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Research Article

Accessing Social Network Sites Using Work Smartphone for Face Recognition and Authentication

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Abstract: Nowadays, Social Networking Sites (SNS) are increasingly getting the attention of academic, industrial researchers intrigued by their affordances and gradually gaining its importance and became a major method used to share thoughts, video, image, etc., in various domains such as research, politics, religion, academics and development. Apart of its strength points SNS has one major drawback which is the inefficient authentication of users to login. Due to this drawback; different types of fake message, non-social activities, national or personal threats, Numbers, videos and other important things are used for extortion people, which can be posted by some imposters or non-social personals. In spite of the importance of authentication in the social network, a handful number of researches conducted such accessing social network using efficient authentication technique to solve this problem. This study proposed a method to access a social network sites (such as Facebook and twitter) using face recognition techniques at the time of login in the site by Smartphones. Where Local Binary Pattern (LBP) was used to detect users face and the LBP histogram was used for features extraction. The proposed method obtained very promising results in term of accuracy (93.5%) and effectiveness for authentication of user identity.

Keywords: Authentication, biometrics, face recognition, feature extraction, LBP histogram, Local Binary Pattern (LBP), security, social network site

INTRODUCTION

Nowadays, Millions of users are attracted to the Social Networking Sites (SNSs) through continuous use of these sites in their daily activities. All the way through, hundreds of SNSs are running and available with variety types of technology. These sites have a large scale of features which providing maintenance ability for the pre-existing social network sites (Kaur and Singh, 2012; Boyd and Ellison, 2007; Garg and Rajput, 2014). Furthermore, the mentioned sites have consistent technological features with reference to the aspects of sharing the interest, providing some information about the current business status, religious and national views, culture and individual opinions and political views and many other aspects. Some sites also able to provide various users types, while other Social networking sites are restricted to specific group of people based on their common language in order to allow them to share their opinions and views. SNSs can be varied in the context of the information they provides, information representation method and the sued communication tool such as images, figures, video files and it can be accessed by using the mobile technology as well. Moreover; the media play important role in covering the development of the SNSs, its positive effects and concerns about the way that how the users can deal with it (Kaur and Singh, 2012; Boyd and Ellison, 2007).

On the other hand; the users of SNSs have many options which can be used in order to access their accounts on the sites, where they can either use their personal computer, or they can use their Smart Phone to login after get a connection to the Internet. The main advantage the SNSs sites is providing the ability for the users to create their own profile including some biographical data, images and many other information which can be added depending users selections to post and share, some type of users can create online profile with some biographical data, images or any other information they prefer to select and post as well (Kaur and Singh, 2012). Moreover; SNSs users can exchange information and communicate with each other by adding some comments, posts, or thoughts and making them available for public, users can use some extra appended application and use them for the communication such as

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the E-mail, instant messaging or they can establish multimedia communication in order to start using their voice and share their videos as well. However, many business adopted most of the features which were available on the SNSs at the personal level, where many companies are using the SNSs now for marketing by advertising for their products, or they can use the SNSs for improving the credit of their brand and improves the increase the using of their web site by increasing the number of customers (Boyd and Ellison, 2007; Cecconi, 2007a).

SNSs can be considered as a site that able to provide the users with services in order to share their activities, interests, or their information on some particular topic with their families, friends and contemporaries. Some of the SNSs are Facebook, Google+, LinkedIn and Twitter which are common used sites nowadays (Cecconi, 2007a).

SNSs are known as 'Social Networking Sites', this expression in not limited only on the use of the digital world which means that it is use is restricted only on the use of the Web. On the contrary, many studies on social networks have been started at the beginning of the 20th century in order to obtain more information about the users in order to understand the users' interests, behavior and how the users are interacting with each other (Bhagwat and Goutam, 2013). Today, Social networking can be referred to as the using of some online services, software and tools in order to come out with those activities that allow for the users to have their space and create their social networks. Bhattacharyya *et al*. (2009) presented a review on the biometric authentication techniques and some future potential in the Biometric Authentication. In the biometrics field, users can be authenticated with reference to some features and physiological parameters. Many systems require robust and effective identity recognition schema in order to conform identity and provides the user with the authorized access services or information. The main objective of such schemes is to guarantee that the required services or information are accessed only by the authorized user, prevents the access for any other else such as those who are attempting to get access to user's accounts and verify that you are who you say you are. Utilizing the biometrics is possible to confirm an individual's identity. The position of biometrics in the current field of Security has been represented and many views about the usability, authentication systems, evaluation of various biometric techniques and their benefits and the drawbacks in their work.

Bhattacharyya *et al*. (2009) the using of Biometric authentication techniques has been increased in as an active technique to provide personal identity authentication. Confirming the identity of the user is critical and substantial in the situation when the user is going to use his/her credit card where the possibility for fraud and identity theft is increased. Thus, providing a secure environment and improving authenticating techniques have become a major concern in wider society.

HISTORY OF SOCIAL NETWORKING SITES

Based on the above definition, in 1997 the first social network site was launched and it was called SixDegree.com. SixDegree.com allowed users to create their own profiles, list their friends, in 1998 SixDegree.com provides new feature to the users which is the ability to browse the friends lists.

Moreover; before the Six Degrees each of the mentioned features existed in some forms. Basically; in the most dating community and networking sites profiles. Where lists of friends were supported by ICQ and AIM buddy lists. In spite of those friends were not obvious to others. Classmates.com gave users the ability to integrate with their university, college and browse the network for other integrated users. The other users who were not integrated in the classmates.com, users were not be allowed to create profiles or list Friends until years later. SixDegrees was the first site that combined these features (Kaur and Singh, 2012; Fourli, 2010; Kumar *et al*., 2013; Marion and Omotayo, 2011; Kapoor, 2011).

A number of community tools arose in 1997 till 2001 such as MiGente, Black Planet and Asian Avenue, these community tools were created to support different mixture of profiles and publicly articulated friends. Moreover; these community tools allowed and help users to design personal, professional and dating profiles-users which can be recognize friends using their own personal profiles without searching for an approval for those connections (O. Wasow, personal communication, August 16, 2007).

However; in 1999 the Korean virtual worlds site Cyworld was launched and in 2001 added some SNS features. For further information about the history of Social Networking Sites, please refer to (Kaur and Singh, 2012; Bhagwat and Goutam, 2013).

As well, when the Swedish web community LunarStorm modernized itself as a Social Networking Site in 2000, it contained diary pages, guestbooks and Friends lists (Kumar *et al*., 2013). For further explanation about the history of the social network please refer to (Kaur and Singh, 2012; Fourli, 2010; Kumar *et al*., 2013; Marion and Omotayo, 2011; Kapoor, 2011; Cecconi, 2007b; Banbersta, 2010; Igoe, 2008). Figure 1 illustrates the timeline SNSs sites.

Benefits and drawbacks SNSs: Social networking Sites benefits can be summarized as follows (Kaur and Singh, 2012; Bhagwat and Goutam, 2013):

- The ability to offer national range with a free cost or with a very slightly cost.
- The ability to provide new opportunities that can support the economy such providing online customer service, online marketing and the uses of mobile phone industry.
- The ability to provide help for users in order to improve their usability of the SNSs and become

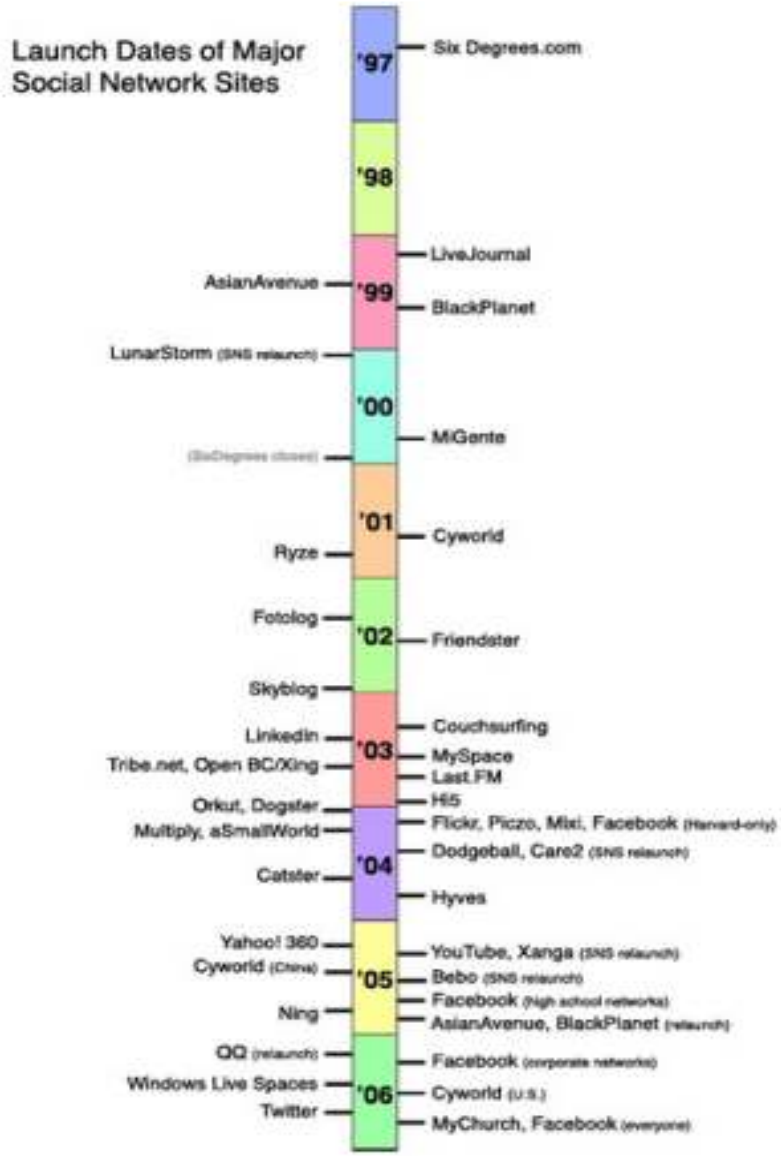

Fig. 1: The dates of launching of many SNSs or re-launching of some community sites with SNSs features are viewed on the timeline (Boyd and Ellison, 2007; Kumar *et al*., 2013; Cecconi, 2007b)

active users during the dealing with the new technologies.

- The ability to provide excessive opportunity for the users to improve their creativity and encourage them for participating in communities.
- Providing the users with the ability to recover and manage their contacts which for a while was lost for some reasons.
- A huge population are used the Social networking sites and it's an excessive way for public and private businesses allowing them to achieve their target groups of users and individuals which will improve the for example the process of product innovation, in it can improve the customer services experiences.
- Providing the organizations with the ability to create their own communities in the workplace by producing organizational SNSs, enhancing the productivity and improving the involvement of the employee.
- For smaller businesses it can provide the ability to take a chance for the advantage of using the Internet through SNSs.
- External offices employment can be achieved.
- Providing the help bind distinct people and diverse cultures with a common interest such as thoughts, video, views, image, culture, status, music, science, politics etc., also SNSs helps users to connect with numerous of users concurrently.
- Social networks consider as good and fast way of significant marketing and advertising platforms.

However, with reference with the large amount of benefits of the SNSs, there are some many serious concerns that must be taken into consideration, mostly regarding the data protection and the protection procedure of children (Kaur and Singh, 2012). Based on the previous benefits and disadvantages of the SNSs, it's not easy to come out with conclusion that the social networks are cordial or not. According to the proposed methodology when the users are going to logins of SNSs by correct user name and password (accurately authenticated) the misuse of this networking facility will be disallowed.

For that purpose, successfully, an innovative SNS technique with biometric authentication (face Recognition) and the obtained results demonstrates very talented results in term of accuracy and effectiveness of authentication for user identity.

METHODOLOGY

In addition to computer with Internet connection, the proposed SNS method requires users to have a webcam in order to capture face image. Therefore; the proposed SNS method has been implemented using C# programming language, due to the replacement; Emgu CV a cross platform wrapper that makes any (what). Further, .NET language will be used as will which provides a compatible platform with Intel Open CV image processing libraries, that consisting of some functions used for real time processing. The main motivation of using the Emgun CV is the ability to provide for the programmer some functions that make the process of face detection more easily. At the beginning; user has to register in our SNS site and create his/her account using "Sign Up" button. After that the site will ask the user to capture his/her image. Once the image has been taken, the user will be able to sign in to our site. Therefore; we designed and implemented our SNS with the connections that make the user able to access his/her social network sites automatically (such as Facebook and twitter) using face authentication only and the user will not be asked to provide their credential (username and password).

For the process of authenticating the user identity, holistic feature have been implemented based on some face recognition algorithms. Moreover, the LBP have been user for the process of detecting the face and LBP histogram was used for the process on representing the data. The coming section provides a brief description about the mentioned algorithms.

Local binary pattern: Local Binary Pattern (LBP) is an efficient and simple texture technique which labels the image pixels using thresholding of the neighborhood for every pixel and writes the outcome as a binary number. Possibly the most significant property of the LBP technique in the real applications is the strength of this technique toward monotonic gray-scale variations like the changes caused by the variation of illumination. Another advantage for the LBP is the computational simplicity, which enables the analysis of images in difficult real-time settings (Ying *et al*., 2009; Jun *et al*., 2010; Marcel *et al*., 2007; Suresha *et al*., 2013; Anbarjafari, 2013; Rahim *et al*., 2013; Garg and Rajput, 2014).

LBP is represented as an arranged group of binary comparisons between the intensities of the center pixel and the eight neighboring pixels. The following Fig. 2 explains the resulting LBP code (8-bit) (Ying *et al*., 2009; Jun *et al*., 2010; Marcel *et al*., 2007; Anbarjafari, 2013).

The comparison can be done by the following formula:

$$LBP\ (x_c, y_c) = \sum_{n=0}^{7} s\ (i_n - i_c) 2^n$$

Where i_c denotes the center pixel value (x_c, y_c), in denotes the 8 neighboring pixel value and $s\ (x)$ is denoted as:

$$s\ (x) = \begin{cases} 1 & if \quad x \geq 0 \\ 0 & if \quad x < 0 \end{cases}$$

Finally; the code of the LBP will be obtained by transforming the binary code to decimal one. Figure 3 shows the flowchart of the LBP process.

LBP histogram: Each image pixel is labelled with LBP code. The image will be divided into several blocks; each block is a matrix with the size of 3*3. Then, in each block, the proposed method will be comparing the center pixel with other pixels in the block. Therefore; the threshold value for the compared pixel will be 1, if the center pixel value is equal to or greater than the compared pixel, otherwise it will be 0. After that, the binary number for each block will be obtained and converted to decimal number (Ying *et al*., 2009).

For each block the LBP histogram will be calculated and concatenated into a single vector. Consequently; the facial recognition will be performed using LBP face shape that will be obtained using the

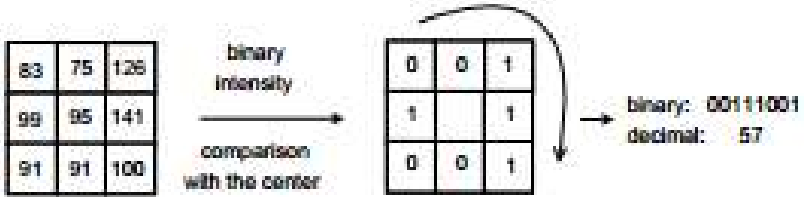

Fig. 2: Calculating the original LBP code

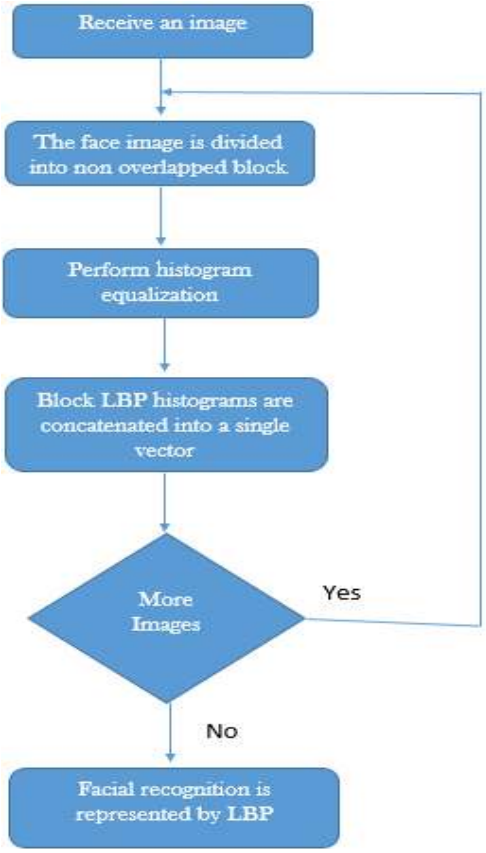

Fig. 3: The flowchart of the LBP process

concatenation of different local histogram (Ying *et al*., 2009; Jun *et al*., 2010; Marcel *et al*., 2007; Anbarjafari, 2013).

Required software and hardware: During this methods development, following tools were used:

- Android Developer Tools bundle (ADT) were used which contains:
  - Eclipse+ADT plugin
  - Android Software Development Kit (SDK) tools
  - Android platforms tools
  - Latest Android platform
  - Latest Android Emulators
  - Open CV Library
- A device that supports an android operating system
- A Personal Computer

EXPERIMENTAL RESULTS

Once the user start the process of registration "Sign up" in the proposed SNS, the webcam (camera) will be activated automatically and it will capture an image of the user face. After that the captured image will be stored in the SNS database after all the required features were extracted, normalized and linked with the user information. The proposed method will start executing a matching process between the information features of the mentioned user and the user's data features which have been stored on the SNS database before. During the matching process the proposed method will check if no matching for those features were found, the system will consider the user as a new user and all the provided information will be stored on the systems' Database as new user enrolled the system.

The previous process will guarantee that no two users can have the same face enrolled in the SNS's database. This process contains two major steps, at the beginning the system will accept user face as an input to give it a specific ID, next the face ID will be associated with the data given by the user, such as user name and password of the given site. Figure 4 illustrates the general structure of the proposed method.

Referring to Fig. 4 and to "Sign in", four distinct steps occur during the processing. The first and most important step is the user image acquisition using a webcam "camera". The second step is the user face will be determined using LBP operator. The third step is the feature extraction, where Human-face patches are extracted from images. Face patches is transformed into a vector with fixed dimension using LBP histogram. Finally; the verification step will start, where the features extracted will be compared with each face class stored in the database, which contains features extracted from several images for each user, if the features extracted are matching with any face class that stored in the database, the user will be able to access our SNS, if not, the user will be denied.

For the verification purpose and the evaluation of the proposed method, we have tested the proposed method using 100 users. The obtained results shows the effectiveness and the efficiency of the proposed method, where the overall accuracy of the proposed method was 93.5%. Table 1 described the results of the proposed method based on four different poses for the user.

DISCUSSION

The proposed method has been compared with state of the art of social networking user authentication methods as shown in Table 1, Where the obtained results of the proposed method are compared against the Kaur and Singh (2012) methods, as it's known to be the best social networking user authentication methods, as shown in Table 1. For comparison purpose, Kaur and Singh algorithms are implemented in J2EE and JavaScript. According to the experimental results based on 100 users image, the proposed method correctly identify users face with 93.5% overall accuracy while the overall accuracy of Kaur and Singh (2012) methods was 93.10%.

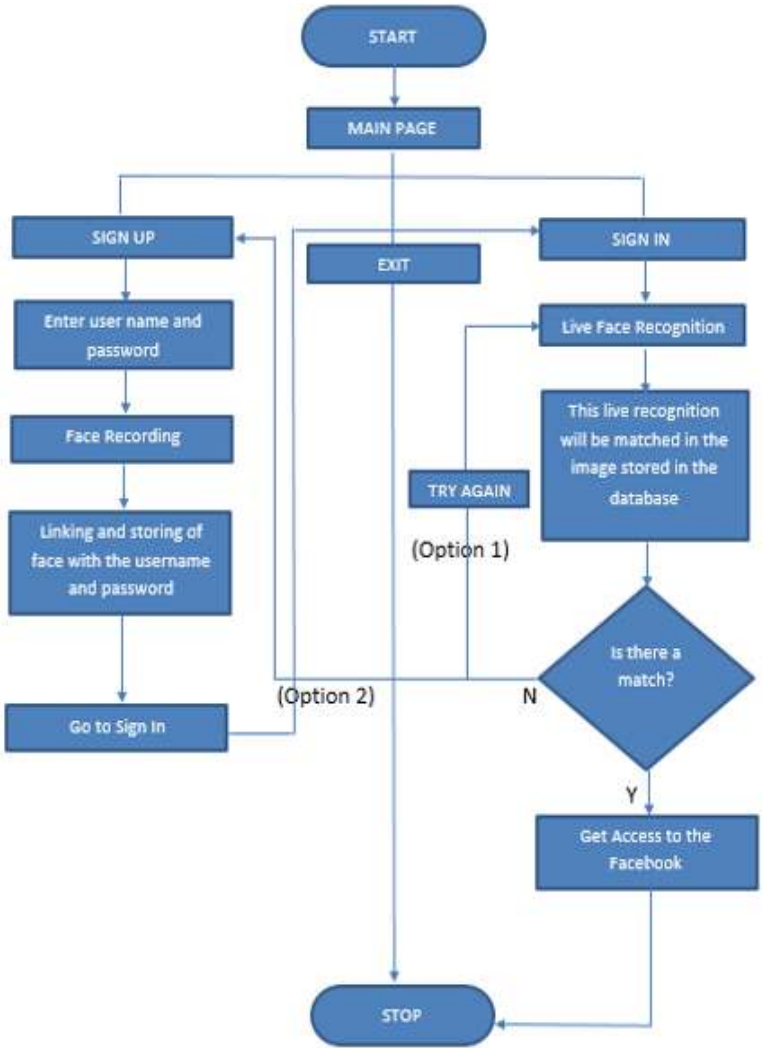

Fig. 4: The flowchart of the proposed method

Table 1: The overall accuracy using different poses of the proposed method compared with other methods (Kaur and Singh, 2012)

	The overall accuracy with different poses						
Algorithms	0^0 frontal (%)	10^0 left (%)	10^0 right (%)	20^0 left (%)	20^0 right (%)	30^0 left (%)	30^0 right (%)
Our proposed method	93.50	92.96	93.00	90.00	90.10	85.50	85.44
PCA	89.71	89.43	89.45	85.91	85.79	79.81	79.77
LDA	91.62	90.98	91.03	88.78	88.51	80.44	80.41
ICA	89.90	89.52	89.68	87.10	87.10	80.19	80.22
SVM	93.10	92.70	92.73	91.17	91.20	83.44	82.99

CONCLUSION

Using the biometric authentication a high degree of security level can be offered in the social network, but so far it is still unresolved problem and they are quiet distance from the optimal solution. The risk of the privacy and the influence of the biometric technology on the society and the threat of identifying will require mediation through legislation. In this study we carefully considered the importance of the biometric authentication in the SNSs methods and successfully designed and implemented an intelligent and secure SNS, which have massaging, photo upload, friend requests that can be accepted or rejected, express list of friends, user profile upgrading features and the connections that make the user able to access his/her social network sites automatically (Facebook and twitter) using face authentication by smart phones. The LBP were used for the process of detecting user's face and the LBP histogram was used for the process of extracting the features from the given image. The proposed method obtained very promising results in term of accuracy (93.5%) and effectiveness of authentication for user identity.

REFERENCES

Anbarjafari, G., 2013. Face recognition using color local binary pattern from mutually independent color channels. EURASIP J. Image Video Process., 2013: 6.

Banbersta, M., 2010. The Success Factors of the Social Network Sites "Twitter". Utrecht University of Applied Sciences and Crossmedialab.

Bhagwat, S. and A. Goutam, 2013. Development of social networking sites and their role in business with special reference to facebook. IOSR J. Bus. Manage., 6: 15-28.

Bhattacharyya, D., R. Ranjan, A. Farkhod Alisherov and M. Choi, 2009. Biometric authentication: A review. Int. J. u-and e-Serv. Sci. Technol., 2: 13-28.

Boyd, D.M. and N.B. Ellison, 2007. Social network sites: Definition, history, and scholarship. J. Comput-Mediat. Comm., 13(1): 210-230.

Cecconi, A., 2007a. Research paper on social networking: Research paper on social networking. Nova Southeastern University.

Cecconi, A., 2007b. Research Paper on Social Networking: Research Paper on Social Networking 11. Nova Southeastern University.

Fourli, I., 2010. Business Model for Mobile Social Network Master, Athens Information Technology. M.A. Thesis, Science in Business, Innovation and Technology.

Garg, R. and R.S. Rajput, 2014. Review on local binary pattern for face recognition. Int. J. Adv. Res. Comput. Sci. Technol., 2: 201-204.

Igoe, J.M., 2008. Social networking sites as employment tools. M.A. Thesis, George Mason University.

Jun, M., G. Yumao, W. Xiukun, L. Tsauyoung and Z. Jianying, 2010. Face recognition based on local binary patterns with threshold. Proceeding of IEEE International Conference on Granular Computing (GrC), pp: 352-356.

Kapoor, T., 2011. Pros and Cons of Social Networking: A Review Paper. Retrieved from: http://www.academia.edu/619443/Pros_and_Cons_of_Social_Networking.

Kaur, P. and A. Singh, 2012. User authentication in social networking sites using face recognition. Procedding of 2nd IEEE International Conference on Parallel Distributed and Grid Computing (PDGC, 2012), pp: 773-778.

Kumar, N.S., U. Karthikchandran, N. Arunkumar and K. Karnavel, 2013. Social networking site for self portfolio. Int. J. Res. Eng. Adv. Technol., 1: 1-4.

Marcel, S., Y. Rodriguez and G. Heusch, 2007. On the recent use of local binary patterns for face authentication. Int. J. Image Video Process. Special Issue Facial Image Process., pp: 1-9.

Marion, A. and O. Omotayo, 2011. Development of a social networking site with a networked library and conference chat. J. Emerg. Trends Comput. Inform. Sci., 2: 396-401.

Rahim, M.A., M.N. Hossain, T. Wahid and M.S. Azam, 2013. Face recognition using Local Binary Patterns (LBP). Global J. Comput. Sci. Technol. Graph. Vision, 13(4).

Suresha, M., A. Danti and S.K. Narasimhamurthy, 2013. Invariant of rotation and scaling for classification of arecanut based on local binary patterns. Int. J. Adv. Res. Comput. Sci. Software Eng., 3: 598-603.

Ying, Z., L. Cai, J. Gan and S. He, 2009. Facial expression recognition with local binary pattern and laplacian eigenmaps. In: Huang, D.S. and *et al*., (Eds.): ICIC 2009. LNCS 5754, Springer-Verlag, Berlin, Heidelberg, pp: 228-235.