Literature Review: Implementation of Facial Recognition in Society

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Abstract. At one of the most successful applications of image analysis and understanding, face recognition has recently received significant attention, especially during the past few years. Facial recognition technology (FRT) has emerged as an attractive solution to address many contemporary needs for identification and verification of identity claims. It brings together the promise of other biometric systems, which attempt to tie identity to individually distinctive features of the body, and the more familiar functionality of visual surveillance systems. This report develops a socio-political analysis that bridges the technical and social scientific literature on FRT and addresses the unique challenges and concerns that attend its development, evaluation, and specific operational uses, contests, and goals. It highlights the potential and limitations of the technology, noting those tasks for which it seems ready for deployment, those areas where performance obstacles may be overcome by future technological developments or sound operating procedures, and still other issues that appear intractable. Its concern with efficacy extends to ethical considerations. Face recognition technology may solve this problem since a face is undeniably connected to its owner except in the case of identical twins. It's nontransferable. The system can then compare scans to records stored in a central or local database or ever on a smart card.

1. Introduction

The availability of facial recognition methods is common. Facial recognition is currently one of the most discussed topics in computer-related research. Most of these researches focus on the performance of the algorithm using a special set of samples. However, some of the researches also focus on the social impact of facial recognition implementation in society.

Various areas can take advantage of using facial recognition. On of the area that may use facial recognition is security. One of the most popular implementations is user authentication using facial recognition on smartphones. Apple has become one of the most accurate face recognition applications in its smartphone products. Apple's Face ID can prevent fraudulent access to its smartphone [1].

However, the use of excessive facial recognition technology has been widely considered as a privacy intrusion. One recent finding on misusing facial recognition technology is by pointed to FBI. This institution was alleged to collect face data without consent and using accurate facial recognition to perform identification [2]. There is also fear that the use of excessive facial recognition can transform a nation into a full surveillance state where the privacy of citizens is not the priority of the government [3].
This paper is structured as follows the first section discusses the background and motivation of work. In the second section, we will discuss the currently available technology (both software and hardware) that can be used to implement facial recognition. In the third section we will discuss journal articles and research that focus on the impact of facial recognition in modern society. We will focus on both negative and positive impacts of this technology. In the last section, we will conclude our work by providing statements that represent our review of the discussed matters. We will also provide a suggestion on current related to our works. In recent years, veritable image processing systems have been developed for several field applications, some of which are recognition and classification.

2. Facial Recognition Technology
In the current era of globalization, a variety of technologies have been created that make it easier for humans to do their jobs. Technological developments have brought great changes in parts of the world or in every country, both developed and developing countries both need technology as a process of providing and transferring information in the form of hardware or software. One of the technologies developed at this time is face recognition. Face recognition technology has been widely applied in human life such as device security and in the medical world.

In the medical world, facial recognition technology has been developed to be able to overcome the challenges that exist on the face as in the 2002 Face Recognition Vendor Test (FRVT) which can connect identical twin faces [4].

Facial recognition in digital technology such as smartphones has developed rapidly in this globalization era. Maybe all this time facial recognition on a smartphone device can only be done in a face not moving condition. But now comes a smartphone that has a face recognition feature in mobile conditions such as those found on the Google Pixel 4 smartphone [5].

In the modern era, facial recognition has been widely applied in daily activities, such as in the field of statehood. Francis has now implemented the "Alicem" program, which is a state program used to produce Francis' citizen identification cards which are expected to make the country more advanced and efficient. The implemented program will not integrate facial recognition biometrics into the identity database of its citizens so that citizens do not have to worry about potential abuse [6].

In today's world of technology, technology has increasingly developed starting from software or hardware. Facial recognition software has also developed, such as "King's Cross" which has been implemented in the United Kingdom. The software functions to scan faces on streets, shopping centers, football stadiums and events such as the Notting Hill carnival [7].

Face recognition in the security sector has evolved a lot in the modern era, such as automatic face recognition technology (AFR) which functions to map faces in the crowd and compare them to watchlist images, which are accessible to suspects, missing persons and people sought by the police. AFR technology has been widely installed in public places such as streets, shopping centers, and stadiums. Every time AFR technology is approved on the face subject, superimposed on the person's face is the so-called, plus other information about citizenship, age, visa status, educational qualifications, victory victories (if any), related research, political elections [8].

Face recognition in the security field has been widely applied in the world, one form of the application of face recognition as in Biostar 2. The Biostar 2 platform is a platform developed by the Suprema Company which functions to limit access to centralized control for access to secure facilities such as warehouses or office buildings. Biostar 2 uses a combination of fingerprints and face recognition as part of the effort to identify people who are trying to get access to buildings. Biostar 2 has been used by more than 5,700 organizations in 83 countries, including the government, banks and the Metropolitan Police of the United Kingdom [9]. difficult to penetrate. Face recognition was one of the pattern recognition approaches for personal identification purposes as well as other approaches such as the introduction of biometric fingerprint, signature, retina of the eye and so on [17].

In the world of police, South Wales Police have implemented a face recognition application installed on their cellphones to identify suspects without having to bring them to the police station. This application will allow officers to run a snapshot of a person through a database of suspects called
a watchlist, and find potential matches even if the individual provides false or misleading information. This facial recognition technology is expected to be able to secure arrest faster and enable officers to resolve cases of false identity without the need to travel to the station or detention room [10].

In the world of marketing, face recognition technology has been widely applied as in Westfield retail parks, visitors are routinely scanned and recorded by dozens of hidden cameras mounted on the central digital advertising billboards. The camera can not only determine your age and gender but your mood, so sales advertisements will later be given to you according to your mood [11].

The New South Wales Government has introduced a face recognition method on rail transportation. The people of New South Wales no longer need to use a swipe card to be able to use rail transportation. Face recognition technology that is applied is expected to facilitate the public in using transportation facilities and is also able to replace the function of the payment string card commonly used by the people of New South Wales for traveling [12].

3. The Impact of Facial Recognition

At present, it is undeniable that technology has been included in the basic needs of human life. Ranging from small things to big things. Both children, adolescents, adults, and even the elderly depend on technology, especially those for those who are in urban areas.

The development of technology is currently very rapid ranging from the medical world, military, transportation, entertainment and many others. It's wrong to know that the technology developing at this time is face recognition technology.

Facial recognition has become a world trend nowadays. Lots of impacts are given from one part of the artificial intelligence system, such as positive impacts and negative impacts given to the community. Here are some of the positive and negative effects of facial recognition.

3.1. positive impact

Facial recognition technology has spread widely nowadays. Face recognition technology has been widely applied ranging from small companies to large companies such as Microsoft, Facebook, and Google. Lots of positive effects are given from face recognition technology from the security, medical, police, to marketing sides.

Face recognition technology in terms of security as implemented by large companies Google on Google Pixel 4 smartphones that use face recognition methods to access the system on the smartphone [5]. Face recognition also plays a role in the medical world as in the 2002 Face Recognition Vendor Test (FRVT) which is able to distinguish identical twin faces [4]. Face recognition technology is also used in the police world, where face recognition technology is used to identify criminals so that the police can find out the identity and criminal data even though the criminal is lying [10]. Face recognition technology is also used in the police world, where face recognition technology is used to identify criminals so that the police can find out the identity and criminal data even though the criminal is lying [11].

3.2. negative impact

Technology brings positive and negative impacts on human life. Face recognition technology that was originally created to provide positive benefits to humans, on the other hand face recognition technology also has a negative part.

The negative impact of facial recognition technology such as racism on the face recognition method used by Google where the method can only be focused and accurate on white faces and less accurate on black faces. This makes some Google face recognition technology users uneasy about the algorithm used by these large companies [13].

The use of databases in face recognition on a large scale is feared to disrupt individual privacy rights, as is the case in the UK, the growth of face recognition cameras found on the streets, places to shop or entertainment venues can continue to oversee the activities or activities of each individual [14]. With face recognition supervision everywhere, making freedom of life and activities of the
British people threatened, all community activities are monitored and monitored by the government or private companies [15].

In Australia, anyone who makes a driver's license or makes a passport is likely to face recognition data will end up in a new large national network that the federal government is trying to make [16].

4. Conclusion

Face recognition technology has come a long way in the last twenty years. Today, machines are able to automatically verify identity information for secure transactions, for surveillance and security tasks, and for access control to buildings etc. These applications usually work in controlled environments and recognition algorithms can take advantage of the environmental constraints to obtain high recognition accuracy. However, next-generation face recognition systems are going to have a widespread application in smart environments where computers and machines are more like helpful assistants.

To achieve this goal computer must be able to reliably identify nearby people in a manner that fits naturally within the pattern of normal human interactions. They must not require special interactions and must conform to human intuitions about when recognition is likely. This implies that future smart environments should use the same modalities as humans, and have approximately the same limitations. These goals now appear in reach -- however, substantial research remains to be done in making person recognition technology work reliably, in widely varying conditions using information from single or multiple modalities.

References

[1] A. Hern, “Apple: don’t use Face ID on an iPhone X if you’re under 13 or have a twin,” The Guardian, 27-Sep-2017.
[2] O. Solon, “Facial recognition database used by FBI is out of control, House committee hears,” The Guardian, 27-Mar-2017.
[3] H. Devlin, “We are hurtling towards a surveillance state’: the rise of facial recognition technology,” The Guardian, 05-Oct-2019.
[4] D. Voth, “Face recognition technology,” IEEE Intell. Syst., vol. 18, no. 3, hlm. 4–7, Mei 2003.
[5] T. J. Post, “Google in smartphone push with motion-sensing Pixel 4,” The Jakarta Post. [Daring]. Tersedia pada: https://www.thejakartapost.com/life/2019/10/16/google-smartphone-push-with-motion-sensing-pixel-4.html. [Diakses: 16-Oct-2019].
[6] “France Set to Roll Out Nationwide Facial Recognition ID Program,” Bloomberg.com, 03-Oct-2019.
[7] D. S. Defence dan security editor, “Facial recognition technology scrapped at King’s Cross site,” The Guardian, 02-Sep-2019.
[8] O. B. L. affairs correspondent, “Police use of facial recognition is legal, Cardiff high court rules,” The Guardian, 04-Sep-2019.
[9] J. Taylor, “Major breach found in biometrics system used by banks, UK police and defence firms,” The Guardian, 14-Agu-2019.
[10] I. S. S. editor, “South Wales police to use facial recognition apps on phones,” The Guardian, 07-Agu-2019.
[11] J. G. H. affairs correspondent, “Police trials of facial recognition backed by home secretary,” The Guardian, 12-Jul-2019.
[12] N. Zhou dan J. Taylor, “NSW suggests facial recognition could replace Opal cards in ‘not too distant future,’” The Guardian, 11-Jul-2019.
[13] J. C. Wong, “Google reportedly targeted people with ‘dark skin’ to improve facial recognition,” The Guardian, 03-Oct-2019.
[14] D. Davis, “Facial recognition technology threatens to end all individual privacy,” The Guardian, 20-Sep-2019.
[15] S. Hare, “Facial recognition is now rampant. The implications for our freedom are chilling,” The Guardian, 18-Agu-2019.

[16] J. Taylor, “Plan for massive facial recognition database sparks privacy concerns,” The Guardian, 28-Sep-2019.

[17] Purbandini, “The comparison of laplacianfaces qr decomposition and linear discriminant analysis qr decomposition algorithm for face recognition system on orthogonal subspace,” J. Teknol., vol. 71, no. 1, pp. 43–47, 2014, doi: 10.11113/jt.v71.3612.