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An Anonymous Social Network Site to Share Pictures

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Abstract — **A Social Network Site (SNS) is a Web 2.0 software application used by many Internet users. These types of networks have their advantages and disadvantages. The main advantage is the degree of communication that they can bring among users. This can improve the work environment, the productivity and also the educational environment. The negative point of these networks is communication misuse. Sometimes, users can share private information that can lead them to trouble. In order to solve these problems two options could be used: (a) create a closed platform, which only feasible in working and educational environments, or (b) use a web platform, where the data about users are anonymous. In this latter case, we present a platform to share pictures based on the Web 2.0, where user information is anonymous. In this platform, in addition to sharing photos, we can create groups, introduce comments, etc. The platform is based on PHP and MySQL. We present the evaluation of this SNS in a real environment during a month. The parameters measured show that the SNS is working fine. Nobody has measured the same parameters as the ones studied in this paper.**

Keywords: social network site; anonymous; Web 2.0; PHP

I. INTRODUCTION

Web 2.0 includes all of those utilities and Internet services use databases [1]. This database can modify the Internet service contents, by adding, changing or erasing information between the users of these services. The work [2] explains the Web 2.0 concept. The main characteristics of Web 2.0 are:

- The introduction to "the open community".
- The use of software without installing it in the computer.
- An On-line collaboration through different available resources.
- The allignment to open standards, etc…

A social network is a structure that can be represented by several graphs, where the nodes represent the individuals (called actors) and the edges, the relationships among them [3]. Social network's theory is inspired from the theory of the Six degree of separation [4]. This theory says that all people of the world are connected through not more than six people. Tribe [5] and LinkedIn [6] use some U.S.A. patents related with this topic.

In general, people consider a social network, like Facebook [7], MySpace [8], or Hi5 [9], a place where they can talk with friends from any part of the world. This place can be considered more than a blog or an instant message service. A social network site is a web site of friends where they can exchange information, music, pictures, etc. [10].

Many social networks with the purpose of fomenting the search of friends appeared in 2001 and 2002. Some of them were Friendster [11], Tribe [5] and Myspace [8].

A Social Network Site (SNS) begins when the software platform is developed and the technical support is mounted. Then, a group of initiators invite their friends to be part of the social network. After that, each new member can bring other new members. The growth of this SNS can be exponential. When someone decides to join one of these places, he or she should begin accepting a series of rules or social contract that will serve to maintain the order and the harmony among the users inside that society [12]. Then, he or she should create a profile. A profile is some information that let a member to be identified inside the network.

Starting from this point, this person should connect with his or her friends and known people in order to invite them to be a part of this social network. In almost all the cases, because a new member is a part of this place, the new members of the network send a message to their friends, inviting them to enter in this place. Then, this new member will have access to members' profiles that have been already added of the same social network, and vice-versa [13].

A remarkable risk that can be seen in these types of networks is the inclusion of private data. People can use these networks to gather some information about its users. There have been cases where people have taken advantage of this information. In particular, a teenager in Chicago was arrested for spraypainting graffiti on the walls of a church because authorities were able to track his moniker via his MySpace.com account [12]. But people with bad purposes can also take advantage of it. A serious case has happened in Mexico. A Mexican youth was killed by their kidnappers. They used the information shown in the SNS by the innocent boy about him and his family (place where he lived, personal belongings, etc.) [14]. The danger is increasing when a user decides to cancel the membership; his pictures and information will remain in the network, because the company decides it in the contract. Moreover, the user is not moved away even when he or she dies.

For these reasons, in this paper we propose an anonymous SNS to share pictures (or other information). It is a digital photo album where users can upload their photos and introduce comments. The main advantage of this platform is the anonymity of the users because no private

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information is provided, only the e-mail. Each user has his/her control panel which is saved in the system. The user can control the photos, comments, the appearance of his site, etc. Finally, in order to check the proper performance of web site and the degree of acceptance, we present measures related to the anonymous SNS.

The rest of the paper is structured as follows. Section 2 shows the main papers published about social networks sites. Section 3 describes our system and shows its code structure. Some measurements taken from the real social network site is shown in Section 4. Section 5 compares the measurements taken in our work with measurements taken by other authors Finally, Section 5 gives the conclusion and future work.

II. Related Work

If we search for social networks on Internet, we will see that there are many networks on the Web. Some of them have been already named before, but there are many others, such as Windows Live Spaces [15], Orkut [16], Fotolog [17] or XING [19]; they can be classified according to their type of use or characteristics.

Several studies have been published about the main current social networks, where we can see, for example, the statistics of people that usually use these places and what features are more used of these places.

In this way, we can find where their authors make a study about MySpace social network [19][20]. In these papers, we can read what kind of users participate in this social network (the sociability), or how they are described (demographics) and their mode of communicating their personal interests and feelings. Many of the profiles created have been abandoned, and, in the active population of MySpace, we can observe a great influence of girls between 14 and 20 years, while the ages of the men users, is usually superior to 21 years [19]. It also speaks about the type of vocabulary used by users in their communications. In this study, J. Caverlee et al. want to help developing new models and algorithms of social networks in order to improve their performance.

In [21], E. Hargittai makes a population's study between a person that belongs to a SNS and another person that doesn't belongs to it. They include population statistical of ages, sex, country, and education level.

J. DiMicco et al. provided another research shown in [22], where they explain the concept of Beehive [23]. This was created by IBM for its employees. On this site, the company employees can exchange images and personal or professionals comment about other people's projects. Some graphics show us information about the details of their life outside of work, which has not been found with any frequency in other enterprise social software tools.

There are other studies related to privacy and security in SNSs. B. Zhou et al. propose in [24] a practical method to make anonymous social networks based on the K-anonymity requirements [25]. They distinguish two steps; in the first phase, the software makes identification and the nodes are organized in neighborhoods; on the second phase, the nodes and vertexes are classified by grades inside the node's group. The authors state that their method can still be used to answer aggregate network queries with high accuracy.

In [26], A. Korolova et al. show a description about the main attacks against a social network user. They also provide a comparative study of different possible strategies that can be used to perpetuate the attacks. The authors propose several strategies for carrying out such attacks. Finally in the final part of [27], a relationship of the risks and threats that can be in a social network is shown.

III. Anonymous Social Network Site

In this section, the elements of our SNS are described. Firstly, we will show the components used to create the platform. Then, all the application's parts will be explained. Finally, we will check their operation and how the SNS works.

A. Elements used

This social network site is developed through PHP (Personal Home Page) programming language [28] and MySQL database management system [28].

MySQL database management system has been used because it is very simple and it allows managing relational databases. It has GNU General Public License (GPL) [29] and it is one of the most used software managers in Internet. On the other hand, it is very fast managing the data; this speed improvement has been achieved because of the collaboration of many users.

PHP was the programming language we used. It is especially designed for web development. PHP is a HTML-embedded scripting language. Quite a lot of its syntax is borrowed from C, Java and Perl [30] with a couple of unique PHP-specific features thrown in. It also has a PHP license; this license is considered as free software. The PHP language is being widely used throughout the world. This language is in constant evolution.

Generally, PHP runs on a web server that uses PHP code in the web pages. In our case the web server used was Apache [31]. The Apache HTTP server is free software and, in addition, it is open source for several types of platforms, such as UNIX (BSD, GNU/Linux, etc.), Windows, Macintosh and others that implement the HTTP/1.1 protocol. Apache is the web server component of application stack (Linux, MySQL, and PHP/Perl/Python) programming languages.

B. Aplication parts

In Figure 1, the initial appearance of the application is shown. In the home web page, a title is displayed at the top. Below this title, there are 6 links that direct the user to different sites. In the left-central side there is an explanatory text, where news and information are displayed. In the right side, at the top, it is a form to access the administration site and, at the bottom, the sponsors can be displayed. Once the user is authenticated, in the left side there is a place where the user can send text, images, videos, etc.

The links located below the title in the SNS directs the user to different sites. The link "Home" shows the home page. The link "Fotologs" opens a page where there is a list of all existing pictures. The link "Últimes fotos" displays the last pictures uploaded to the web platform.

Figure 1. Home page of the anonymous SNS.

The link "Patrocinadors" shows a page with all the sponsors. The link "Contacte" opens a web page that let the user contact with the administrator of the social network site. Finally, the link "Avis Legal" shows a text with all the rules that the users must follow in this SNS. The rules clearly indicate that this social network site does not collect any private information because the user can't introduce it.

Clicking on "Fotologs" and, then, selecting a "Fotolog" of the list, the photo panel will appear (see the Figure 2).

C. *User operation mode*

There are two ways to access the social network site. A user can be a guest user or a registered user. The first step is to pass an authentication phase (see Figure 3). The public panel only allows viewing the images of photo panel, to see all "fotologs" and the friend of each "fotolog".

If we access as a guest user, this user can only view the pictures. However, if we access as a registered user, we can submit pictures introduce comments to the pictures inside, manage or modify things in a "fotolog".

The guest user photo panel is shown in Figure 2. In the top-right side of the web page there are two buttons: the first is a button to go home and the second is to go to the administration panel of the SNS. In addition to this upper part there is also a zone to introduce other links. In the right side, the most recent pictures are displayed in miniature. At the end of these pictures there is a link to see all the pictures of that "fotolog". In the central side, the selected picture is displayed with the opinions of the users below of it. As it is shown in Figure 2, there is a form to introduce a comment for that picture. Finally, on the left side the friends of that "fotolog" are shown. This friend list is created by the number of reviews of the "fotolog", the number of access to each "fotolog", etc. All these variables are used by the SNS to find the "fotolog" most akin to the user preferences.

When the user access as a registered user (introducing a username and password), the user has privileges and can access to the administration panel.

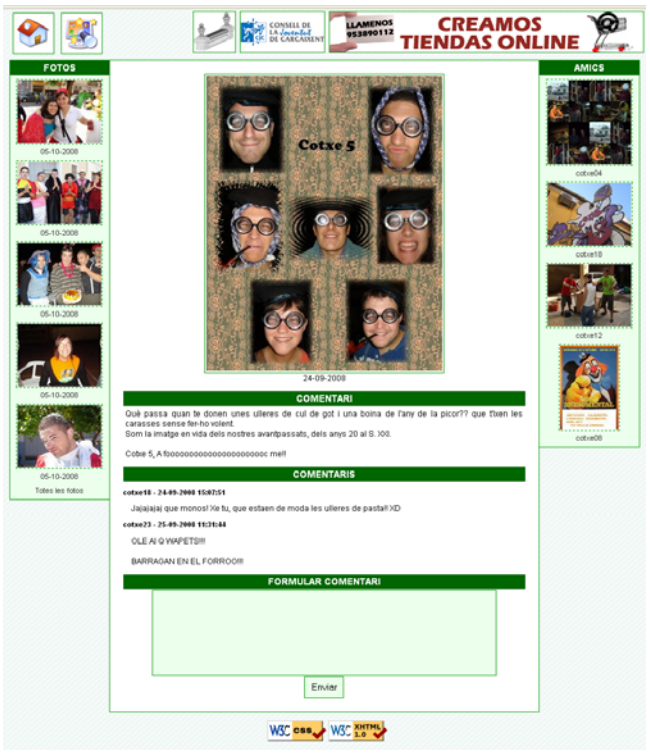

Figure 2. Photo panel.

The administration panel lets the user manage the photos, the relations, the friends, the comments and modify the template of the "fotolog".

When a user access the SNS, the access form shown on the top-right side in Figure 1 is not displayed and, instead of it, there are some configuration options. Figure 4 shows the menu for registered users. Notice that there are several links on the right side that let the user access to the comments received, see the friends, see the relations and logout the SNS. The administration panel lets the user see and manage the pictures, and perform different actions in that "fotolog".

The main action is the management of pictures. Our SNS allows introducing new pictures, to include a comment of the author in a picture and to delete any of the pictures and/or comments existing in our "fotolog". As administrators, we can manage our friends. With this tool we may include new relationships not included by the system and/or delete relations. In order to create a relationship, we need a confirmation from both parts. When we want to delete a relationship, the confirmation from both parts is not required, but users involved in that relationship will be informed.

A user can make modifications in its profile. In Figure 5, the user information is shown, only nickname, e-mail, and the theme color of his "fotolog", topic interests and password have to be provided. The SNS saves the registration time and the date of the last visit automatically. It is an anonymous SNS because none of the data are bond to a person, only to his mail address. The application needs an e-mail to confirm the creation of the user and to deliver the password generated.

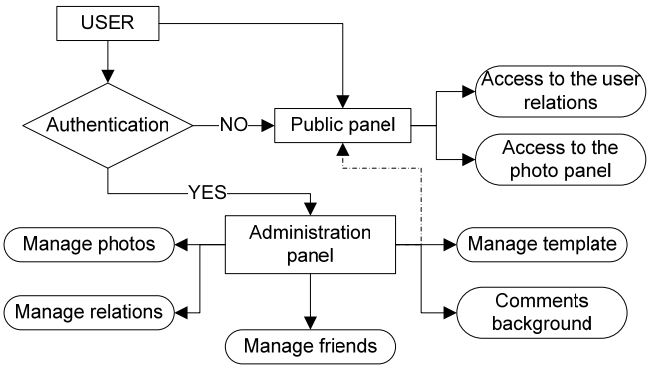

Figure 3. Operation diagram.

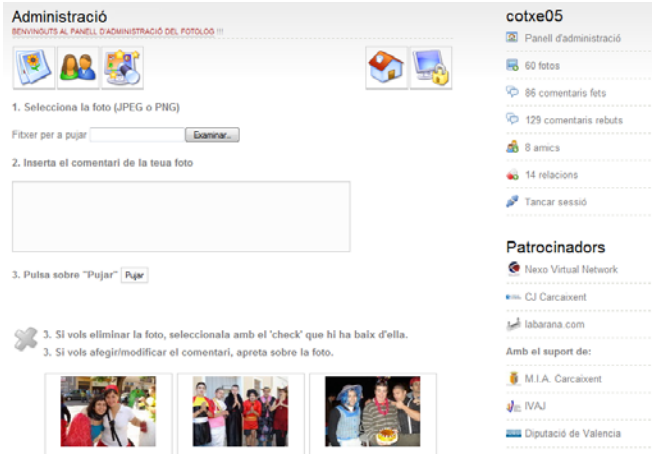

Figure 4. Administration control panel.

In the administration panel, the registered user can see the comments received. All the comments are shown in a listing form. Every comment belongs to the one who did the comment and the system adds the date.

Finally, in this control panel gives the option to logout the SNS. It should not be forgotten in SNS applications. When a user clicks on the link to logout, he or she will not have rights to do administration tasks in the SNS.

IV. Evaluation System and Measurements

This section shows the performance of the proposed SNS in a real environment.

A. Test bench

In order to assess the SNS, we used it in a competition. This competition was presented in a village called "Carcaixent". This village is placed very close to Valencia (Spain). It has 22000 habitants. This village performed festivities, where each group of friends throughout a year is preparing some costumes and a car similar to those in "Wacky Races".

The proposal of the competition was the following one: "The team with the most complete fotolog wins". In order to evaluate each fotolog, some mandatory pictures related with the festivity should be submitted. This mandatory issue encourages the users to use the fotolog as a way for communication.

Figure 5. User information.

The SNS platform has been evaluated using the tool Google Analytics [32]. It allowed us to collected several data related with the use of it. It has been studied during a month and the data were gathered every day. We studied the number of visits, the number of web pages visited, web pages per visit, average time per visit, etc.

B. Measurements

First, we took the number of visits in our social network site. These values can be viewed in Figure 6. In this figure, we see that in the first days there were not too many visits. There are two maxima on the days 5 and 6 and the days 11 and 12. This is because these days were weekends and the people have more time to update their fotologs. The maximum number of visits was the day 11, with 297 visits and the minimum was in the second day, with 2 visits. The average number of visits per day was 152.7 visits. It is a quite high value if we remember that the application was only used in this village.

In Figure 7, the number of web pages visited each day is shown. Figure 6 only shows the number of access to the site, while Figure 7 shows the number of pages opened, but both have the same behavior because the number of visits is directly related to the number of webs visited. Two maximum have been found. They were in days 5 and 6 and in days 11 and 12 (both were weekends). The maximum number of web pages visited was 5532 in the day 11 and the minimum was 19 for the second day. The average number of web pages during this month was 2656. We can observe that the days when there were more visits are the same that when there were more web pages visited.

Then, we measured the average number of web pages per visit (see Figure 8). In this case the data vary very much, but the variation range was smaller than in Figure 6 and Figure 7. The average number of web pages per visit in this evaluation month was 15.85. The third day had the lower value with 5.25 web pages per visit and the day with higher value was the 28th day with 22.59 web pages per visit.

In Figure 9, the percentage of abandon per day is shown. The second and third day have a percentage of abandon of 0%; this was because during those days there were very few visits, and therefore, the abandon likelihood was very low. On the other hand, we obtained the worst days in the 4th and the 5th day. In this period, the number of visits was high, so there was high abandon likelihood. The maximum percentage was 34.01% in the 5th day. The average percentage of abandon during the month was 12.45%. In the last days there were less visits, these data are linked with the number of abandons. If we have fewer visits, the number of abandons will be greater.

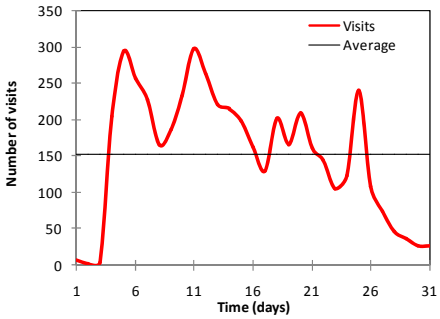

Figure 6. Visits per day in our SNS

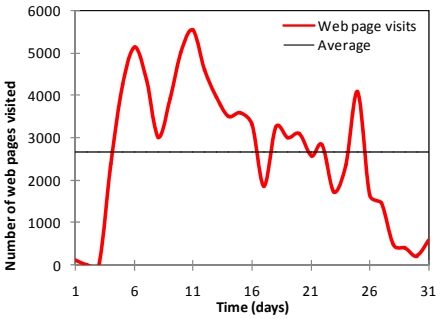

Figure 7. Web pages visited per day.

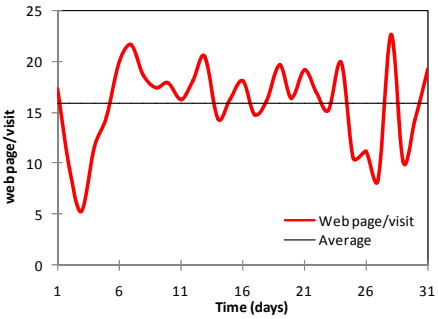

Figure 8 Web pages per visit.

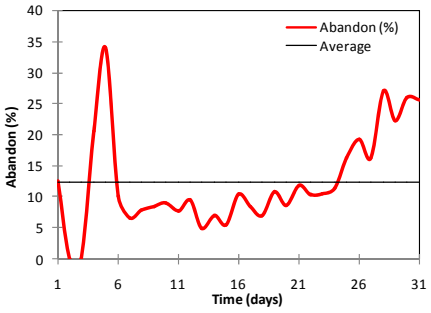

Figure 9. Abandon percentage of our SNS.

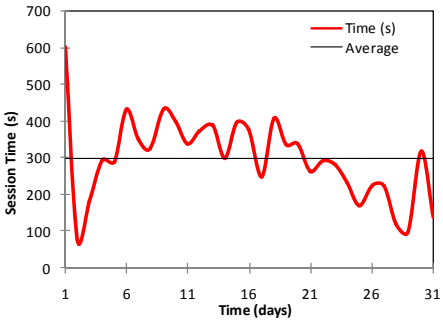

Figure 10. Average time of a session.

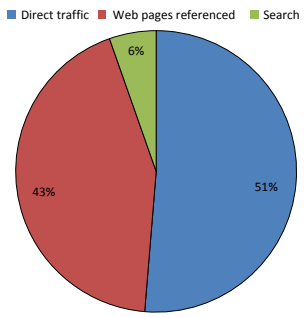

Figure 11. Where the users came from.

Then, we measured the average time of a session (see Figure 10). The medium value of the average time of a session was 297.8 seconds. From the 6th day to the 16th day, the average time of session exceeded the medium value of the average time of the month. The maximum time of a session was given in the first day with 600 seconds. After that day, the maximum values were given in the 6th and 9th days with a value of 433 and 432 seconds respectively. The minimum value was 78 seconds in the second day.

Next, we wanted to know where the user came from (see Figure 11). We can see that 51% of the users have reached directly the SNS. The 43% of the users reached our SNS from other web pages with links to our SNS. Finally, the rest of users (6%) visited the anonymous SNS through search engines. The 98% of users used Google search engine and 2% of the users used other search engines.

Finally, we present the Table 1, where there is a summary of the data obtained in the previous figures. During this month, our anonymous SNS had 4779 visits. These visits consulted 82791 web pages. The average number of pages visited was around 15.85 per visit.

The average percentage of abandons has been 12.45%. It is rather quite high, but it seems to be because, initially, there were many people that created more than one user because they didn't know how it works. The average time in the SNS was 328 seconds. It is a reasonable time.

TABLE I. SUMMARY OF OBTAINED RESULTS.

Visits	4779	**Abandon percentage**	12.45 %
Web page visits	82791	**Average time in the site**	328 s
Web page/visit	15.85	**New visits percentage**	26.8 %

This time let us know how many time have the people spent looking the new pictures and introducing new pictures and comments. Finally, the percentage of new visits during this month was 26.8% of the total of users (around 1280 visits).

V. MEASUREMENT DISCUSSION AND COMPARISON WITH OTHER WORKS

We have studied which types of measurements are performed in other works in order to compare our study with them.

The parameter most studied in [19, 20, 21, 33, 34, 35, 36, 37, 38] is the number of users that use the social network. In our case, we preferred to measure the number of visits instead of studying the number of users because the number of users was limited by the number of people involved in the competition. Both data are important to see the success of a public site. In addition, the studies [19, 20, 21, 32, 35] analyzed the sex and the age of each user. In our study, it is not possible to gather these metrics because the private data of the users were not provided in our anonymous SNS. There are even some studies [20][21] that analyzes the data displayed by the SNS, the guest users can extract the religion, the ethnicity and the educational level of each user. Papers [19][33] study the user profiles and the visibility degree for the final users in different SNSs. These measurements, together with previous ones, can not be gathered because of the anonymity of our platform.

What the SNS is used for is also an analyzed aspect in [20][21][33][35]. SNSs can be used to exchange views, maintaining relationships, exchanging files, etc. Our SNS is only used as a fotolog, but there many potential applications focused on the purpose of the purpose of our SNS that can be added to enhance it.

Our SNS has only one server, but the SNSs analyzed in [35][36][38] are important social networks that have a network architecture below them.

Reference [36] shows some measurements like ours, but it examines an important SNS and the data cannot be compared with the data we have collected. They discuss the growth of the SNS evaluating the number of connections, the number of subscribers, the number of abandons, etc.

But, none of the works aforementioned shows the number of visits per day, the number of web pages visited per day, the number of web pages per visit and the average time of a session as we have provided in our study.

The measurements provided in the previous section are oriented to the use of our SNS. We have analyzed these parameters because they allow us to assess quickly our anonymous SNS.

VI. CONCLUSION AND FUTURE WORK

In this paper we have presented an anonymous social network site. It neither saves nor distributes user information. This feature removes one of the most important problems of the social networks. There are some studies about possible strategies that can be used to perpetuate the attacks. We have tested its performance in a real environment and we gathered data related to the use of the platform. On one hand, we have observed that the days, when there were more visits, are the same that when there were more web pages visited, but it has not any relationship with the average number of web pages per visit. We have compared the measurements taken in our test with measurements taken by other authors in other social network sites. Now, this platform has only features related with pictures. We are going to improve this anonymous social network site by including more applications such as chat, wiki, forum, meeting places, etc.

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