Research on Application of Face Recognition Techniques in Social Networks

Fang Wan*, Rui Bian

1 School of public administration, Guangdong University of Finance & Economics, Guangzhou, 510320, China

* Corresponding author should be Fang Wan, 4516937@qq.com

Abstract. The progress in information technology makes social networks much more compact between people from all over the world. In the age of Internet, many new social interaction ways become more and more prevalent such as instant messaging, Web conference. These tools help people share their ideas and cooperate. However, in the meantime, there exist some risks because the person you are chatting with may just be a fake one. In this situation, the face recognition techniques could help identify the truth and make the social networks safe. In this paper, research is conducted on application of face recognition techniques into daily social networks. By combining robust face recognition techniques into our social networks, we can better discriminate risks on the Internet and make full use of social networks on academics, business or other issues. At first, the basic concept of social networks is introduced. Afterwards, the state of the art in the field of face recognition is described. Finally, some suggested ways are given on how to apply face recognition techniques into our social networks.

1. Introduction

Today’s world becomes a global village owing to the fast developments in Internet technologies with billions of cell phones, computers, televisions, etc. In the meantime, may instant messaging and Internet chatting applications were developed, which became an important part of people’s social networks. Facebook, Twitter and MySpace are some typical representatives, which are famous all over the world. Specifically, in China, Tencent QQ, WeChat and Sina Weibo are the most popular applications in people’s daily social networks [1-6]. Undoubtedly, these tools provide easy ways for people with a long distance to communicate and share their ideas. For example, academics and businessman could use the e-mails and Web conferences to deal with their urgent issues. For the strangers, they can make friends by chatting online and cooperating furtherly. So, it is assumed that social networks play an important role in our daily life and could help us a lot.

However, it should also be noted that there are many risks in our social networks especially those on the Internet. While one is chatting with another via the instant messaging tools like Twitter or WeChat, it is not always possible to correctly judge his or her true identity. As a result, some people may be cheated or even frauded. As a remedy, face recognition techniques may help relieve the problem. The face images of the chatters can be simultaneously recognized by searching the face images on the Internet. Then, some related things about this man can be found out to help you make decisions. With the progress of machine learning algorithms, face recognition techniques have greatly developed [7-16], which could provide real-time and high-prevision decisions on the face labels. Based on the large volume of Internet images, robust face classifiers can be trained to support the safety management in the social networks. Therefore, via the application of face recognition
techniques to social networks, the security in our social networks can be enhanced. In the remainder of this paper, the concept of social networks and face recognition techniques are first described. Based on these theoretical supports, the possible ways of applying face recognition techniques to social networks are discussed afterwards. Finally, conclusions are drawn to summarize the whole paper.

2. Concept of Social Networks
Social networks come from social networking, and the starting point for social networking is email. The Internet is essentially a network between computers [1-6]. Early E-mail solved the problem of remote mail transmission. It is also the most popular application on the Internet, and it is also the starting point of social networking. The BBS goes one step further and normalizes "broadcasting" and "forwarding", theoretically realizing the function of releasing information to all people and discussing topics (the boundary is the number of visitors to the BBS).

The BBS has taken the social networking one step further, from the simple cost reduction of peer-to-peer communication to the reduction of the cost of point-to-point communication. Instant messaging (IM) and blogs are more like upgraded versions of the first two social tools. The former improves immediate effects (transmission speed) and simultaneous communication (parallel processing); the latter begins to embody sociology and psychology. The theory—the information publishing node begins to embody more and more individual consciousness, because the scattered information in the time dimension can be aggregated at first, and then become the “image” and “character” of the information publishing node. For example, from RSS, Flickr to recent YouTube, Digg, Mini-feed, Twitter, Fetion, Video-Mail have solved or improved a single function, is a tool to enrich the network social.

Making friends is just the beginning of a social network. Just as Google’s start is just the same as the backlinks of every web page, the beginning of social networking is just to get your personal information and friends list. Social networks have generally experienced such a development process: the early conceptualization phase—the six-degree separation theory represented by SixDegrees; the engagement with strangers—the theory that Friendster helps you build weak relationships to bring higher social capital; the stage of entertainment— The rich multimedia personalization space created by MySpace attracts the theory of attention; the social graph stage—the real network of Facebook replication offline comes to the theory of low-cost management online; the social stage of cloud. The whole process of SNS development is to gradually transfer the more complete information flow of offline life to online for low-cost management, which makes virtual social interaction with real-world social interaction.

3. Face Recognition Techniques
Face recognition is a very classical problem in the field of pattern recognition and machine learning. Over the fast century, many face recognition methods have been developed, which greatly improved the classification precision of different types of face images under different conditions [7-14]. Generally, a typical face recognition algorithm is combined by two parts: feature extraction and classification. Feature extraction make analysis on the original face images and extract discriminative features from them, which could effectively separate faces from different people. So far, the features used in face recognition were very rich such as intensity distributions, geometrical features or texture features. Afterwards, the classification stage is conducted based on the features to make decisions on the face types of unknown samples. Many classical and advanced classifiers were applied to face recognition such as K-nearest neighbor (KNN), support vector machine (SVM), and sparse representation-based classification (SRC).

With the emergence and development of deep learning theories, deep networks such as convolutional neural networks (CNN) are demonstrated notably effective for image classification tasks such as face image recognition when there are enough training samples. In the case of online social networks, the face images on the Internet are actually sufficient. Meanwhile, the computation capability of the online cloud computing is also able to train the large volume of samples. Therefore, it
is promising that face techniques can be applied into social networks to enhance the safety level and help us enjoy on the Internet.

4. Application of Face Recognition Techniques to Social Networks

In order to guard the safety of our social networks on the Internet, face recognition techniques can be used to help you evaluate the people you are chatting with. Fig. 1 shows a potential way of applying face recognition techniques into social networks on the Internet. In detail, the procedure can be summarized as following steps:

   Step 1: the available face images or similar ones are accessed by the cloud computing units;
   Step 2: a deep CNN is designed and trained based on the large volume of training samples;
   Step 3: the online chatting guarding system capture the face images of the chatters and classify them based on the trained CNN;
   Step 4: the labels of these chatters are obtained through CNN classification;
   Step 5: related news or reports about the recognized people are sent the corresponding chatters to help them make judgements.

In the practical applications, there may be some software to be researched and attached to personal computers. When one makes social networking on the Internet, the software is activated to monitor the whole process. In the meantime, it makes judgements on the person chatting with by searching the relevant information on the Internet with the assistance of face recognition techniques. Therefore, the developed system like Fig. 1 could help the whole process of social networking on the Internet.

![Fig.1 Illustration of application of face recognition techniques to social networks.](image)

5. Conclusion

This paper researchs on the application of face recognition techniques to social networks. Considering the possible risks in our daily social networks, face recognition techniques can be incorporated to help judge these risks or dangers. Owing to the fast development of deep learning algorithms, the CNN-based face recognition methods could achieve very high classification precision especially when there are volumes of training samples on the Internet. Based on the labels of the chatters, one can get access to their past news or reports published on the Internet. These prior information could help him make correct decisions when dealing with the social networks. In the future works, some mathematical models about the preliminary ideas can be setup to validate the feasibility. In addition, with the fast development of face recognition algorithms, the newest methods could be used in this system to help the smooth operating of the social networks.

Acknowledgements: The study was supported by National Social Science Foundation of China (Grant No. 15CGL076).
References

[1] Bhagat S, Cormode G and Muthukrishnan S 2011 Node classification in social network In Social Network Data Analytics pp 115–148.

[2] Choudhury M D, Mason W A, Hofman J M and Watts D J 2010 Inferring relevant social networks from interpersonal communication In Proceedings of the 19th International Conference on World Wide Web pp 301–310.

[3] Golder S A, Wilkinson D and Huberman B A 2007 Rhythms of Social Interaction: Messaging within a Massive Online Network In Proceedings of 3rd International Conference on Communities and Technologies pp 1-5.

[4] Kleinberg J 2008 The convergence of social and technological networks Communications of the ACM vol 51 no 11 pp 66-72.

[5] Wasserman S and Faust K 1993 Social Network Analysis: Methods and Applications. Cambridge University Press.

[6] Wellman B and Hampton N 1999 Living networked in a wired world Contemporary Sociology vol 28 no 6 pp 64-654.

[7] Turk M A and Pentland A P 1991 Face recognition using eigen-faces in Proc. of IEEE Conf. Computer Vision and Pattern Recognition pp 586–591.

[8] Wen Y, He L and P. Shi 2012 Face recognition using difference vector plus KPCA Digital Signal Processing vol 22 no 1 pp 140-146.

[9] Du J, Zhai C and Ye Y 2013 Face aging simulation and recognition based on nmf algorithm with sparseness constraints Neurocomputing vol 116 pp 250-259

[10] Jose J, Prabin P and Kumar K M 2012 A novel method for color face recognition using KNN classifier in Proc. of International Conference on Computing pp 1-4.

[11] Zhang Y and Liu C 2003 Face recognition based on support vector machine and nearest neighbour classifier Journal of Systems Engineering and Electronics vol 14 no 3 pp 73-76.

[12] Wright J, Yang A and Ganesh A et al. 2009 Robust face recognition via sparse representation IEEE Transactions on Pattern Analysis and Machine Intelligence vol 31 no 2 pp 210–227.

[13] Ding C and Tao D 2015 Robust face recognition via multimodal deep face representation IEEE Transactions on Multimedia vol 17 no 11 pp 2049-2058.

[14] Kang S, Lee J and Bong K et al. 2018 Low-Power Scalable 3-D Face Frontalization Processor for CNN-based Face Recognition in Mobile Devices IEEE Journal on Emerging and Selected Topics in Circuits & Systems vol 8 no 4 pp 873-883.

[15] Blanz V and Vetter T. 2003 Face recognition based on fitting a 3d morphable model. IEEE Transactions on Pattern Analysis and Machine Intelligence vol 25 no 9 pp. 1063-1074.

[16] Lawrence S, Giles C L, Tsoi A. C. and Back A. D. 1997 Face recognition: a convolutional neural-network approach. IEEE Transactions on Neural Networks vol 8 no 1 pp 98-113.