CONTEXT BASED SOCIAL NETWORKING AND ITS APPLICATIONS TO ANALYTICS

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CERTIFICATE

This is to certify that the project report entitled *"Context Based Social Networking And its Applications to Analytics"*, submitted by **Ankit Sabharwal (061215)**, **Jatin Singh (061248)**, **Pankaj Mohan Sandhu (061268)** and **Shardul Jain (061289)** in partial fulfillment for the award of Degree of Bachelor of Technology in Computer Science and Engineering to Jaypee University of Information Technology, Waknaghat, Solan has been carried out under my supervision.

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LIST OF ABBREVATIONS

PHP	A scripting language
HTML	Hyper Text Markup Language
HTTP	Hypertext Transfer Protocol
URL	Universal Resource Locator
WWW	World Wide Web
HTTP	Hypertext Transfer Protocol
BBS	Bulletin Board System
EIES	Electronic Information Exchange System
The WELL	The Whole Earth 'Lectronic Link
SNS	Social network service
API	Application Programming Interface
PDA	Personal digital assistant
IIS	Internet Information Services
LAN	Local Area Network
SQL	Structured Query Language

ABSTRACT

The recent emergence of context-based social networking services is revolutionizing the web allowing users to share real-life experiences via user-generated multimedia content. In this document we give you an insight of the framework that leverages the power of social networks to location based analytics. This social networking application allows for real time tracking of users in a small continuous geographic location. It enables users to find peers around them and interact with them in real time. The application maps the active users on a map in real time along with the crowd density at all locations. A crowd density representation has been used for analytic purposes and can help us in the best possible resource management. The main aim is to create a better understanding of the daily working/living patterns of the academic community, which are rapidly changing due to the emergence of Wi-Fi/LAN itself. This application greatly improves productivity of students, faculty and the administration.

1.1   Social Networking

A **social network** is a social structure made of individuals (or organizations) called "nodes," which are tied (connected) by one or more specific types of interdependency, such as friendship, kinship, common interest, financial exchange, dislike, sexual relationships, or relationships of beliefs, knowledge or prestige.

Social networking is the grouping of individuals into specific groups, like small rural communities or a neighborhood subdivision, if you will. Although social networking is possible in person, especially in the workplace, universities, and high schools, it is most popular online. This is because unlike most high schools, colleges, or workplaces, the internet is filled with millions of individuals who are looking to meet other people, to gather and share first-hand information and experiences about golfing, gardening, aesthetics and cosmetic surgery, developing friendships or professional alliances, finding employment, business-to-business marketing and even groups sharing information about the end of the Mayan calendar and the Great Shift. The topics and interests are as varied and rich as our society and the history of the human being.

As mentioned, social networking often involves grouping specific individuals or organizations together. While there are a number of social networking websites that focus on particular interests, there are others that do not. The websites without a main focus are often referred to as "traditional" social networking websites and usually have open memberships. This means that anyone can become a member, no matter what their hobbies, beliefs, or views are. However, once you are inside this online community, you can begin to create your own network of friends and eliminate members that do not share common interests or goals.

1.2   History of Social Networking

The notion that individual computers linked electronically could form the basis of computer-mediated social interaction and networking was suggested early on. There were many early efforts to support social networks via computer-mediated communication, including USENET, ARPANET, LISTSERV, BBS (Bulletin Board Services) and EIES: Murray Turoff's server-based Electronic Information Exchange Service (Turoff and Hiltz, 1978, 1993). The Information Routing Group developed a schema about how the proto-Internet might support this.

Early social networking websites started in the form of generalized online communities such as The WELL (1985), Theglobe.com (1994), Geocities (1994) and Tripod.com (1995). These early communities focused on bringing people together to interact with each other through chat rooms, and share personal information and ideas around any topics via personal homepage publishing tools which were a precursor to the blogging phenomenon.

Social networking began to flourish as a component of business internet strategy at around March 2005 when Yahoo launched Yahoo! 360°. In July 2005 News Corporation bought MySpace, followed by ITV (UK) buying Friends Reunited in December 2005. Various social networking sites have sprung up catering to different languages and countries. It is estimated that combined there are now over 200 social networking sites using these existing and emerging social networking models, without counting the niche social networks (also referred to as vertical social networks) made possible by services such as Ning. Twitter, launched in 2006, has as recently as 2009 eclipsed many other social network services and—although lacking in some of what were considered the essential aspects of a SNS—has allowed add-on services to connect and supply these services via its public API.

1.3   Why is Social Networking popular?

Through social networking, people can use networks of online friends and group memberships to keep in touch with current friends, reconnect with old friends or

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create real–life friendships through similar interests or groups. Besides establishing important social relationships, social networking members can share their interests with other like–minded members by joining groups and forums. Some networking can also help members find a job or establish business contacts.

Most social networking websites also offer additional features. In addition to blogs and forums, members can express themselves by designing their profile page to reflect their personality. The most popular extra features include music and video sections. Members can read bios of their favorite music artists from the artist's profile page as well as listen to their favorite songs and watch music videos. The video section can include everything from member–generated videos from hundreds of subjects to TV clips and movie trailers.

1.4   What does Social Networking offer?

The phenomenon of online social networking—made extremely popular by many social networking sites like MySpace.com , has evolved to include more than the teenage stereotype looking to expand his/her network of online friends. People of all ages and backgrounds have discovered that they can enrich their lives through the contacts they make on a social networking website.

Profiles

The heart and soul of social networking sites are user's personal profiles. It's like their own Internet sanctuary, a place where they can express their thoughts and feelings, post photographs and show off their network of friends. The most popular social network websites put a strong emphasis on the user's profile, making it easy to use yet still reflective of the user's personality.

Security

The Internet can be a dangerous place to post personal information. All social networks should provide the ability to set profiles to private in some way or another. Additionally they should have the ability to report and block users.

Networking Features

A good social network goes above and beyond just allowing users to post profiles and update pictures. Additional features should include music sections, video uploads, groups and more.

Search

The object of a social network is to find friends and expand relationships. Top social networking websites allows members to search for other members in a safe and easy to use environment. Common search functions include search by name, city, school and email address.

Help/Support

Most social network sites are self-explanatory. However, in the off-chance a user needs help there needs to be some way to contact the webmaster or answers in an FAQs section.

Legitimate Friend Focus

The growing trend for social networks is to communicate and keep in touch with people you already know. No one wants to be inundated with unsolicited spam friend requests. The best social network sites keep profiles and search options private enough that the only people that can find you are the ones actually looking for users in their own school or neighborhood networks. Even with a completely public profile, users shouldn't be bothered with more than a couple of unsolicited comments or messages.

1.5   Social Network Analysis

Social network analysis (related to network theory) has emerged as a key technique in modern sociology. It has also gained a significant following in anthropology, biology, communication studies, economics, geography, information science, organizational studies, social psychology, and sociolinguistics, and has become a popular topic of speculation and study.

Social network analysis views social relationships in terms of network theory consisting of nodes and ties. Nodes are the individual actors within the networks, and ties are the relationships between the actors. The resulting graph-based structures are often very complex. There can be many kinds of ties between the nodes. Research in a number of academic fields has shown that social networks operate on many levels, from families up to the level of nations, and play a critical role in determining the way problems are solved, organizations are run, and the degree to which individuals succeed in achieving their goals.

1.6   Metrics in Social Network Analysis

Betweenness

It is the extent to which a node lies between other nodes in the network. This measure takes into account the connectivity of the node's neighbors, giving a higher value for nodes which bridge clusters. The measure reflects the number of people who a person is connecting indirectly through their direct links.

Bridge

An edge is said to be a bridge if deleting it would cause its endpoints to lie in different components of a graph.

Centrality

This measure gives a rough indication of the social power of a node based on how well they "connect" the network. "Betweenness", "Closeness", and "Degree" are all measures of centrality.

Centralization

It is the difference between the numbers of links for each node divided by maximum possible sum of differences. A centralized network will have many of its links dispersed around one or a few nodes, while a decentralized network is one in which there is little variation between the numbers of links each node possesses.

Closeness

The degree an individual is near all other individuals in a network (directly or indirectly). It reflects the ability to access information through the "grapevine" of network members. Thus, closeness is the inverse of the sum of the shortest distances between each individual and every other person in the network. The shortest path may also be known as the "geodesic distance".

Clustering Coefficient

A measure of the likelihood that two associates of a node are associates themselves. A higher clustering coefficient indicates a greater 'cliquishness'.

Cohesion

The degree to which actors are connected directly to each other by cohesive bonds is known as the Cohesion. Groups are identified as 'cliques' if every individual is directly tied to every other individual, 'social circles' if there is less stringency of direct contact, which is imprecise, or as structurally cohesive blocks if precision is wanted.

Degree

It is the count of the number of ties to other actors in the network.

Density

The degree a respondent's ties know one another/ proportion of ties among an individual's nominees. Network or global-level density is the proportion of ties in a network relative to the total number possible (sparse versus dense networks).

Flow Betweenness Centrality

It is the degree that a node contributes to sum of maximum flow between all pairs of nodes (not that node).

Eigenvector Centrality

It is a measure of the importance of a node in a network. It assigns relative scores to all nodes in the network based on the principle that connections to nodes having a high score contribute more to the score of the node in question.

Local Bridge

An edge is a local bridge if its endpoints share no common neighbors. Unlike a bridge, a local bridge is contained in a cycle.

Path Length

The distances between pairs of nodes in the network. Average path-length is the average of these distances between all pairs of nodes.

Prestige

In a directed graph prestige is the term used to describe a node's centrality. "Degree Prestige", "Proximity Prestige", and "Status Prestige" are all measures of Prestige.

Radiality

Degree an individual's network reaches out into the network and provides novel information and influence.

Reach

The degree any member of a network can reach other members of the network.

Structural Cohesion

It is the minimum number of members who, if removed from a group, would disconnect the group.

Structural Equivalence

Refers to the extent to which nodes have a common set of linkages to other nodes in the system. The nodes don't need to have any ties to each other to be structurally equivalent.

Structural Hole

Static holes that can be strategically filled by connecting one or more links; to link together other points. It is often linked to the idea of social capital: if you link to two people who are not linked you can control their communication.

1.7 Uses of Social Network Analysis

Social network analysis has been used in epidemiology to help understand how patterns of human contact aid or inhibit the spread of diseases such as HIV in a population. The evolution of social networks can sometimes be modeled by the use of agent based models, providing insight into the interplay between communication rules, rumor spreading and social structure.

SNA may also be an effective tool for mass surveillance -- for example the Total Information Awareness program was doing in-depth research on strategies to analyze social networks to determine whether or not U.S. citizens were political threats.

Diffusion of innovations theory explores social networks and their role in influencing the spread of new ideas and practices. Change agents and opinion leaders often play major roles in spurring the adoption of innovations, although factors inherent to the innovations also play a role.

Robin Dunbar has suggested that the typical size of an egocentric network is constrained to about 150 members due to possible limits in the capacity of the human communication channel. The rule arises from cross-cultural studies in sociology and especially anthropology of the maximum size of a village (in modern parlance most reasonably understood as an ecovillage). It is theorized in evolutionary psychology that the number may be some kind of limit of average human ability to recognize members and track emotional facts about all members of a group. However, it may be due to economics and the need to track "free riders", as it may be easier in larger groups to take advantage of the benefits of living in a community without contributing to those benefits.

CHAPTER II

PROBLEM STATEMENT

To develop a social networking application and use track users over a campus in real time. Furthermore, the location of all the users is used to list crowd density of locations. The data will then be analyzed for better management and resource distribution.

2.1 Description

The target client users include people in a continuous geographic location who are logged into the application using a computer or by using cellular phones. Within the group of users, a wide range of personalities will exist. Listed below are some examples:

- Person A: University member who visits library, labs etc. and logs into the application he/she can network with other colleagues present in the University Campus.

- Person B: University/Office member can spot another colleague if present at a specific location.

- Person C: A group of people working on a task can collaborate and setup a meeting.

- Person D: An organization that wants to enable this package and web application at their location. They would want to have enough customizations to match their specific needs.

2.2   Designing Interface

The user Interface will be a web based with basic features of social networking like Community generation interface, User information interface, Message board interface. In addition to these features it will include features like crowd density generation which will give detailed mapping of users with the floor plan of the place which the user wants to check. It will also include a feature in which the user can locate his friends in his vicinity.

There will be special interface for the administrator account which will include graph generation for the *crowd density vs. time* for various locations defined by the admin which he/she can use for various purposes e.g. security consideration, staff management and resource management.

Fig. 1: Login page depicting User Interface.

Fig. 2: Screenshot of the home page.

2.3 Storing data into Database

The login details of the user will be stored into the database (My SQL). The login details will consist of the following elements:

- *User name*
- *Password*
- The *IP Address* of the node on which the user is currently logged in
- *Start time* and the *End Time* of the session for which the user is logged on to the application.

2.4 Calculating Crowd Density

It is the ratio of the number of the active users to the total capacity of a particular location. Say X is the number of people who logged in to the application using computers or mobile devices. And let N be the total capacity of the particular location under normal circumstances.

Hence, the Crowd Density (D) can be calculated as:

$$D = X / N$$

In our implementation we have assumed that if $D>=0.8$ then there is High Crowd Density, if $0.4<=D<0.8$ then there is Moderate Crowd Density and if $D<0.4$ then there is Low Crowd Density. These values can be changed according to the requirement of the administrator who is managing the application.

2.5   Mapping Crowd Density Levels in Floor Plan

For making it more interactive the calculated values of crowd density will be represented in graphical form e.g. the high crowd density will be represented by the red buddle, moderate crowd density will be represented by the blue bubble and similarly the low crowd density will be represented by the green bubble, Or we can use other types of graphical representation for the purpose.

Now these graphical objects or bubbles will be diffused with the floor plan or map of the campus as shown in the figure below. Hence the administrator or any other authenticated person can easily predict or estimate the number of people in the campus and their locations.

There will be two types of density graphs; first there is the general crowd density graph that is the campus crowd density map. Then there will specific graph showing only the peers of the person who is logged on, this graph is the Peer Map and is different for every user because it depends upon the peer location. The two types of graphs or maps are shown below:
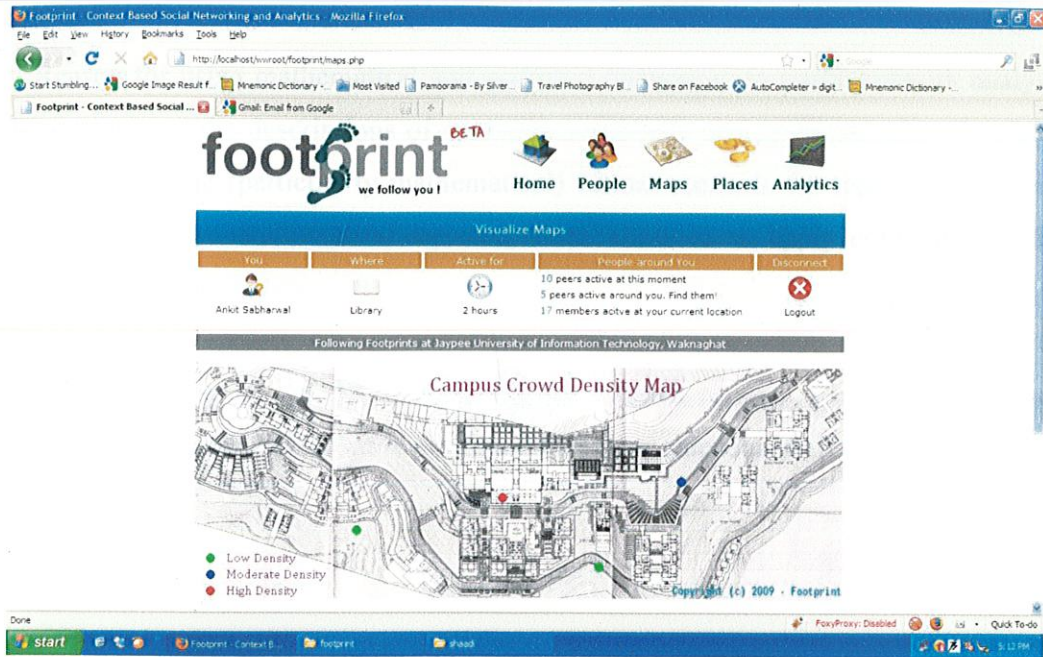
Fig. 3: Campus Crowd Density Map.
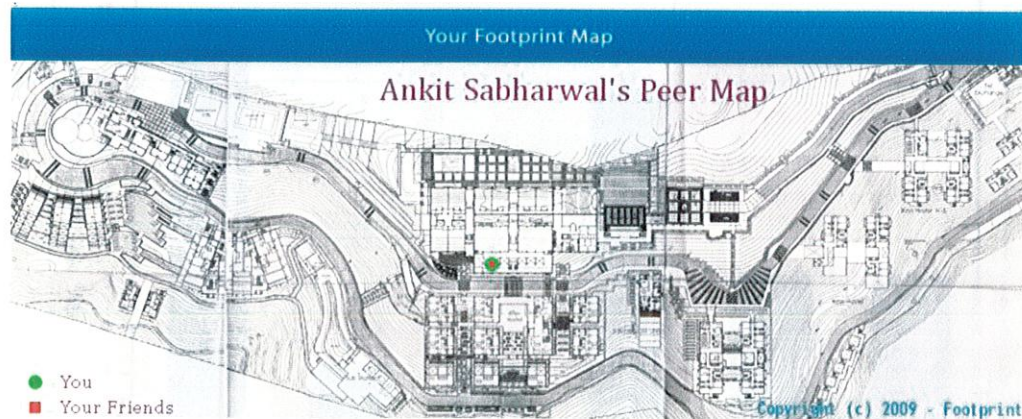
Fig. 4: User's Peer Map.

2.6   Graph Generation

We will fetch the data from the database and then generate the graphs accordingly. The graph will be generated for crowd density versus time for different locations of the campus which will allow comprehensive analyses to be carried out at a later date, by reports/graph generation that will help to explore behavioral trends in a longer time frame.

Reason for using mathematical and graphical techniques in social network analysis is to represent the descriptions of networks compactly and systematically. A related reason for using (particularly mathematical) formal methods for representing social networks is that mathematical representations allow us to apply computers to the analysis of network data.

The results can be helpful in analyzing the internet activity, the amount of bytes transferred, a spatial reference to the real time events calendar, staff management.
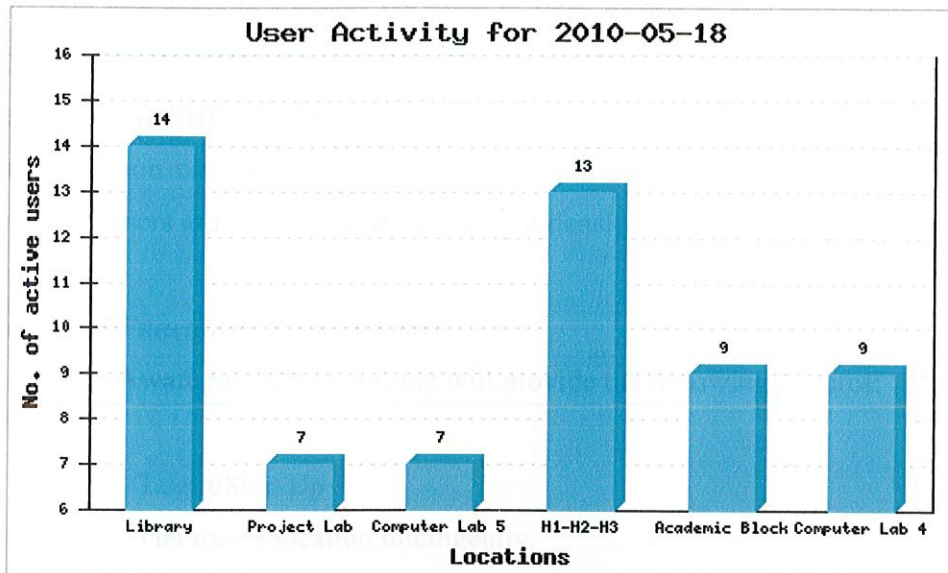
Fig. 5: Bar Graph depicting No. of Users vs. Time.

This project is a new development to create an interactive and social networking application for students/faculty at an institution with web browsers or mobile phone with web browsers installed. The initial target audience is university staff and students and an office setup in a continuous geographic location. The applications will help users utilize the context aware features to collaborate efficiently.

This tool will provide a means for users to track people in the geographic location set by them in the software provided. The tool will provide a web based application developed using PHP which can be run in web browsers for users to utilize the facility. This application can be used by users in a continuous geographic location to find other active users around them and view crowd density status at various locations.

Overview of Functional Requirements

The Context Aware Social Networking will provide the following features:

- Login/Sign Up
- Get user's location intelligently.
- Setting time at location.
- View position on map.
- View virtual panorama of the location.
- Display Crowd Density at locations.
- Track your friends in real time.
- Request a meeting.
- Public/Private viewing.
- Share tasks
- Domain Specific Intelligent Search agent
- Host sessions and meet-ups.
- Message Filters

- Security Protocol
- Check availability of rooms
- Combat Spam issues

A student/faculty member with a valid enrollment id signs up for the service. After signing up the user can log into the application at any time. The system determines the user's location intelligently and associates it with their profile.

The users can interact with the other users and send messages, request for help from the other people on their list. The user can also use the intelligent search agent to get the most relevant search results from the system. A map is always to shown for every location to make the system more interactive. A layout of the entire campus shows where the crowd is concentrated at a particular time.

Students will have the option of listing their friends, and filling out a short profile that lists their interests and what classes they are taking. Whenever they are logged in from any building, their client's instance will receive a list of their friends in the nearby area, as well as a list of people who share one or more of their interests, and another separate list of people in any of their classes. This list will be updated every minute or so.

CHAPTER IV

METHODOLOGY

Our preliminary study is based on Social Networking Interface and applications towards analytics. Social networks analysis is an interesting research direction to analyse the structures and relationships of social networks, such as analyses of density, centrality and cliques in social network structures. In order to understand the social structure, social relationships and social behaviours, social networks analysis therefore is an essential and important technique.

1.1   Developing a social network interface

Platforms for the users sharing a common interest and activities will be developed in which user create a profile and build a personal network that connects him or her to other users. Our interface shall also comprise of contextual parameter i.e. the user will get to know about the location of the people in his friend list.

1.2   Real Time Collaboration and User Tracking

The target client users include people in a continuous geographic location who are logged into the application using a computer or by using cellular phones. Within the group of users, a wide range of personalities will exist.

1.3   Location Analytics

The users' activities along with their locations are represented through time series graphs. These graphs can be used in location based analytics and predicting crowd densities depending on various time or event parameters. These graphs will appear in the administrator's application view. These graphs will present a live view of the

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current crowd densities in a continuous geographic location. These analytics can be further used to suggest administrative and infrastructural changes; say, for example allocating more staff in the library during the evening or putting more coffee machines on the second floor instead of the third in the building.

5.1 Platform

The application has been developed to be platform independent to ensure compatibility with all kinds of devices. The application just needs a web browser and can be run irrespective of the platform.

5.2 Tools and Technologies

HTML/CSS

HTML is the basic markup language for displaying the web pages. This is used to create the frontend of the application. Cascading Style Sheets are used to describe the presentation semantics of the web pages.

PHP (Hypertext Pre-processor)

This is the main server side scripting language to be used in the project. It gives us the basic functionalities of connecting to the MySQL databases and passing queries to insert/delete/update. It also helps record sessions and cookies for user authentication.

JavaScript

This would be the main client side language that would help in improving the look and usability of the web pages. It will also be used to get and pass data into xmlHTTP request objects.

AJAX (Asynchronous JavaScript and XML)

It is a bridge between the server side scripts and the client side scripts and helps in increasing the usability of the system by reducing no. of times the page refreshes.

MySQL

This is the database technology to be used in the system. Most of the data will be stored into the databases by the backend and will be retrieved by the front-end for display. The MySQL queries will be written in the PHP scripts and run by the server on getting the requests.

Apache Web Server

It is open source, cross platform, stable, fast, and flexible. It's pretty much the standard for web serving on the Internet and has lots and lots of features available to it. There is a Windows version, but our web host runs it on Debian Linux.

5.3   Hardware Requirements

Client Side

Ideally this sort of system would run on something smaller and portable (like a PDA or wearable, like a piece of jewelry using Bluetooth or RFID tags but given current constraints, this system will be a program that would run on laptop/personal computer or a mobile device.

Server Side

A web server that can support the strength of a campus in terms of the number of connections. We have therefore used Apache Server because Windows based IIS Server limits the number of connections.

PROCESS DESCRIPTION

6.1   Implementation using Spiral Model

The spiral model is a software development process combining elements of both design and prototyping-in-stages, in an effort to combine advantages of top-down and bottom-up concepts. Also known as the spiral lifecycle model (or spiral development), it is a systems development method (SDM) used in information technology (IT). This model of development combines the features of the prototyping model and the waterfall model. The spiral model is intended for large, expensive and complicated projects.
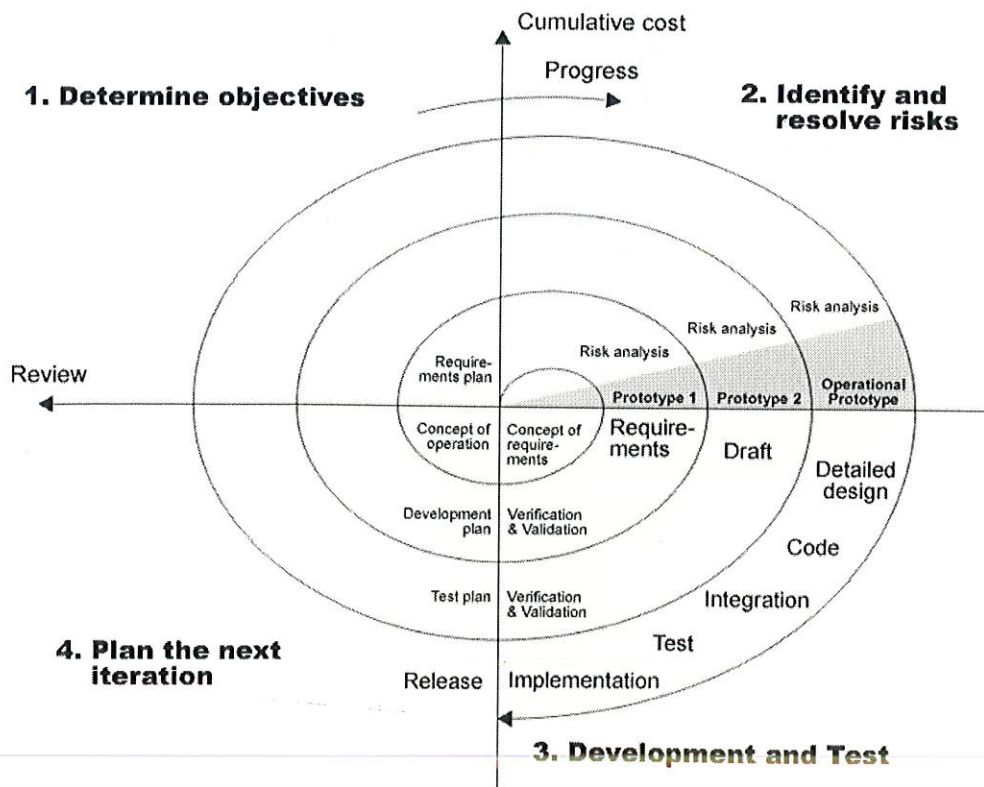
Fig. 6: Spiral Model Representation.

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6.2 Phases of Spiral Model

Objective setting

Specific objectives for the project phase are identified

Risk Assessment and Reduction

Key risks are identified, analyzed and information is sought to reduce these risks

Development and Validation

An appropriate model is chosen for the next phase of development.

Planning

The project is reviewed and plans drawn up for the next round of the spiral

Advantages

- Estimates (i.e. budget, schedule, etc.) become more realistic as work progresses, because important issues are discovered earlier.
- It is more able to cope with the (nearly inevitable) changes that software development generally entails.
- Software engineers (who can get restless with protracted design processes) can get their hands in and start working on a project earlier.

6.3   Data Flow Diagram

Level 0 – Data Flow Diagram
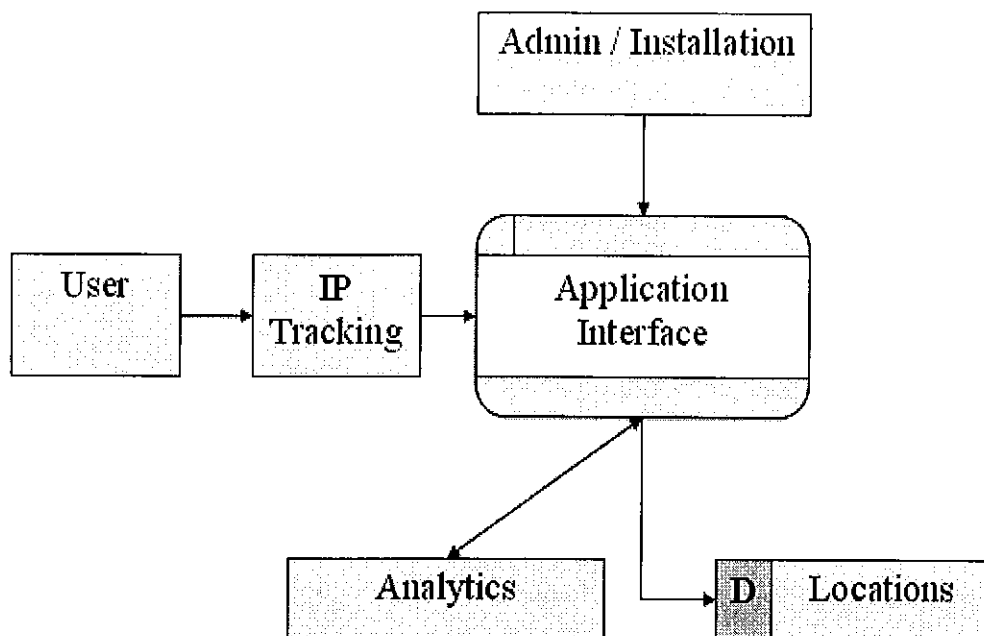
Fig. 7: Level 0 – Data Flow Diagram.

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Level 1 – Data Flow Diagram

Fig. 8: Level 1 – Data Flow Diagram.

User Signup & Authentication	Analytics	Location Mapping	Crowd Density

| Security	Networking	Report Generation	Admin Panel
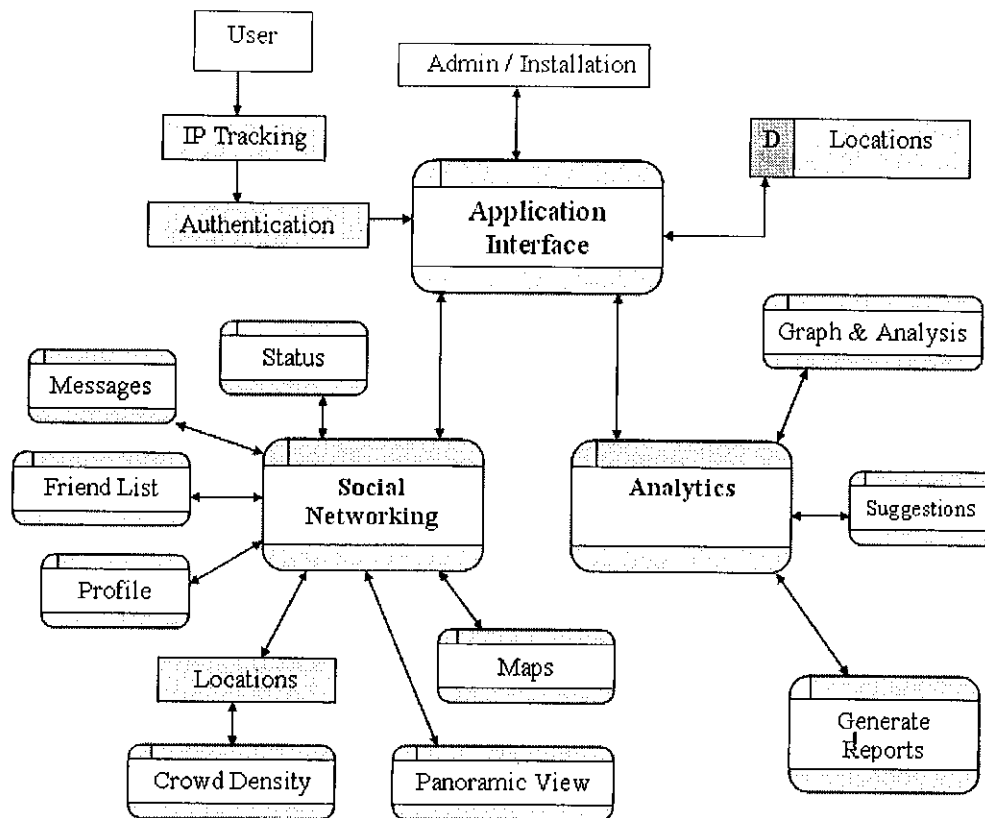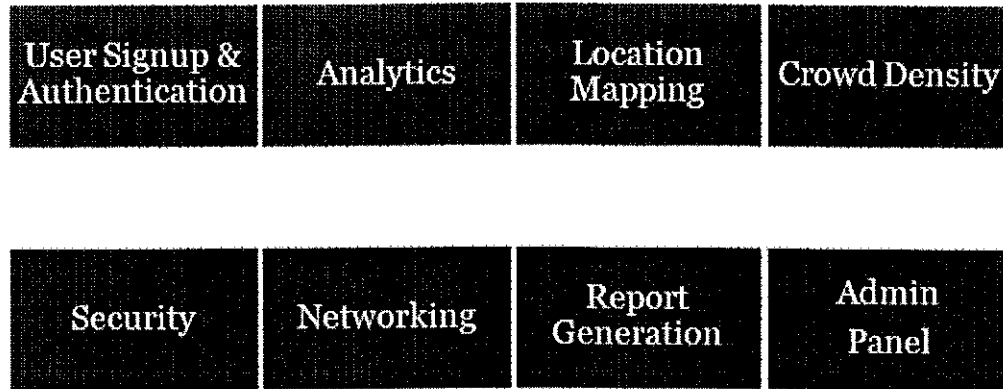
Fig. 9: Modules for the application.

7.1   User Signup and Authentication

There will a feature of sign up for the new user who is not registered to use the application. To control spamming we are using CAPTCHA. A **CAPTCHA** or **Captcha** is a type of challenge-response test used in computing to ensure that the response is not generated by a computer. The process usually involves one computer (a server) asking a user to complete a simple test which the computer is able to generate and grade.

Because other computers are unable to solve the CAPTCHA, any user entering a correct solution is presumed to be human. Thus, it is sometimes described as a reverse Turing test, because it is administered by a machine and targeted to a human, in contrast to the standard Turing Test that is typically administered by a human and targeted to a machine. A common type of CAPTCHA requires that the user type letters or digits from a distorted image that appears on the screen.

Please enter the letters shown in the image *

4kxyxt

Submit   Reset

Fig. 10: Screenshot showing Captcha.
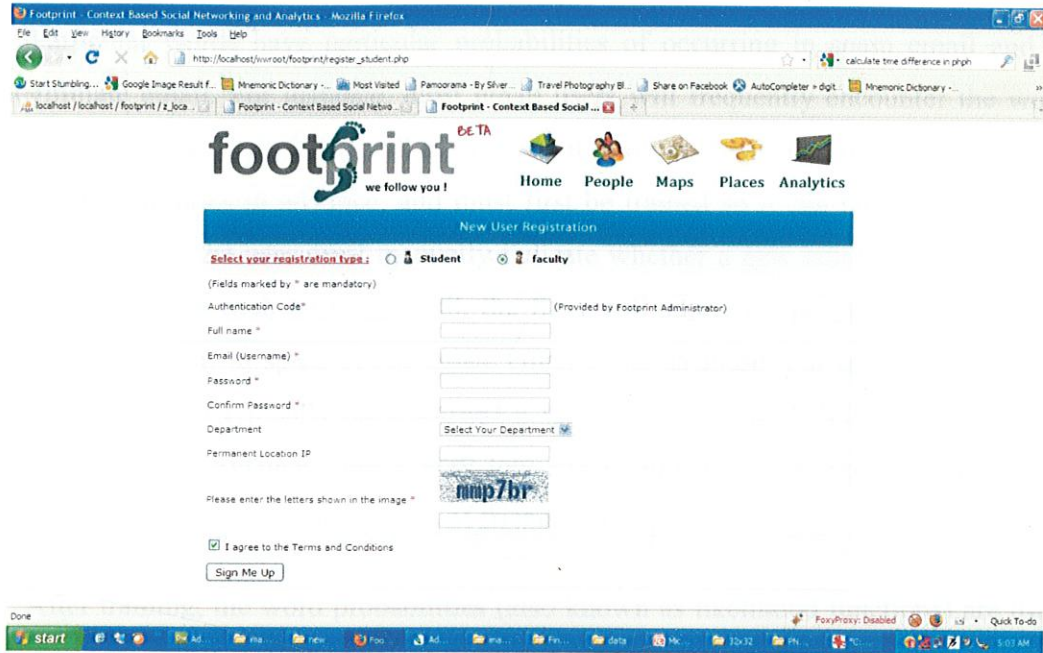
Fig .11: Signup Screen embedded with Captcha.

7.2   Security

For security we are using Bayesian Spam filter. Bayesian spam filtering is a statistical technique of e-mail filtering. It makes use of a naive Bayesian classifier to identify spam e-mail.

The first known mail-filtering program to use a Bayes classifier was Jason Rennie's iFile program, released in 1996. The program was used to sort mail into folders. The first scholarly publication on Bayesian spam filtering was by Sahami et al. (1998). Variants of the basic technique have been implemented in a number of research works and commercial software products. In 2002, the principles of Bayesian filtering were publicized to more general audiences in an essay by Paul Graham.

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Bayesian spam filtering has become a popular mechanism to distinguish illegitimate spam email from legitimate email (sometimes called "ham"). Many modern mail clients implement Bayesian spam filtering. Users can also install separate email filtering programs. Server-side email filters, such as DSPAM, SpamAssassin, SpamBayes, Bogofilter and ASSP, make use of Bayesian spam filtering techniques, and the functionality is sometimes embedded within mail server software itself.

Particular words have particular probabilities of occurring in spam email and in legitimate email. For instance, most email users will frequently encounter the word "Viagra" in spam email, but will seldom see it in other email. The filter doesn't know these probabilities in advance, and must first be trained so it can build them up. To train the filter, the user must manually indicate whether a new email is spam or not. For all words in each training email, the filter will adjust the probabilities that each word will appear in spam or legitimate email in its database. For instance, Bayesian spam filters will typically have learned a very high spam probability for the words "Viagra" and "refinance", but a very low spam probability for words seen only in legitimate email, such as the names of friends and family members.

After training, the word probabilities (also known as likelihood functions) are used to compute the probability that an email with a particular set of words in it belongs to either category. Each word in the email contributes to the email's spam probability, or only the most interesting words. This contribution is called the posterior probability and is computed using Bayes' theorem. Then, the email's spam probability is computed over all words in the email, and if the total exceeds a certain threshold (say 95%), the filter will mark the email as a spam.

Like in any other spam filtering technique, email marked as spam can then be automatically moved to a "Junk" email folder, or even deleted outright. Some software implements quarantine mechanisms that define a time frame during which the user is allowed to review the software's decision.

The initial training can usually be refined when wrong judgments from the software are identified (false positives or false negatives). That allows the software to dynamically adapt to the ever evolving nature of spam.

Some spam filters combine the results of both Bayesian spam filtering and other heuristics (pre-defined rules about the contents, looking at the message's envelope, etc.), resulting in even higher filtering accuracy, sometimes at the cost of addictiveness.

Bayesian email filters take advantage of Bayes' theorem. Bayes' theorem is used several times in the context of spam:

- a first time, to compute the probability that the message is spam, knowing that a given word appears in this message;
- a second time, to compute the probability that the message is spam, taking into consideration all of its words (or a relevant subset of them);
- Sometimes a third time, to deal with rare words.

Computing the probability that a message containing a given word is Spam

Let's suppose the suspected message contains the word "Replica". Most people who are used to receiving e-mail know that this message is likely to be spam, more precisely a proposal to sell counterfeit copies of well-known brands of watches. The spam detection software, however, does not "know" such facts; all it can do is compute probabilities.

The formula used by the software to determine that is derived from Bayes' theorem

$$\Pr(S|W) = \frac{\Pr(W|S) \cdot \Pr(S)}{\Pr(W|S) \cdot \Pr(S) + \Pr(W|H) \cdot \Pr(H)}$$

where:

- *Pr(S | W)* is the probability that a message is a spam, knowing that the word "replica" is in it;
- *Pr(S)* is the overall probability that any given message is spam;
- *Pr(W | S)* is the probability that the word "replica" appears in spam messages;
- *Pr(H)* is the overall probability that any given message is not spam (is "ham");
- *Pr(W | H)* is the probability that the word "replica" appears in ham messages.

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7.3   Location Mapping

Basically the location mapping is done by tracking the IP Address of the node on which the user is logged in though LAN/Wi-Fi. Hence the user will be shown on the campus map.

7.4   Crowd Density

It is the ratio of the number of the active users to the total capacity of a particular location. As discussed above there are three distinct crowd densities possible:

- High (Red): $D >= 0.8$
- Moderate (Blue): $0.4 <= D < 0.8$
- Low (Green): $D < 0.4$

CHAPTER VIII

CONTRIBUTION OF THE PROJECT

8.1 Security Alert

Say a fire alarm or a toxic gas leak in a large building, and then the security officers can access the application and could easily check the current status of Wi-Fi/LAN usage in that building and make an intelligent estimate about how many people might be inside the building and how in which parts of the building are the people distributed.

8.2 Staff Management

Let's take an example of the library. During examination periods the usage of the library is more i.e. crowd density is more in library. Hence by knowing this analytic data the administrator can place required number of librarians or staff members in the library and vice versa. This can also be done on another scenarios e.g. cafeteria, dormitories, faculty houses, hostels etc.

8.3 Resource Management

One can easily find out the best opening hours of the cafeteria by knowing the crowd density patterns. Let's take an example of installation of coffee/tea vending machine in a multi-storied building. By analyzing the crowd density patterns the management can easily decide which floor needs more vending machines. It will be more appropriate to place more vending machines at locations with higher crowd density and vice-versa.

8.4   Overall View of the Application

User A enters the library. He logs in the application. His location is retrieved by the system as 'Library'. He sets his time at location as 1 hour. His friends can see that A is sitting in the library for the next 1 hour.

User A's location is also depicted on a map of the campus. Similarly, you can track where your classmates or friends are in the campus. Also this representation can be used to indicate which parts of the campus are most densely crowded, and at what times. Users are also able to view a panoramic view of the location they are currently looking. Give a unique feeling to the users as if they are actually present there.

Crowd density is shown in the form of dots on the map. Red and green dots indicate large and moderate crowds respectively. Blue dots indicate low crowd densities.

Suppose, *User A* wants to meet *User B* to discuss about their upcoming test. *User A* sees that *User B* is sitting one of the labs nearby. So *User A* requests for a meeting to *User B*. Also, both *User A* and *User B* can interact through the application as well. They can send notes to each other, share tasks or ask for help from other students in their friend lists.

Also, *User C* is presently in the hostel. He has to go to the library. Earlier, he had to visit the library repeatedly only to find out that there were no nodes available. Now *User C* just logs into the application sees the number of people occupying nodes in the library. The application will tell him the number of nodes which are free or if all the nodes are occupied it tells him at what time will a node get free. Similarly, faculty members can track if a Lecture Hall or Classroom is free or occupied. And on the similar lines, students can check whether a faculty member available or not.

8.5   Limitations

The user has to log in to the application. There may be a case when user is sitting on the node but rather then log in to the application he/she is doing some other work. Hence, the detection of this kind of user cannot be done without Bluetooth tracking of their mobile phones.

Also, the application is highly dependent upon the LAN/Wi-Fi. Hence, the administrator has to keep a watch for any fault in the network.

9.1   Test Runs

*Missing objects (graphics) in the page*
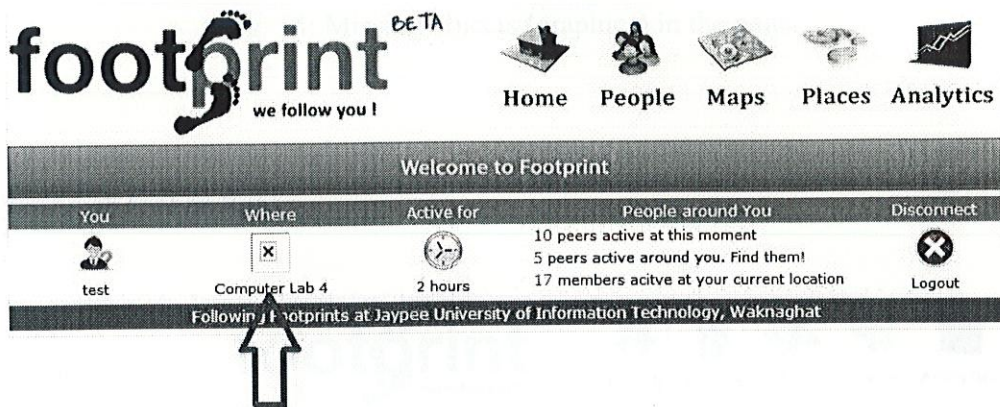
Fig. 12: Missing objects (graphics) in the page.
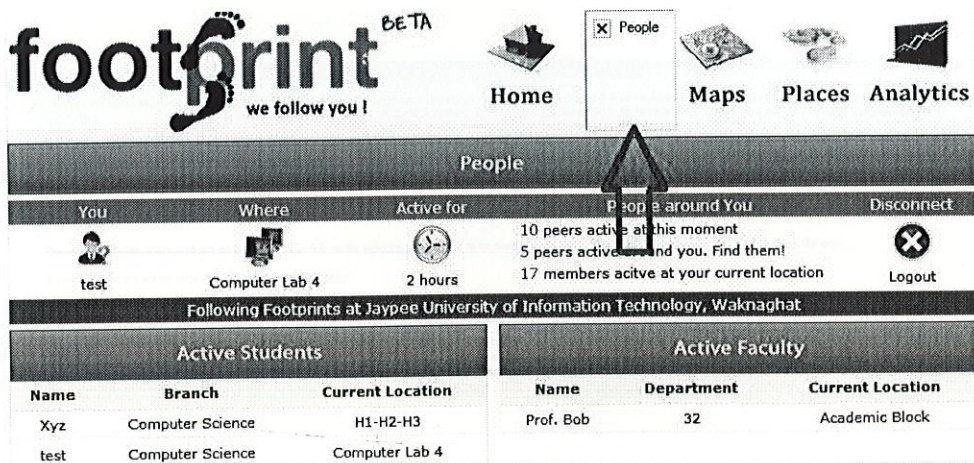
Fig. 13: Missing objects (graphics) in the page.
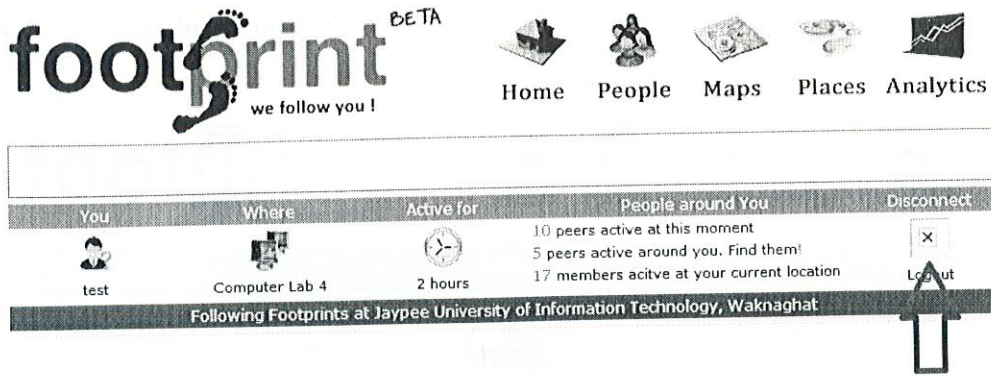
Fig. 14: Missing objects (graphics) in the page.

Missing or broken links

alert(\"Invalid Security Code.... Redirecting to Registration Page.\");location.href=\"register_student.php?name=$name&email=$email&dob=$date\"; "; exit(0); } ?>
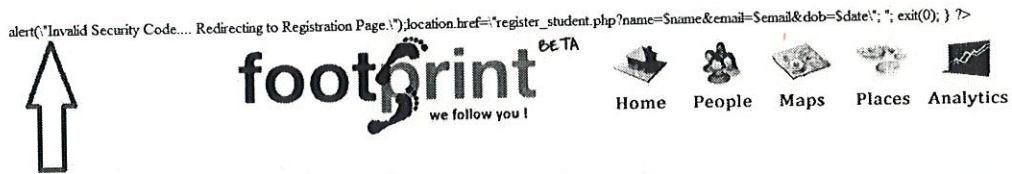
Fig. 15: Broken link in the page.

Object not found!

The requested URL was not found on this server. The link on the referring page seems to be wrong or outdated. Please inform the author of that page about the error.

If you think this is a server error, please contact the webmaster.

Error 404

localhost
05/18/10 01:26:51
Apache/2.2.12 (Win32) DAV/2 mod_ssl/2.2.12 OpenSSL/0.9.8k mod_autoindex_color PHP/5.3.0 mod_perl/2.0.4 Perl/v5.10.0

Fig. 16: Error due to link not available. On clicking the "Maps" link in the user home page, the page which shows the map of the campus should be displayed.
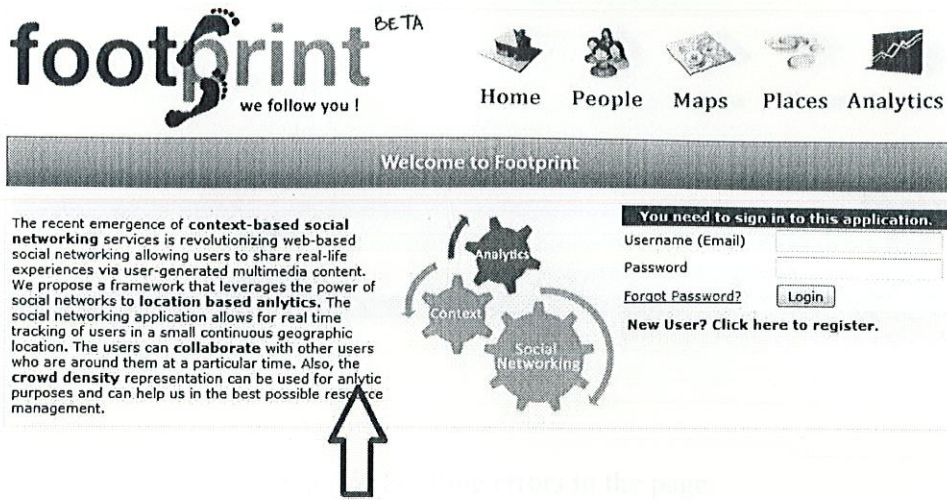
Fig. 17: Spelling errors in the page.
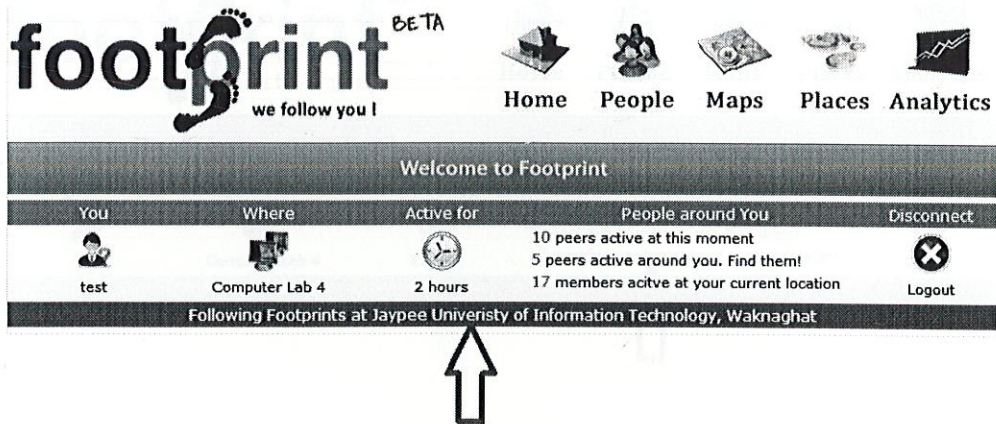
Fig. 18: Spelling errors in the page.
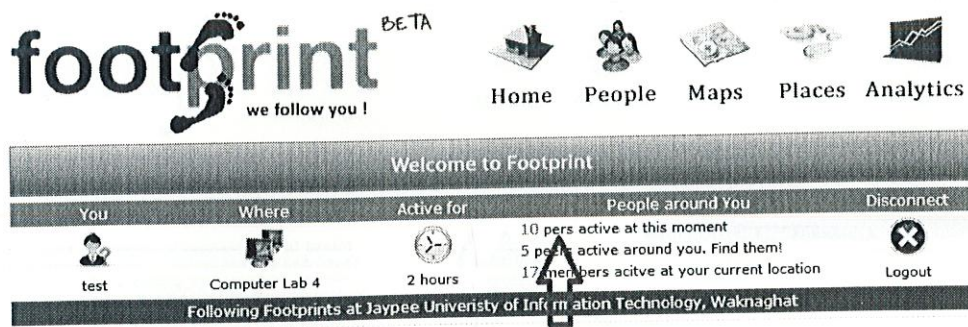
Fig. 19: Spelling errors in the page.
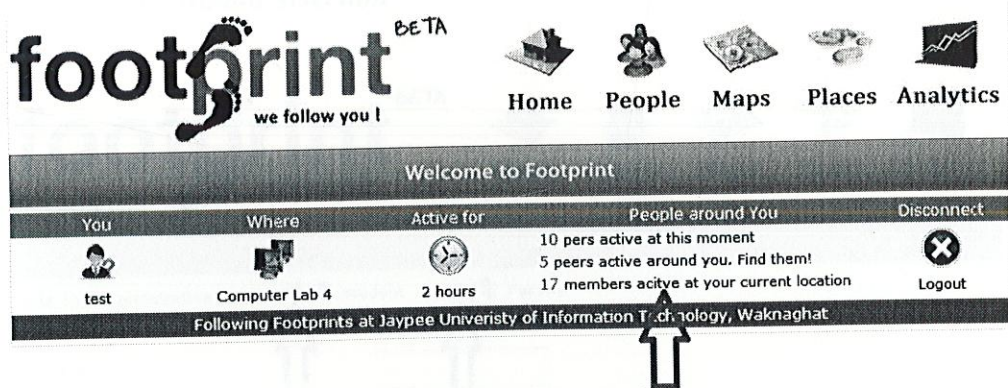
Fig. 20: Spelling errors in the page.

Missing Login Button
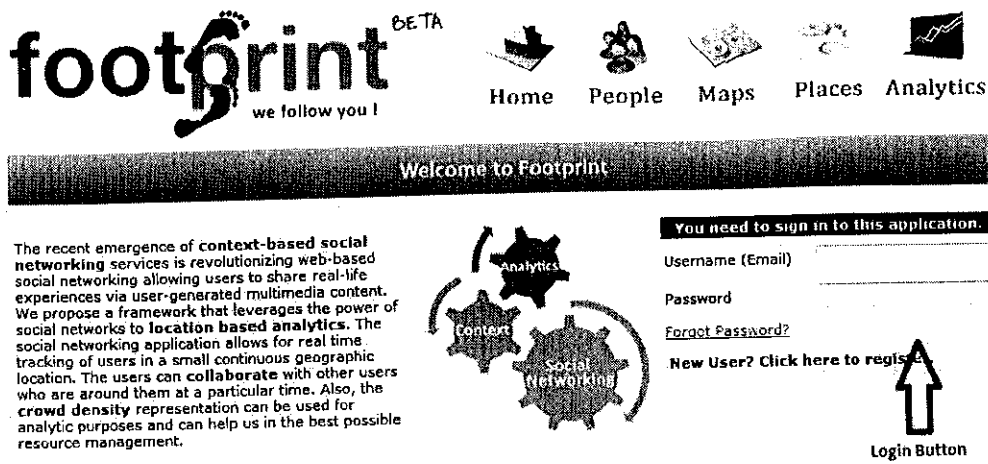
Fig. 21: Missing login button in the page.

Multiple Radio Button Selection
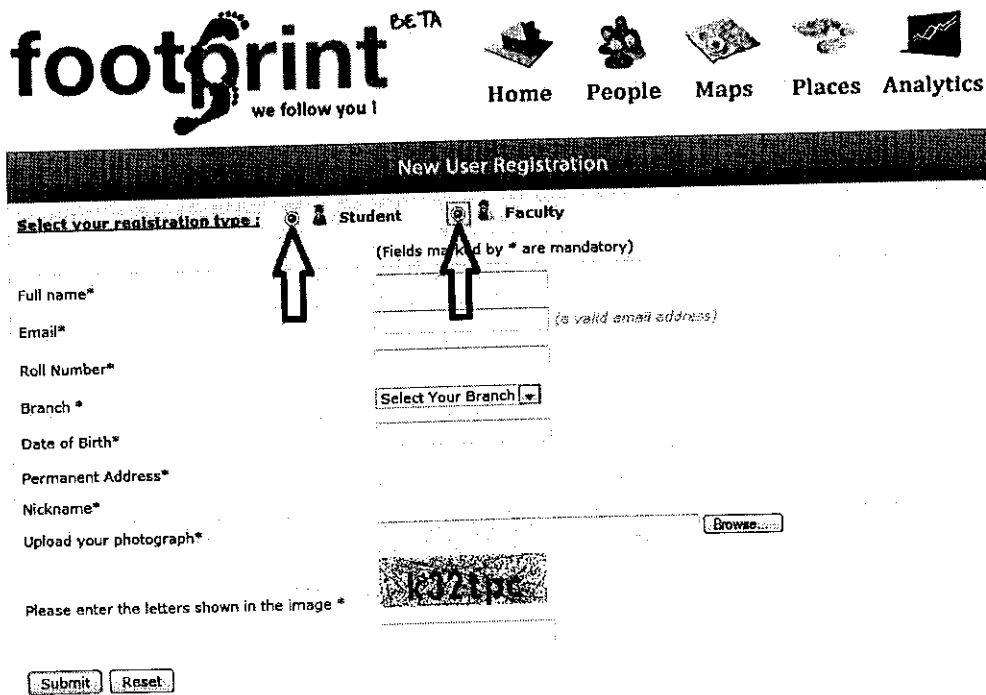
Fig. 22: Multiple selection of radio button in the page.

9.2 Test Cases

### Table 1. Functional Test Cases

Test case ID	Input description	Input data	Expected Results	Actual Results
T-1	Go to the "New user? Click here to register" link.	Click on the link.	Go to the signup page.	Page with error.
T-2	Log in for the application.	Username= Password= Click On Login button	Go to the home page of the user.	Go to the home page of the user.
T-3	To see the active users.	Click on the "People" link.	Go to the active users' page.	Nothing to display.
T-4	Log out from the application	Click on the logout link	Go to the sign in page.	Opening of the Home Page of the user.

Table 2. Page content test cases

Test Case ID	Input description	Input data	Expected results	Actual Results
T-5	View images and graphics.	page viewed= browsers=	Images and graphics display correctly on selected browsers.	Images and graphics display correctly on selected browsers.
T-6	View table.	Table viewed= Browsers=	Table displays correctly on selected browsers.	Some of the rows in the table are overlapping.
T-7	Place mouse over every object.	Objects tested=	The proper text appears over every object.	Text is not appearing over the abject.
T-8	Display the active users	Active users=	Display the list of active users.	Display active as well as non active users.

Table 3. Reliability and Availability test cases

Test case ID	Input Description	Input Data	Expected Results	Actual Results
T-9	Four users login at the same time.	user1= user2= user3= user4=	The home page of all the four should be displayed at the same time.	Home pages displayed.
T-10	During a database upgrade, repeat test T-9.		The database upgrade is successful, and users can log in at the same time.	Same as the expected results.
T-11	Conduct a volume test, which initiates 10 new users every 15 minutes. Run this test for one hour.		All users can access the system and can perform various functions of the application.	Degraded performance is noted in the system.

Table 4. Test cases for testing forms

Test case ID	Input description	Input data	Expected results	Actual Results
T-12	Tab from field to field.	Starting field=	Fields traversed in proper order.	Same as expected result.
T-13	Enter the maximum number of characters that the field accepts.	Field name=Username Characters typed=10	Field accepts the input as max length=255.	Same as expected result.
T-14	Exceed the maximum number of characters that the field accepts.	Field name=Password Characters typed=30	Field rejects the characters as max length=25.	Same as expected result.
T-15	Omit information in a required field in the registration page.	Field name=Captcha.	Information required in field.	New user registers successfully.

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Table 5. Browser Compatibility Table

	Internet Explorer 6.0 below	Internet Explorer 6.0 above	Mozilla Firefox	Google Chrome	Internet Explorer v.5(for Mac only)	Opera
Win XP	Yes (But with some errors.)	Yes	Yes	Yes	N.A.	Yes
Vista	Yes (But with some errors.)	Yes	Yes	Yes	N.A.	Yes
Windows 7	Yes (But with some errors.)	Yes	Yes	Yes	N.A.	Yes
Mac OS	N.A.	N.A.	Yes	Yes	Yes	Yes
Linux	N.A.	N.A.	Yes	Yes	N.A.	Yes

This application can be modeled to include others form of mobile devices.

10.1   RFID (Radio-Frequency Identification)

It is the use of an object (typically referred to as an RFID tag) applied to or incorporated into a product, animal, or person for the purpose of identification and tracking using radio waves. Some tags can be read from several meters away and beyond the line of sight of the reader.
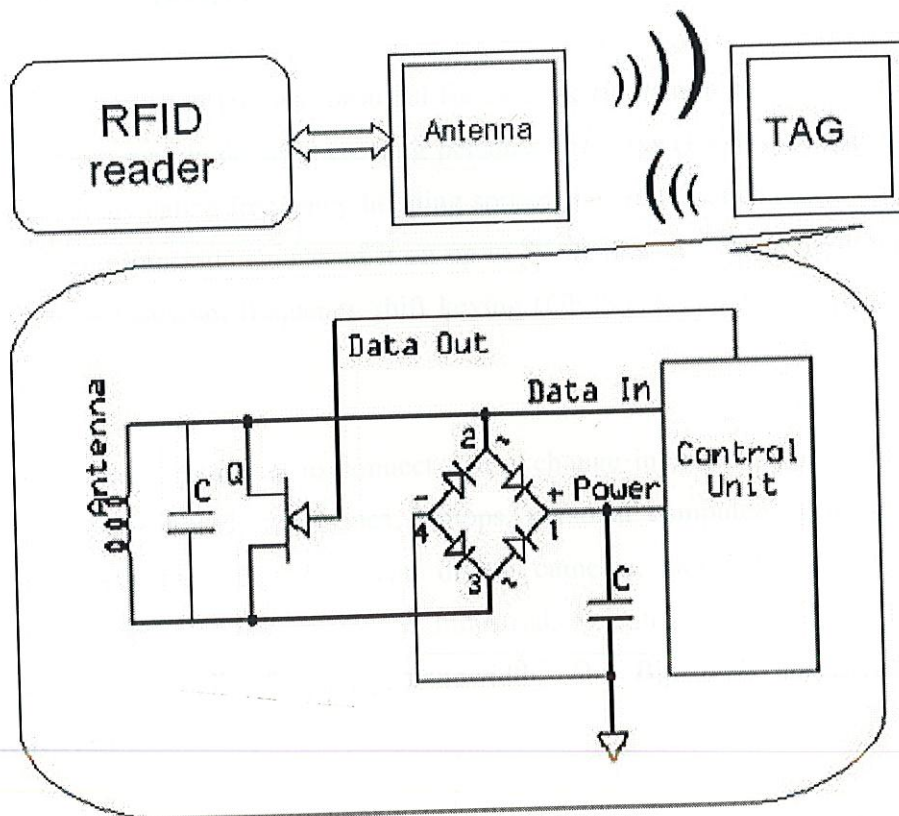
Fig. 23: RFID Tag and its usage.

Most RFID tags contain at least two parts. One is an integrated circuit for storing and processing information, modulating and demodulating a radio-frequency (RF) signal, and other specialized functions. The second is an antenna for receiving and transmitting the signal.

There are generally three types of RFID tags: active RFID tags, which contain a battery and can transmit signals autonomously, passive RFID tags, which have no battery and require an external source to provoke signal transmission, and battery assisted passive (BAP) which require an external source to wake up but have significant higher forward link capability providing great read range.

RFID has many applications, for example, it is used in enterprise supply chain management to improve the efficiency of inventory tracking and management.

10.2   Bluetooth Devices

Bluetooth is an open wireless protocol for exchanging data over short   distances from fixed and mobile devices, creating personal networks (PANs). Bluetooth uses a radio technology called frequency-hopping spread spectrum, which chops up the data being sent and transmits chunks of it on up to 79 frequencies. In its basic mode, the modulation is Gaussian frequency-shift keying (GFSK). It can achieve a gross data rate of 1 Mb/s.

Bluetooth provides a way to connect and exchange information between devices such as mobile phones, telephones, laptops, personal computers, printers, Global Positioning System (GPS) receivers, digital cameras, and video game consoles through a secure, globally unlicensed Industrial, Scientific and Medical (ISM) 2.4 GHz short-range radio frequency bandwidth. The Bluetooth specifications are developed and licensed by the

Bluetooth Special Interest Group (SIG). The Bluetooth SIG consists of companies in the areas of telecommunication, computing, networking, and consumer electronics.

10.3   GPS (Global Positioning System)

The Global Positioning System (GPS) is a U.S. space-based global satellite navigation system. It provides reliable positioning, navigation, and timing services to worldwide users on a continuous basis in all weather, day and night, anywhere on or near the Earth.
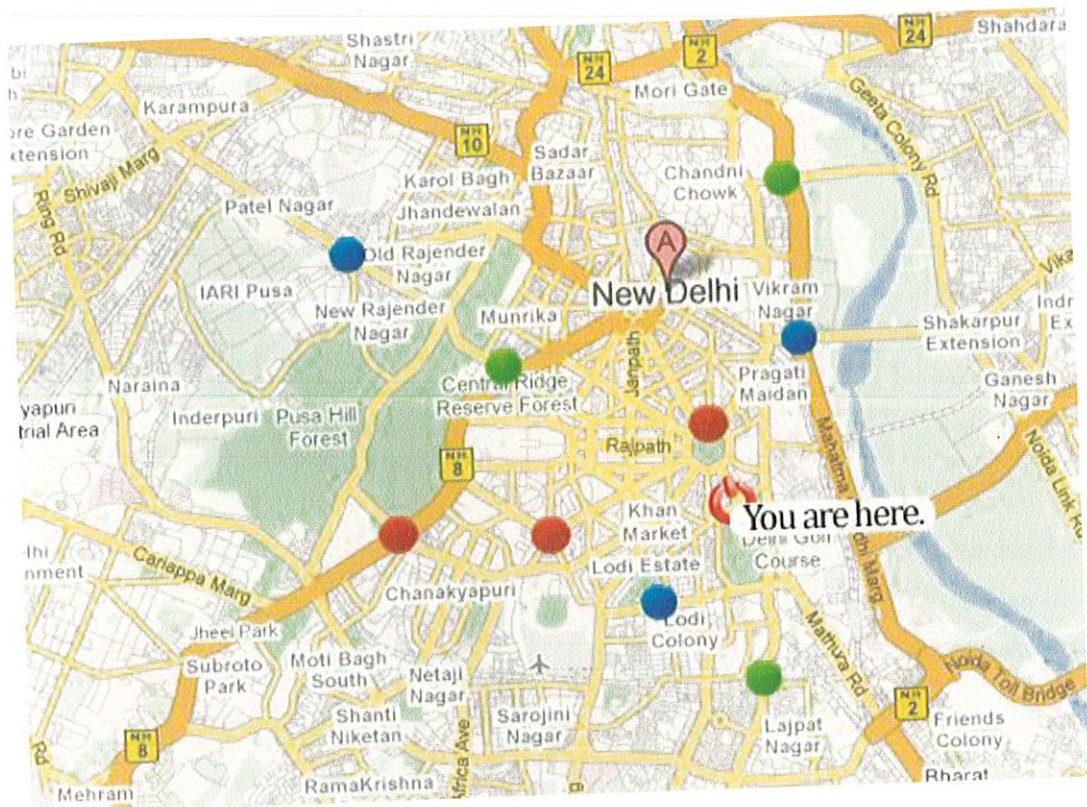

Fig. 24: GPS view of a city.

A GPS receiver calculates its position by precisely timing the signals sent by the GPS satellites high above the Earth. Each satellite continually transmits messages which include

- the time the message was sent
- precise orbital information (the ephemeris)
- the general system health and rough orbits of all GPS satellites (the almanac).

The receiver utilizes the messages it receives to determine the transit time of each message and computes the distances to each satellite. These distances along with the satellites' locations are used with the possible aid of trilateration to compute the position of the receiver. This position is then displayed, perhaps with a moving map display or latitude and longitude; elevation information may be included. Many GPS units also show derived information such as direction and speed, calculated from position changes.

CHAPTER XI

CONCLUSION

The core application is a social networking application that allows real time tracking of users in a small continuous geographic location. The application enables users to find peers around them and interact with them in real time. The application maps the active users on a map along with the crowd density at all locations. The crowd density representation is used for analytic purposes which helps us in the best possible resource management.

In the last 16 weeks we have successfully implemented a Context based Social Networking Application embedded in a Website.

Problems faced during the implementation

1. The development of the mobile application was unsuccessful as mobile devices did not allow the application to take full control of its Bluetooth connectivity due to the security features built within the firmware of the mobile devices. Bypassing the security of the mobile firmware required advanced knowledge of the unavailable source code of the firmware.

2. Web Testing required a lot of inventory as it demanded several users to login at a specified time.

3. Finding the various subnets IP addresses for a single IP address connected to the website required deep knowledge of the UNIX Networking Methodology and thus resulted in a lot of research work.

4. Analytic Module of the application required Data Mining Skills and its integration with Web Designing, required to generate the Real Time Density/Peer Maps and Graphs.

Work done

1. Web Interface for the Context Based Social Networking Application.
2. Implementation of the conventional Social Networking Features.
3. Resolving the location of a logged in user based upon his IP address.
4. Implementation of CAPTCHA to identify between human user and hardcoded programs.
5. Bayesian Spam Filter used to avoid message spamming.
6. Crowd Density Calculation & Mapping.
7. Graph generation for Analytical purposes.
8. Optimal Resource Management achieved by the use of the results generated by the application.

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APPENDIX

A.   *Homepage*

```php
<?php
session_start();
$show=0;
include("db.php");
if(isset($_SESSION["username"])) //check session or throw him out
  {
                echo "<script language=\"javascript\">
location.href=\"home.php\";
</script>";
}
?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
<head>
<meta http-equiv="Content-Type" content="text/html; charset=utf-8" />
<title>Footprint - Context Based Social Networking and Analytics</title>
<style type="text/css">
<!--
body {
        margin-left: 0px;
        margin-top: 0px;
        margin-right: 0px;
        margin-bottom: 0px;
}
-->
</style>
<link href="footprint.css" rel="stylesheet" type="text/css" />
</head>

<body>
<table width="800" border="0" align="center" cellpadding="0" cellspacing="0"
class="sample">
  <tr>
   <td colspan="2" valign="top"><?php include("header.php"); ?></td>
  </tr>
  <tr>
  <td colspan="2">
  <table width="800" border="0" cellpadding="0" cellspacing="0" class="sample">
```

```html
<tr class="heading">
  <td        align="center"   valign="middle"><img    src="images/welcome.png"
width="240" height="40" /></td>
  </tr>
 </table>
 </td>
 </tr>
<tr class="blank">
<td colspan="2" >.</td>
</tr>
 <tr>
<td colspan="2"><?php if($show==1) { include("snapshot.php"); } ?></td>
</tr>
 <tr class="blank">
<td colspan="2">.</td>
</tr>
<tr class="blank">
<td colspan="2">.</td>
</tr>

<tr>
<td colspan="2">
<table width="100%" border="0" cellpadding="0" cellspacing="0">
 <tr>
 <td>
  <table width="520" border="0" cellpadding="5" cellspacing="0">
     <tr>
  <td width="330" align="left" class="black_text">
```

The recent emergence of context-based social networking services is revolutionizing web-based social networking allowing users to share real-life experiences via user-generated multimedia content. We propose a framework that leverages the power of social networks to location based analytics. The social networking application allows for real time tracking of users in a small continuous geographic location. The users can collaborate with other users who are around them at a particular time. Also, the crowd density representation can be used for analytic purposes and can help us in the best possible resource management.

```html
  </td>
  <td>
   <img src="images/intro.jpg" />
  </td>
  </tr>
  </table>
  </td>
```

```html
<td valign="top">
<form id="form1" name="form1" method="post" action="verify.php">
<table width="280" border="0" align="left" cellpadding="2" cellspacing="5">

  <tr>
    <td colspan="2" align="center" bgcolor="#C70900" class="white"><strong>You need to sign in to this application.</strong></td>
  </tr>
  <tr>
    <td width="122" class="black_text">Username (Email)</td>
    <td width="143"><input name="username" type="text" class="black_text" size="20" maxlength="255" /></td>
  </tr>
  <tr>
    <td class="black_text">Password</td>
    <td><input name="password" type="password" class="black_text" id="password" size="20" maxlength="25" /></td>
  </tr>
  <tr>
    <td><a href="forgot_password.php" class="blue_link">Forgot Password?</a></td>
    <td><input name="Submit2" type="submit" class="black_text" value="Login" /></td>
  </tr>
  <tr class="content_focus">
    <td colspan="2" class="content_col"><strong><a href="register.php">New User? Click here to register.</a></strong></td>
  </tr>
</table>
</form>
</td>
</tr>
</table>
</td>
</tr>

</table>

</body>
</html>
```

B.   User Authentication

```php
<?php
if(!$_GET['ref'])
        {

        include("db.php");
        include("getip.php");

        if(($_POST['password'])&&($_POST['username']))
        {


        $user=$_POST['username'];
        $inpass=md5($_POST['password']);

        $sql="select email,password,status from z_user where email='$user'";
        $result=mysql_query($sql);
        if (!mysql_query($sql))
          {
          die('Error: ' . mysql_error());
          }

        $row = mysql_fetch_row($result);
        $pass=$row[1];
        $status=$row[2];

                if(strcasecmp("$inpass","$pass")==0)
                {

                        if($status=="1") //good user
                        {


                                //update the user table
                                $query = "update z_user set log_ip='$subpart[2]' where email='$user'";

                                $dbresult = mysql_query($query);

                                //add location ip
                                $query  =  "update  z_user  set  activity=1  where email='$user'";

                                $dbresult = mysql_query($query);
```

```php
//update the location table
$query = "select current_nodes from z_location where
ip_address='$subpart[2]'";

$dbresult = mysql_query($query);
$row = mysql_fetch_row($dbresult);


$exist=$row[0];
$exist=$exist+1;
$query = "update z_location set current_nodes=$exist
where ip_address='$subpart[2]'";
$dbresult = mysql_query($query);


//load user id and location id
$query = "select id from z_user where email='$user'";
$dbresult = mysql_query($query);
$row = mysql_fetch_row($dbresult);
$user_id=$row[0];


$query    =    "select    id    from    z_location    where
ip_address='$subpart[2]'";

$dbresult = mysql_query($query);
$row = mysql_fetch_row($dbresult);
$loc_id=$row[0];


//insert in history table
$date=date("Y-m-d");
$start_time=date("Y-m-d h:i:s");
$query        =        "insert        into        z_history
values('','$user_id','$loc_id','$date','$start_time','','')";
                $dbresult= mysql_query($query);


session_start();
$_SESSION["username"] = $user;
$_SESSION["ip_address"] = $subpart[2];


if($user=="admin")
{
echo "<script language=\"javascript\">
location.href=\"admin.php\";
</script>";
}
else
{
```

```php
                                        echo "<script language=\"javascript\">
                                        location.href=\"home.php\";
                                        </script>";
                                        }
                                        exit(0);
                        }
                        else if($status=="0") //bad user boooo banned !
                        {
                                        $error=2;
                        }
                }

                else //invalid login
                {
                $error=1;
                }
        }

        else //verify called widout arguments
        {
        $error=1;
        }
}

else if($_GET['ref']=="logout") $error=3;

else
{
echo "<script language=\"javascript\">
location.href=\"index.php\";
</script>";
}

?>
```

C.   *Captcha*

```php
<?php
session_start();
class CaptchaSecurityImages {

        var $font = 'monofont.ttf';

        function generateCode($characters) {
                /* list all possible characters, similar looking characters and vowels
have been removed */
                $possible = '23456789bcdfghjkmnpqrstvwxyz';
                $code = '';
                $i = 0;
                while ($i < $characters) {
                        $code .= substr($possible, mt_rand(0, strlen($possible)-1), 1);
                        $i++;
                }
                return $code;
        }


        function CaptchaSecurityImages($width='120',$height='40',$characters='6')
{
                $code = $this->generateCode($characters);
                /* font size will be 75% of the image height */
                $font_size = $height * 0.75;
                $image = @imagecreate($width, $height) or die('Cannot initialize new
GD image stream');
                /* set the colours */
                $background_color = imagecolorallocate($image, 255, 255, 255);
                $text_color = imagecolorallocate($image, 20, 40, 100);
                $noise_color = imagecolorallocate($image, 100, 120, 180);
                /* generate random dots in background */
                for( $i=0; $i<($width*$height)/3; $i++ ) {
                        imagefilledellipse($image,                mt_rand(0,$width),
mt_rand(0,$height), 1, 1, $noise_color);
                }
                /* generate random lines in background */
                for( $i=0; $i<($width*$height)/150; $i++ ) {
                        imageline($image,   mt_rand(0,$width),   mt_rand(0,$height),
mt_rand(0,$width), mt_rand(0,$height), $noise_color);
                }
                /* create textbox and add text */
```

```php
            $textbox = imagettfbbox($font_size, 0, $this->font, $code) or
die('Error in imagettfbbox function');
            $x = ($width - $textbox[4])/2;
            $y = ($height - $textbox[5])/2;
            imagettftext($image, $font_size, 0, $x, $y, $text_color, $this->font ,
$code) or die('Error in imagettftext function');
            /* output captcha image to browser */
            header('Content-Type: image/jpeg');
            imagejpeg($image);
            imagedestroy($image);
            $_SESSION['security_code'] = $code;
        }

}

$width = isset($_GET['width']) ? $_GET['width'] : '135';
$height = isset($_GET['height']) ? $_GET['height'] : '40';
$characters = isset($_GET['characters']) && $_GET['characters'] > 1 ?
$_GET['characters'] : '6';

$captcha = new CaptchaSecurityImages($width,$height,$characters);

?>
```

D. *Location Analytics via Graph Generation*

```php
<?php
include("db.php");
require_once 'phplot.php';
$date=$_GET['date'];
$i=0;
$query = "select id,location_name from z_location";
$dbresult = mysql_query($query);
while($row = mysql_fetch_row($dbresult))
        {
                $location_id=$row[0];
                $location_name=$row[1];

                $query1= "select count(*) from z_history where loc_id='$location_id'
and date='$date';";
                $dbresult1 = mysql_query($query1);
                $row1 = mysql_fetch_row($dbresult1);
                $no_of_users=$row1[0];
                $data[$i]=array($location_name, $no_of_users);
                $i++;
        }
        $plot = new PHPlot(500, 300);
$plot->SetImageBorderType('plain');

$plot->SetPlotType('bars');
$plot->SetDataType('text-data');
$plot->SetDataValues($data);

# Main plot title:
$plot->SetTitle('User Activity for '.$date);

# Make a legend for the 3 data sets plotted:
//$plot->SetLegend(array('Engineering', 'Manufacturing', 'Administration'));
$plot->SetYDataLabelPos('plotin');
$plot->SetYTitle("No. of active users");
$plot->SetXTitle("Locations");

# Turn off X tick labels and ticks because they don't apply here:
$plot->SetXTickLabelPos('none');
$plot->SetXTickPos('none');

$plot->DrawGraph();
?>
```

E. Registration Script

```php
<?
session_start();
include("gctip.php");

   //to check CAPCHA
   if((($_SESSION['security_code']                              ==
$_POST['security_code'])||($_SESSION['security_code2']          ==
$_POST['security_code2'])) && (!empty($_SESSION['security_code'])) ) {
      // Insert you code for processing the form here, e.g emailing the submission,
entering it into a database.
      unset($_SESSION['security_code']);
   } else {
      // ERROR MESSAGE !!
                  if(!isset($_POST['name'])) $name="";
                    else $name=urlencode($_POST['name']);
                    if(!isset($_POST['email'])) $email="";
                    else $email=urlencode($_POST['email']);
                    if(!isset($_POST['dob'])) $date="";
                    else $date=urlencode($_POST['dob']);

                  echo "<script language=\"javascript\">
                  alert(\"Invalid    Security    Code....    Redirecting    to    Registration
Page.\");location.href=\"register_student.php?name=$name&email=$email&dob=$da
te\";
                  </script>";
                  exit(0);

   }
?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html xmlns="http://www.w3.org/1999/xhtml">
<head>
<meta http-equiv="Content-Type" content="text/html; charset=utf-8" />
<title>Footprint - Context Based Social Networking and Analytics</title>
<style type="text/css">
<!--
body {
         margin-left: 0px;
         margin-top: 0px;
         margin-right: 0px;
         margin-bottom: 0px;
```

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```
}
-->
</style>
<link href="footprint.css" rel="stylesheet" type="text/css" />
<script type="text/javascript">
function validate_form_login_big()
{

            if (document.form_login_big.username.value=="")
            {
                alert("Please enter your username");
                document.form_login_big.username.focus();
                return false;
            }
            if (document.form_login_big.password.value=="")
            {
                alert("Please enter your password");
                document.form_login_big.password.focus();
                return false;
            }
}
</script>
</head>

<body>
<table width="800" border="0" align="center" cellpadding="0" cellspacing="0">
  <tr>
    <td valign="top"><?php include("header.php"); ?></td>
  </tr>
  <tr>
    <td>
    <?php
                include("db.php");
                $type = $_POST['type'];
                if($type == 's')//student
                {
                        $name = $_POST['name'];
                        $email = $_POST['email'];
                        $pass = $_POST['password'];
                        $gender = $_POST['gender'];
                        $dob = $_POST['dob'];
                        $yop = $_POST['yop'];
                        $enroll = $_POST['enroll'];
                        $branch = $_POST['branch'];
```

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```php
$log_ip = $_POST['log_ip'];

$dob         =         $dob[6].$dob[7].$dob[8].$dob[9]."-
".$dob[0].$dob[1]."-".$dob[3].$dob[4];
$md5_pass = md5($pass);

$sql="select * from z_user where email='" . $_POST['email'] .
"'";

$rs=mysql_query($sql,$con);
if (!mysql_query($sql,$con))
  {
  die('Error: ' . mysql_error());
  }
$rs=mysql_query($sql,$con);
$numrows=mysql_num_rows($rs);
if($numrows>0)//already registered email... dont register again
{

echo "<script language=\"javascript\">
        location.href=\"error.php?ref=dregister\";
        </script>";
        exit(0);
}


$query       =       "insert       into       z_user
values('','$name','$email','$md5_pass','$yop','$branch','$gender','$dob','$log_ip','$type',
'','','1')";
$dbresult= mysql_query($query);

if(!$dbresult)         //Bad query... uff this Database thing :x
        echo "<script language=\"javascript\">
        location.href=\"error.php?ref=register\";
        </script>";
else         //We always want this else to run :)
                {

                                          echo "  <table  width=\"800\"
border=\"0\"  cellpadding=\"0\" cellspacing=\"0\" class=\"sample\">
                                                <tr class=\"heading\">
                                                <td      width=\"100%\"
align=\"center\" valign=\"middle\">
                                                <img
src=\"images/register_14.png\" alt=\"Register\" width=\"240\" height=\"40\" />
```

```
                                            </td>
                                        </tr>
                                    </table>
                                    <br/>
                                    <table      width=\"400\"
border=\"0\" align=\"center\"  cellpadding=\"10\" cellspacing=\"0\" class=\"sample\">


                                            <tr>
                                            <td        align=\"center\"
valign=\"middle\" bgcolor=\"#669900\" class=\"white\">Registration Successfull
                                            </td>
                                            </tr>
                                            <tr class=\"content\">
                                            <td         height=\"40\"
align=\"center\" valign=\"middle\" class=\"content_col\">
                                            You   have   successfully
registered for Footprint. You can now login and start using the application.
                                            </td>
                                            </tr>
                                            </table>";
                                            ?>
        <form    id="form_login_big"   name="form_login_big"   method="post"
onSubmit="return validate_form_login_big(this);" action="verify.php">
        <table    width="300"    border="0"    align="center"    cellpadding="5"
cellspacing="5">



        <tr>
         <td width="150" class="black_text">Username (Email)</td>
         <td width="150"><input name="username" type="text" class="black_text"
size="20" maxlength="255" /></td>
        </tr>
        <tr>
         <td class="black_text">Password</td>
         <td><input    name="password"   type="password"    class="black_text"
id="password" size="20" maxlength="25" /></td>
        </tr>
        <tr>
         <td><a         href="forgot_password.php"         class="blue_link">Forgot
Password?</a></td>
         <td><input    name="Submit2"    type="submit"    class="black_text"
value="Sign In" /></td>
        </tr>
```

```php
</table></form>
                <?php

                        }//end of else
        }       //end of student if

    else if($type == 'f')//student
        {
                //check authentication code
                $authen_code=$_POST['authen_code'];
                if($authen_code!=$faculty_code)
                        {
                        echo "<script language=\"javascript\">
                        location.href=\"error.php?ref=fregister\";
                        </script>";
                        exit(0);
                        }
                $name = $_POST['name'];
                $email = $_POST['email'];
                $pass = $_POST['password'];
                $branch = $_POST['branch'];
                $perm_ip = $_POST['perm_ip'];
                $log_ip = $_POST['log_ip'];

                $md5_pass = md5($pass);

                $sql="select * from z_user where email='" . $_POST['email'] .
"";

                $rs=mysql_query($sql,$con);
                if (!mysql_query($sql,$con))
                  {
                  die('Error: ' . mysql_error());
                  }
                $rs=mysql_query($sql,$con);
                $numrows=mysql_num_rows($rs);
                if($numrows>0)//already registered email... dont register again
                {

                echo "<script language=\"javascript\">
                        location.href=\"error.php?ref=dregister\";
                        </script>";
                        exit(0);
                }
```

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```
$query            =            "insert            into            z_user
values(",'$name','$email','$md5_pass',",'$branch',",",'$log_ip','$type','$perm_ip',",'1')";
            $dbresult= mysql_query($query);

            if(!$dbresult)            //Bad query... uff this Database thing :x
                  echo "<script language=\"javascript\">
                  location.href=\"error.php?ref=register\";
                  </script>";
            else            //We always want this else to run :)
                              {

                                          echo  "  <table   width=\"800\"
border=\"0\"  cellpadding=\"0\" cellspacing=\"0\" class=\"sample\">
                                                      <tr class=\"heading\">
                                                      <td      width=\"100%\"
align=\"center\" valign=\"middle\">
                                                      <img
src=\"images/register_14.png\" alt=\"Register\" width=\"240\" height=\"40\" />
                                                      </td>
                                                      </tr>
                                                      </table>
                                                      <br/>
                                                      <table    width=\"400\"
border=\"0\"  align=\"center\" cellpadding=\"10\" cellspacing=\"0\" class=\"sample\">

                                                      <tr>
                                                      <td        align=\"center\"
valign=\"middle\" bgcolor=\"#669900\" class=\"white\">Registration Successfull
                                                      </td>
                                                      </tr>
                                                      <tr class=\"content\">
                                                      <td          height=\"40\"
align=\"center\" valign=\"middle\" class=\"content_col\">
                                                      You    have    successfully
registered for Footprint. You can now login and start using the application.
                                                      </td>
                                                      </tr>
                                                      </table>";


            ?>
      <form    id="form_login_big"    name="form_login_big"    method="post"
onSubmit="return validate_form_login_big(this);" action="verify.php">
```

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```html
        <table    width="300"    border="0"    align="center"    cellpadding="5"
cellspacing="5">


        <tr>
         <td width="150" class="black_text">Username (Email)</td>
         <td width="150"><input name="username" type="text" class="black_text"
size="20" maxlength="255" /></td>
         </tr>
         <tr>
         <td class="black_text">Password</td>
         <td><input    name="password"    type="password"    class="black_text"
id="password" size="20" maxlength="25" /></td>
         </tr>
         <tr>
         <td><a        href="forgot_password.php"        class="blue_link">Forgot
Password?</a></td>
         <td><input    name="Submit2"    type="submit"    class="black_text"
value="Sign In" /></td>
         </tr>

   </table> </form>
                  <?php
                             }//end of else
             }      //end of faculty if
?>
   </td>
  </tr>

</table>

</body>
</html>
```

F.   *Peer Map*

```php
<?php
session_start();
include("db.php");
$user=$_SESSION["username"];
$ip_address=$_SESSION["ip_address"];
$query = "select id,name from z_user where email='$user'";
$dbresult = mysql_query($query);
$row = mysql_fetch_row($dbresult);
$user_id=$row[0];
$name=$row[1];

$query   =   "select   location_name,x_cord,y_cord   from   z_location   where
ip_address='$ip_address'";
$dbresult = mysql_query($query);
$row = mysql_fetch_row($dbresult);
$loc_name=$row[0];
$x=$row[1];
$y=$row[2];

$image = imagecreatefromjpeg("images/campus_map.jpg");
$red = imagecolorallocate ($image, 255,0,0);
$green = imagecolorallocate ($image, 0,255,0);
$blue = imagecolorallocate ($image, 0,0,255);
$text_color = imagecolorallocate($image, 46, 139, 180);
$text_color2 = imagecolorallocate($image, 146, 39, 80);
$black = imagecolorallocate($image, 255, 255, 255);

$font = 'cambria.ttc';
$font2 = 'monofont.ttf';


imagettftext($image, 14, 0, 590, 279,$text_color,$font2,"Copyright (c) 2009 -
Footprint" ) or die('Error in imagettftext function');
imagettftext($image, 19, 0, 290, 30, $text_color2, $font ,"$name's Peer Map" ) or
die('Error in imagettftext function');

imagefilledellipse ( $image , 20 , 255 , 10 , 10 , $green );
imagettftext($image, 12, 0, 40, 260, $text_color2, $font ,"You" ) or die('Error in
imagettftext function');
imagefilledrectangle($image,20-4,275-4,20+4,275+4,$red);
imagettftext($image, 12, 0, 40, 280, $text_color2, $font ,"Your Friends" ) or
die('Error in imagettftext function');
```

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```php
imagefilledellipse ( $image , $x , $y , 10 , 10 , $green );

$query = "select friend_id from z_friend where user_id='$user_id'";
$dbresult = mysql_query($query);
if(mysql_num_rows($dbresult) <= 0)
{
exit();
}
else
{
while($row = mysql_fetch_row($dbresult))
{
$query1 = "select log_ip from z_user where id='$row[0]' and activity=1";
$dbresult1 = mysql_query($query1);
$row1 = mysql_fetch_row($dbresult1);
$query2 = "select x_cord,y_cord from z_location where ip_address='$row1[0]'";
$dbresult2 = mysql_query($query2);
$row3 = mysql_fetch_row($dbresult2);
imagefilledrectangle($image,$row3[0]-2,$row3[1]-2,$row3[0]+2,$row3[1]+2,$red);
}
}
header("Content-Type: image/png");
imagepng($image);
imagedestroy($image);

?>
```

G.   *Crowd Density Map*

```php
<?php
session_start();
include("db.php");

$image = imagecreatefromjpeg("images/campus_map.jpg");
$red = imagecolorallocate ($image, 255,0,0);
$green = imagecolorallocate ($image, 0,255,0);
$blue = imagecolorallocate ($image, 0,0,255);
$text_color = imagecolorallocate($image, 46, 139, 180);
$text_color2 = imagecolorallocate($image, 146, 39, 80);
$black = imagecolorallocate($image, 255, 255, 255);


$font = 'cambria.ttc';
$font2 = 'monofont.ttf';



imagettftext($image,  14,  0,  590,  279,$text_color,$font2,"Copyright  (c)  2009  -
Footprint" ) or die('Error in imagettftext function');
imagettftext($image, 19, 0, 290, 30, $text_color2, $font ,"Campus Crowd Density
Map" ) or die('Error in imagettftext function');



imagefilledellipse ( $image , 20 , 235 , 10 , 10 , $green );
imagettftext($image, 12, 0, 40, 240, $text_color2, $font ,"Low Density" ) or die('Error
in imagettftext function');

imagefilledellipse ( $image , 20 , 255 , 10 , 10 , $blue );
imagettftext($image, 12, 0, 40, 260, $text_color2, $font ,"Moderate Density" ) or
die('Error in imagettftext function');

imagefilledellipse ( $image , 20 , 275 , 10 , 10 , $red );
imagettftext($image, 12, 0, 40, 280, $text_color2, $font ,"High Density" ) or
die('Error in imagettftext function');

$query = "select x_cord,y_cord,current_nodes,max_nodes from z_location";
$dbresult = mysql_query($query);
while($row = mysql_fetch_row($dbresult))
{

if($row[2]/$row[3]>=0.8)
{
        imagefilledellipse($image,$row[0],$row[1],10,10,$red);
```

```php
        }
else if(($row[2]/$row[3])>=0.5&&($row[2]/$row[3])<0.8)
    {
                imagefilledellipse($image,$row[0],$row[1],10,10,$blue);
    }
else
    {
                imagefilledellipse($image,$row[0],$row[1],10,10,$green);

    }
}

header("Content-Type: image/png");
imagepng($image);
imagedestroy($image);

?>
```