Name	Sent Time	Message	Photos

© 2022

9.11 ADMIN HOME:

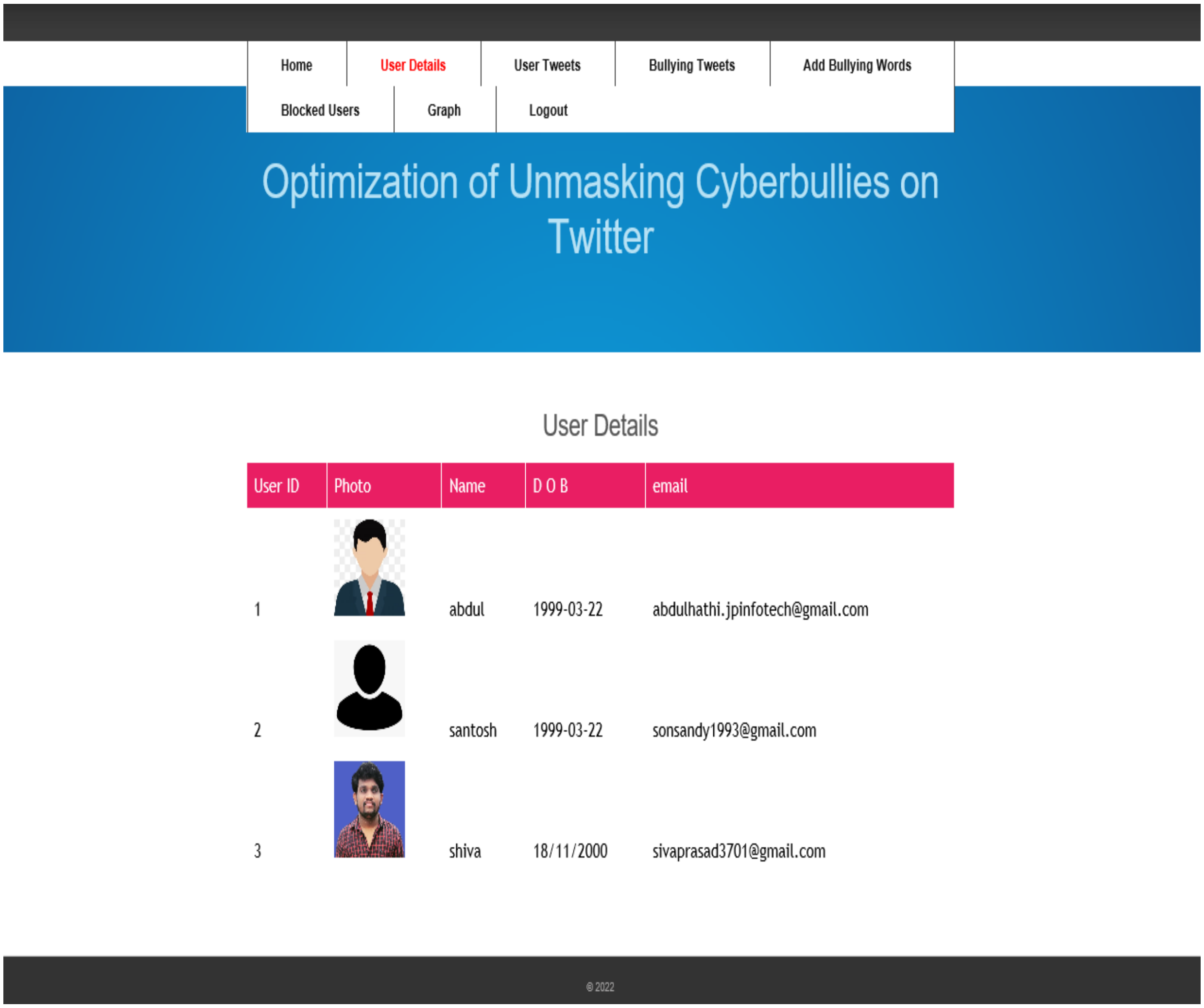


Optimization of Unmasking Cyberbullies on Twitter

Welcome Admin!

© 2022

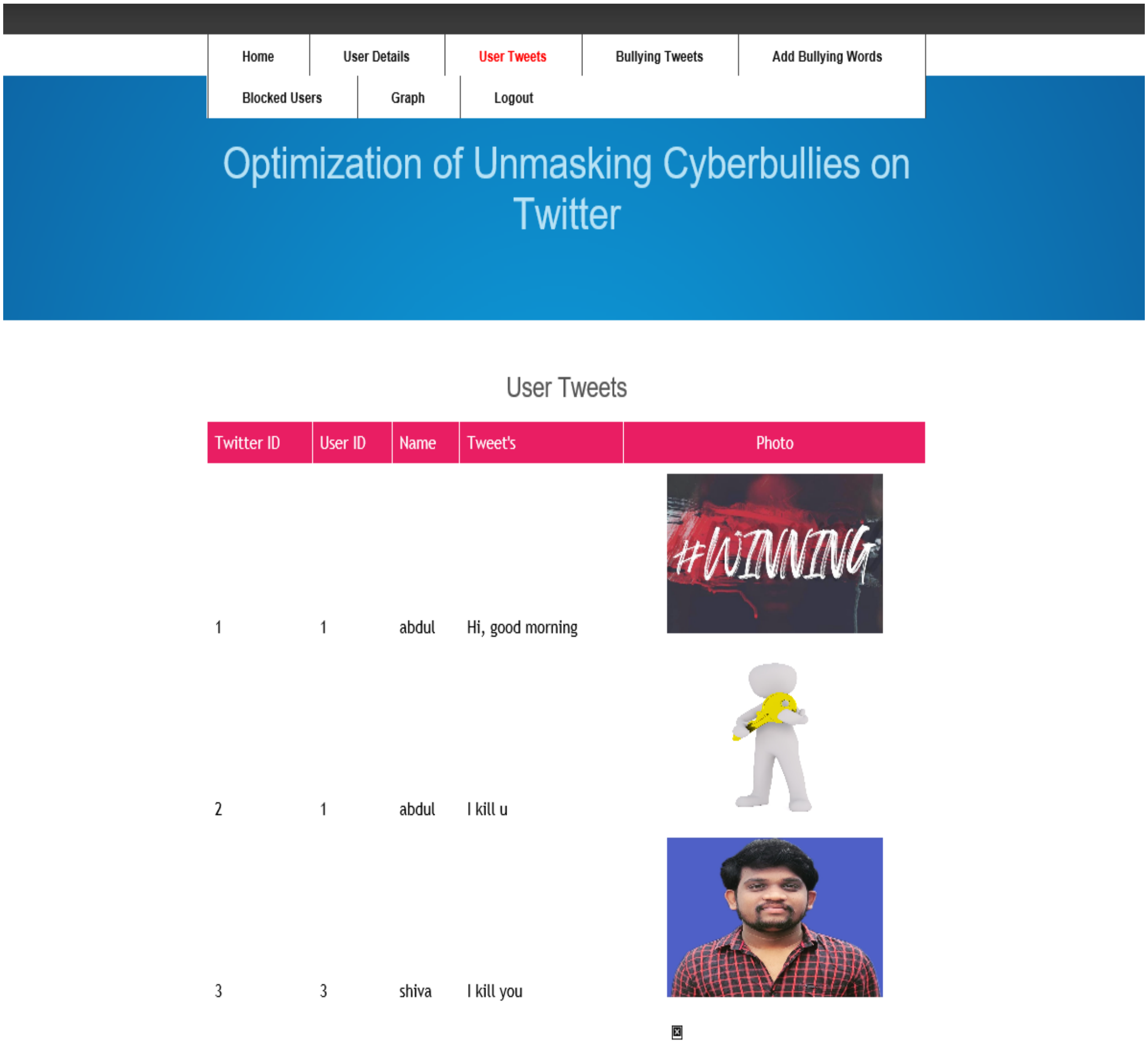
9.12 USER DETAILS:



User Details

User ID	Photo	Name	D O B	email
1		abdul	1999-03-22	abdulhathi.jpinfotech@gmail.com
2		santosh	1999-03-22	sonsandy1993@gmail.com
3		shiva	18/11/2000	sivaprasad3701@gmail.com

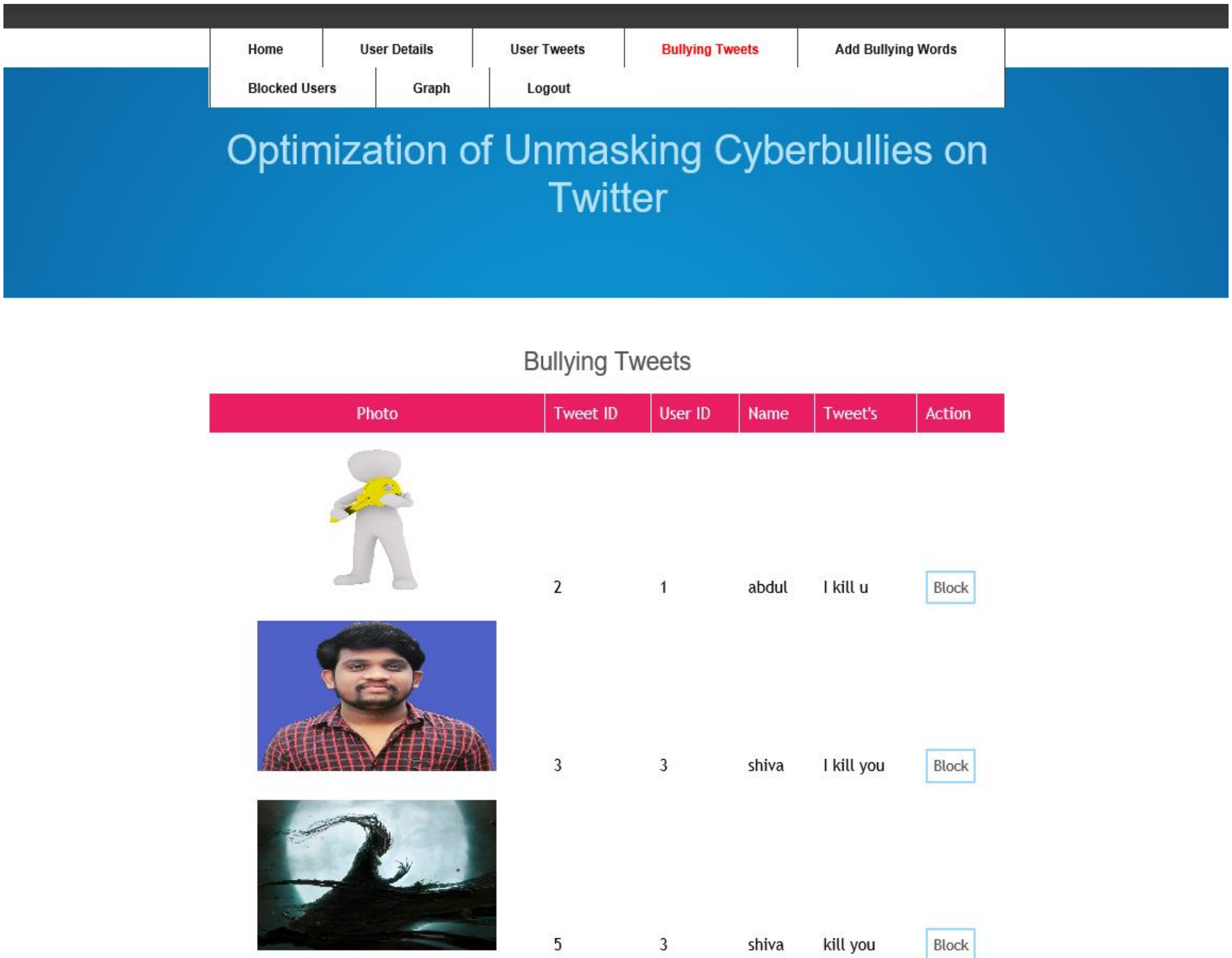
9.13 USER TWEETS:



User Tweets

Twitter ID	User ID	Name	Tweet's	Photo
1	1	abdul	Hi, good morning	
2	1	abdul	I kill u	
3	3	shiva	I kill you	

9.14 BULLYING TWEETS:

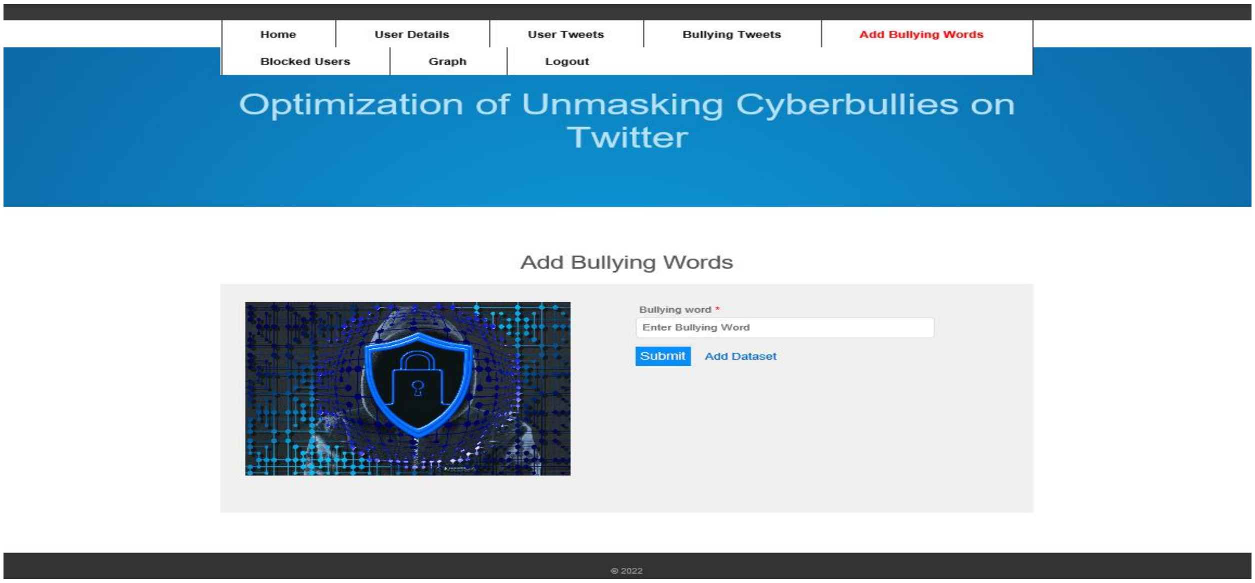


Optimization of Unmasking Cyberbullies on Twitter

Bullying Tweets

Photo	Tweet ID	User ID	Name	Tweet's	Action
	2	1	abdul	I kill u	Block
	3	3	shiva	I kill you	Block
	5	3	shiva	kill you	Block

9.15 ADD BULLYING WORDS:



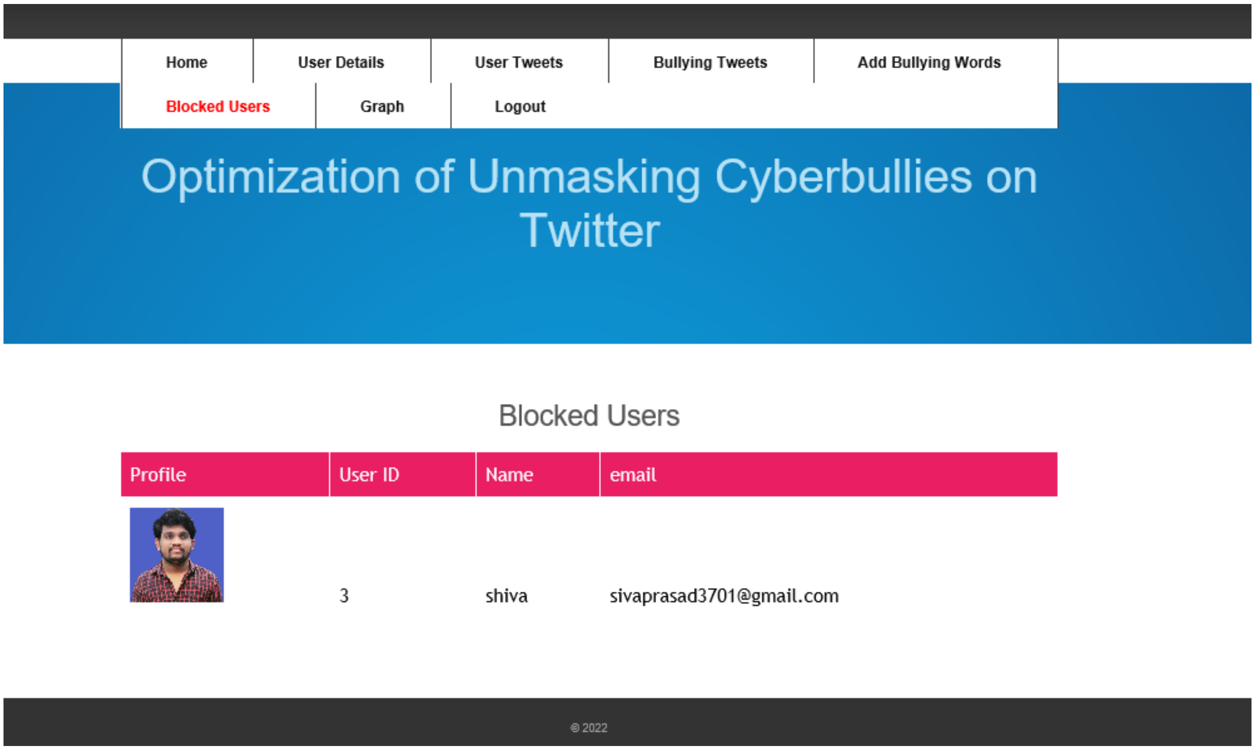
Optimization of Unmasking Cyberbullies on Twitter

Add Bullying Words

Bullying word *

Enter Bullying Word

9.16 BLOCKED USERS:

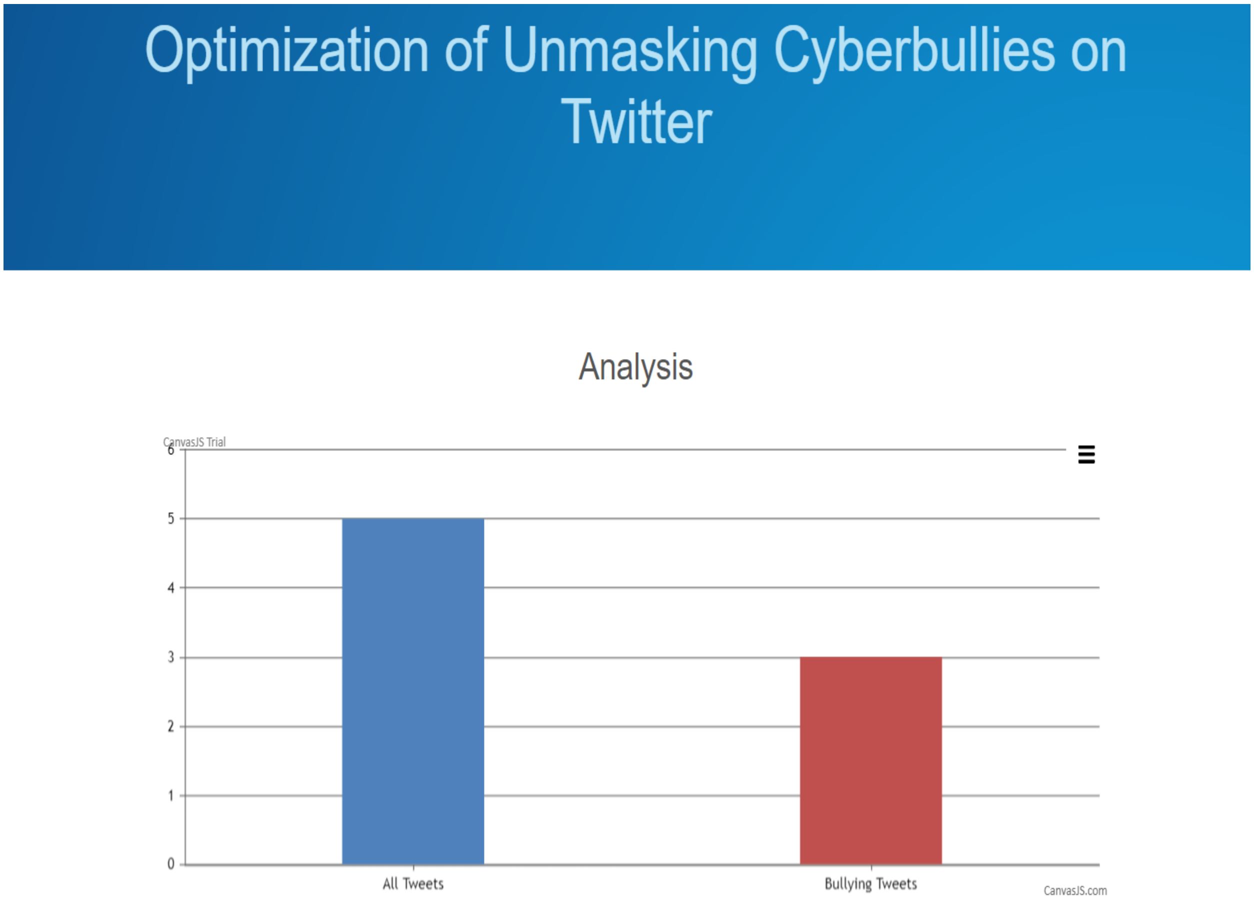


Optimization of Unmasking Cyberbullies on Twitter

Blocked Users

Profile	User ID	Name	email
	3	shiva	sivaprasad3701@gmail.com

9.17 GRAPH:



Optimization of Unmasking Cyberbullies on Twitter

Analysis

Chapter 10

CONCLUSION

Although the digital revolution and the rise of social mediaenabled great advances in communication platforms and socialinteractions, a wider proliferation of harmful behavior knownas bullying has also emerged. This article presents a novelframework of BullyNet to identify bully users from the Twittersocial network. We performed extensive research on miningSNs for better understanding of the relationships betweenusers in social media, to build an SN based on bullyingtendencies. We observed that by constructing conversationsbased on the context as well as content, we could effectivelyidentify the emotions and the behavior behind bullying. In ourexperimental study, the evaluation of our proposed centralitymeasures to detect bullies from SN, and we achieved good accuracy in identifying bullies forvarious cases.

Future Work

There are still several open questions deserving furtherinvestigation. First, our approach focuses on extracting emotionsand behavior from texts and emojis in tweets. However,it would be interesting to investigate images and videos,given that many users use them to bully others. Second,it does not distinguish between bully and aggressive users.Devising new algorithms or techniques to distinguish bulliesfrom aggressors would prove critical in better identificationof cyberbullies. Another topic of interest would be to studythe relationship between conversation graph dynamics andgeographic location and how these dynamics are affected bythe geographic dispersion of the users? Are the proximityincrease the bullying behavior?

Chapter 11

REFERENCES

[1] J. Tang, C. Aggarwal, and H. Liu, “Recommendations in signed socialnetworks,” in Proc. 25th Int. Conf. World Wide Web, Apr. 2016,pp. 31–40.

[2] D. Liben-Nowell and J. Kleinberg, “The link-prediction problem forsocial networks,” J. Amer. Soc. Inf. Sci. Technol., vol. 58, no. 7,pp. 1019–1031, 2007.

[3] U. Brandes and D. Wagner, “Analysis and visualization of socialnetworks,” in Graph Drawing Software. Amsterdam, The Netherlands:Elsevier, 2004, pp. 321–340.

[4] X. Hu, J. Tang, H. Gao, and H. Liu, “Social spammer detectionwith sentiment information,” in Proc. IEEE Int. Conf. Data Mining,Dec. 2014, pp. 180–189.

[5] E. E. Buckels, P. D. Trapnell, and D. L. Paulhus, Trolls Just Want toHave Fun. Springer, 2014, pp. 67:97–102.

[6] S. Kumar, F. Spezzano, and V. S. Subrahmanian, “Accurately detectingtrolls in slashdot zoo via decluttering,” in Proc. IEEE/ACM Int. Conf.Adv. Social Netw.Anal.Mining (ASONAM), Aug. 2014, pp. 188–195.

[7] J. W. Patchin and S. Hinduja, “2016 cyberbullying data,” CyberbullyingRes. Center, Tech. Rep. 2016, 2017.

[8] Cyberbullying Research Center.State Bullying Laws in America.Available: https://cyberbullying.org/bullying-laws

[9] D. Cartwright and F. Harary, “Structural balance: A generalization ofHeider’s theory,” Psychol. Rev., vol. 63, no. 5, p. 277, Sep. 1956.

[10] J. Leskovec, D. Huttenlocher, and J. Kleinberg, “Signed networks insocial media,” in Proc. 28th Int. Conf. Hum.Factors Comput. Syst.(CHI), 2010, pp. 1361–1370.

[11] R. Plutchik, “A general psychoevolutionary theory of emotion,” inTheories of Emotion. 1980, pp. 3–33.

[12] W. Medhat, A. Hassan, and H. Korashy, “Sentiment analysis algorithmsand applications: A survey,” Ain Shams Eng. J., vol. 5, no. 4,pp. 1093–1113, Dec. 2014.

[13] L. Tang and H. Liu, “Community detection and mining in social media,”Synth. Lectures Data Mining Knowl. Discovery, vol. 2, no. 1, pp. 1–137,Jan. 2010.

[14] S. Bhagat, G. Cormode, and S. Muthukrishnan, “Node classification insocial networks,” in Social Network Data Analytics. 2011, pp. 115–148.

[15] J. Tang, Y. Chang, C. Aggarwal, and H. Liu, “A survey of signed networkmining in social media,” in Proc. ACM Comput.Surv., vol. 3, 2016,pp. 42:1–42:37.

[16] J. Kunegis, J. Preusse, and F. Schwagereit, “What is the added valueof negative links in online social networks?” in Proc. 22nd Int. Conf.World Wide Web (WWW), 2013, pp. 727–736.

[17] Z. Wu, C. C. Aggarwal, and J. Sun, “The troll-trust model for ranking insigned networks,” in Proc. 9th ACM Int. Conf. Web Search Data Mining,Feb. 2016, pp. 447–456.

[18] R. Zhao, A. Zhou, and K. Mao, “Automatic detection of cyberbullyingon social networks based on bullying features,” in Proc. 17th Int. Conf.Distrib.Comput.Netw., Jan. 2016, pp. 1–6.

[19] V. K. Singh, Q. Huang, and P. K. Atrey, “Cyberbullying detection usingprobabilistic socio-textual information fusion,” in Proc. IEEE/ACMInt. Conf. Adv. Social Netw. Anal.Mining (ASONAM), Aug. 2016,pp. 884–887.

[20] H. Hosseinmardi, S. A. Mattson, R. I. Rafiq, R. Han, Q. Lv, andS. Mishra, “Detection of cyberbullying incidents on the Instagram socialnetwork,” CoRR, vol. 1503.03909, 2015.

[21] J.-M. Xu, X. Zhu, and A. Bellmore, “Fast learning for sentiment analysison bullying,” in Proc. 1st Int. WISDOM, 2012, pp. 10:1–10:6.

[22] A. Squicciarini, S. Rajtmajer, Y. Liu, and C. Griffin, “Identificationand characterization of cyberbullying dynamics in an online socialnetwork,” in Proc. IEEE/ACM Int. Conf. Adv. Social Netw.Anal. Mining,Aug. 2015, pp. 280–285.

[23] P. Galán-García, J. G. De La Puerta, C. L. Gómez, I. Santos, andP. G. Bringas, “Supervised machine learning for the detection oftroll profiles in Twitter social network: Application to a real case ofcyberbullying,” Logic J. IGPL, vol. 24, no. 1, pp. 42–53, 2015.

[24] D. Chatzakou, N. Kourtellis, J. Blackburn, E. De Cristofaro, G. Stringhini,and A. Vakali, “Mean birds: Detecting aggression and bullying onTwitter,” in Proc. ACM Web Sci. Conf., Jun. 2017, pp. 13–22.

[25] L. Cheng, J. Li, Y. N. Silva, D. L. Hall, and H. Liu, “XBully:Cyberbullying detection within a multi-modal context,” in Proc. 12thACM Int. Conf. Web Search Data Mining, Jan. 2019, pp. 339–347.

[26] H.-T. Kao, S. Yan, D. Huang, N. Bartley, H. Hosseinmardi, andE. Ferrara, “Understanding cyberbullying on Instagram and Ask.Fm viasocial role detection,” in Proc. Companion Proc. World Wide Web Conf.,May 2019, pp. 183–188.

[27] L. Cheng, R. Guo, Y. Silva, D. Hall, and H. Liu, “Hierarchical attentionnetworks for cyberbullying detection on the Instagram social network,”in Proc. SIAM Int. Conf. Data Mining. Philadelphia, PA, USA: SIAM,2019, pp. 235–243.

[28] L. Cheng, J. Li, Y. Silva, D. Hall, and H. Liu, "PI-bully: Personalizedcyberbullying detection with peer influence," in Proc. 28th Int. JointConf. Artif. Intell., Aug. 2019, pp. 5829–5835.

[29] J. Tang, C. Aggarwal, and H. Liu, "Node classification in signed socialnetworks," in Proc. SIAM Int. Conf. Data Mining, Jun. 2016, pp. 54–62.

[30] S. Brin and L. Page, "The anatomy of a large-scale hypertextualWeb search engine," Comput.Netw. ISDN Syst., vol. 30, nos. 1–7,pp. 107–117, Apr. 1998.

[31] M. Shahriari and M. Jalili, "Ranking nodes in signed social networks,"Social Netw.Anal. Mining, vol. 4, no. 1, p. 172, Dec. 2014.

[32] C. D. Kerchove and P. V. Dooren, "The PageTrust algorithm: How torank Web pages when negative links are allowed?" in Proc. SIAM Int.Conf. Data Mining, Apr. 2008, pp. 346–352.

[33] P. Bonacich and P. Lloyd, "Calculating status with negative relations,"Social Netw., vol. 26, no. 4, pp. 331–338, Oct. 2004.

[34] A. Mishra and A. Bhattacharya, "Finding the bias and prestige of nodesin networks based on trust scores," in Proc. 20th Int. Conf. World WideWeb (WWW), 2011, pp. 567–576.

[35] M. Dadvar, D. Trieschnigg, R. Ordelman, and F. de Jong, "Improvingcyberbullying detection with user context," in Proc. Eur. Conf. IR, 2013,pp. 693–696.

[36] K. Dinakar, R. Reichart, and H. Lieberman, "Modeling the detection oftextual cyberbullying," in Proc. Int. AAAI WSM, vol. 5, no. 1, 2011.

[37] Y. Chen, Y. Zhou, S. Zhu, and H. Xu, "Detecting offensive languagein social media to protect adolescent online safety," in Proc. Int.Conf. Privacy, Secur., Risk Trust Int. Conf. Social Comput., Sep. 2012,pp. 71–80.

[38] F. J. Ortega, J. A. Troyano, F. L. Cruz, C. G. Vallejo, and F. Enríquez,"Propagation of trust and distrust for the detection of trolls in a socialnetwork," Comput. Netw., vol. 56, no. 12, pp. 2884–2895, Aug. 2012.

[39] C. J. Hutto and E. Gilbert, "Vader: A parsimonious rule-based modelfor sentiment analysis of social media text," in Proc. Int. AAAI WSM,vol. 8, no. 1, 2014.

[40] J. Han, J. Pei, and M. Kamber, Data Mining: Concepts and Techniques.Amsterdam, The Netherlands: Elsevier, 2011.

[41] Y. Sasaki et al., "The truth of the f-measure," Teach Tutor Mater,pp. 1–5, 2007.

[42] C. E. Metz, "Basic principles of ROC analysis," Seminars Nucl. Med.,vol. 8, no. 4, pp. 283–298, 1978.

[43] J. W. Perry, K. Allen, and M. M. Berry, "Machine literature searchingX. Machine language; factors underlying its design and development,"Amer. Documentation (Pre-1986), vol. 6, no. 4, p. 242, 1955.