Design and implementation of an android application for face detection and age estimation

Lubna N Rasoul [1]*, Ahmed K Abbas[2] and Murtadha N Rasol[3]

[1] Directorate General of Education in Dhi Qar, Iraq
[2] University of Karbala, Iraq
[3] Department of System Analysis and Telecommunications, Southern Federal University, Taganrog, Russia

Corresponding author's e-mail: lubnrdj@gmail.com

Abstract. Age is an important attribute of identity and social interaction as well for medical processing. Face is consists several elements to predict the human age such as facial wrinkles and youthfulness. Age estimation from the face by intelligent human-machine interfacing is required to capture picture that may contains different parts as well the human face. In order to estimate age, we need to detect only the face information. This research proposes an android application to take photo for anyone using android camera or upload photo from gallery, then it will determine the age for everybody in the photo. The application can guess the physical age for the faces depends on internet servers. The application tested on many persons and the results was correct under some conditions such as (the light of picture, the normal state for face, camera accuracy), the other results was correct 90- 95% under other conditions. This application easy to use, and simply you can use it to detect the age of your friends. This proposed application can be used in security, parks and swimming pools entrances, and medical clinics

1. Introduction

Human face gives a lot of useful information about a people such as gender, age, etc. Facial age estimation has taken wide popularity in last years. It has little of applications in the daily life of a people, such as electronic sales machines, enjoyment, makeup culture, etc. Even if the field of age recognition has grown a lot, it is still difficult to recognize age because the process of age recognition is affected by factors such as change in size and shape of face, style of life, nutrition habits, environment, etc. Age recognition from people faces is a challenging problem. It has applications in criminal analysis, safety control, biometrics, management customer relationship electronically, enjoyment, beauty culture, etc. The frequently used measure of age recognition is the mean absolute error (MAE). It is the average of absolute error between ground truth age and estimated age. The main challenge of age recognition is that the facial characteristics changes through aging are different for different peoples [1]. Mobile face detection can be utilized either for user authentication or for cognitive assistance in identifying humans. The latter can be particularly useful for the elderly whose face recognition ability dismiss while aging [2].

Age recognition is an object that is active today because this information needs to be included in real-world systems. Age is necessary to understand requirements of a human in different sides of his daily life. Some systems apply age specific human computer interaction. They are selling machines,

advertisements etc. Facial age recognition is affected automatically by traditional factors, such as non-frontal facial poses, unknown illumination conditions and presence of facial features. Especially, facial features like smile might negatively affect accuracy of automated systems: When a person smiles wrinkles are appeared. These wrinkles can be misleading when only the appearance features are taken into account [1]. Some facial recognition algorithms identify faces by extracting landmarks or features of an image with the subject's face, which is nothing more than a set of pixels ordered by a particular pattern [3]

2. Related works

Face recognition is applied for many applications in many researches. The research work in [2] provide a speed-optimized face recognition system designed for mobile devices. Such applications may be used in the context distributed computing and help to support older people who suffer from dementia when identifying people or to develop cognitive memory games. Eigen faces decomposition have been utilized whereas the recognition application has been developed for Android operating system.

The author in [4] provide all the processes he use to program an android application of face recognition. At the beginning, android API used, after a long study of the android literature to make his application. Because of devices problem, he had to leave this option, and he used the Open CV library, a library create for image processing. Use this library was really hard because it is a difficult one but the Open CV literature on internet permit him to control its utilization. After that, he thought with his tutors that it could be more important to make his own face detection library. Then, he infer to have six specific parameters on each face. Those six features allow him to make the difference between two faces.

The research in [5] characterize the development of a face detection and recognition application developed into Android and Raspberry Pi. The application connects with the Raspberry Pi by Bluetooth protocols. The face detection is based on boosted cascade while the face recognition is based on Eigenfaces.

The authors in [6] developed an application for mobile devices under android OS that can recognize human faces. The main purpose of this application is to grant access to certain areas or rooms only to certain authorized humans.

The research in [7] suggested GPU (graphic processing unit) to avoid the challenges in identifying the human IS recognition of face by portable tools like mobile and tablet, this GPU use connection and local binary pattern histogram algorithm to use optimal software open CV and using hardware platform android to identify the face.

The authors in [8] detected framework that could help police men to recognize the face of an offender or a suspect. The framework is a client-server video based face recognition surveillance in the real-time. The framework applies face detection and tracking using Android mobile devices at the client ide and video based face recognition at the server side. This paper focuses on the development of the client side of the proposed framework, face detection and tracking using Android mobile devices.

3. How old you look like

Many age-fixing applications are designed to ridicule others so that they do not give real age to people. In this paper, the Android application was designed to determine the age by identifying the facial features. The application was tested on many people and gave 96% real results according to the characteristics of the image. The application is programmed using two programming languages, Java and XML. The following is a presentation of how to distinguish the face and determine the age and then display the implementation of the application.

3.1 Face detection

One of the most sensitive parts in the presented face recognition system is the preprocessing of the considered image region. Before the actual process of recognition is necessary to create image galleries. From the perspective of facial recognition, the gallery is a set of models serving as a reference for biometric matching process.

The following are the stages of facial recognition:

1. The image capture is performed using photo camera or from gallery. The camera that is used to capture the image is more powerful so the recognition will be much more accurate.

2. The face detection is usually a fairly complex process because an image has almost always a background or other faces. Age recognition will be depends on internet connection speed because it depends on the servers on internet.

3.2 Age recognition

After the faces are detected in the selected image as shown in the previous subsection, the age of all the faces in the image is calculated using the following function

```java
int age = face.getJSONObject("attribute").getJSONObject("age").getInt("value");
                    Log.i("AGE", age + "");
                    String gender = face.getJSONObject("attribute")
            .getJSONObject("gender").getString("value");
            Bitmap ageBitmap = buildAgeBitmap(age, "Male".equals(gender));
                    int ageWidth = ageBitmap.getWidth();
                    int ageHeight = ageBitmap.getHeight();
```

Figure 1. function of age recognition

4. How old app implementation

The application is designed using the eclipse environment. Here is a view of the application design and how to use it. Figure 2. (a) shows the main interface of the application, after clicking on the button (Add photo) opens the studio to select a particular image, when the image selected Press on (How Old) button to calculate the age or ages in the picture as shown in Figure 2. (b), while Figure 2. (c) gives an overview of how the application is used in addition it displays application programmer information.

Figure 2. (a) Main
Screen

Figure 2. (b)
Face detection and
age recognition

Figure 2. (c)
About App

5. Results and discussion

Mobile applications are becoming increasingly prevalent today, particularly in the world of business. As such, many prospective business researches are interested in creating mobile applications but lack the knowledge to do so. The goal of this project was to develop Android application for face detection and age recognition. In the following subsections face detection and age recognition results will be described, In addition, the tools used to implement the application will be described.

5.1 Software tools

Eclipse is a free integrated Development Environment implemented in Java. The first version was launched in 2001 by the eclispe foundation which   includes important computers companies' such as IBM, Google or Oracle. It has been created at first for Java development. Nowadays, Eclipse support more than 20 programming languages like C, XML, PHP, etc...

Eclipse include a plugin created for android development, named ADT (Android Development Tool). Add to the Android Software Development Kit, Eclispe is a complete IDE to program android applications. The android SDK include all the android libraries, a debugger, an emulator to test the application, samples of code and tutorials. It also permit Eclipse to understand the XML android syntax [4].
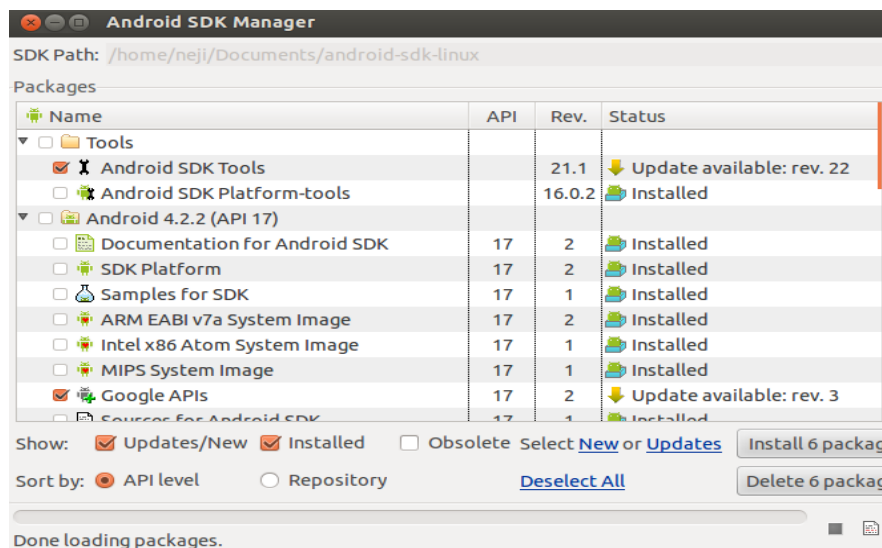

Figure 3. The Android SDK for Eclipse.

5.2 Performance evaluation

After the application programming was completed in the Eclipse and tested on the program emulator, the application was installed on the real devices and testing its work (it work on android 4.2.2 and above). By testing many images to distinguish the faces and determine the age, the success rate (gave the exact age of the people in the picture) 98% It was taken in perfect cases (camera resolution, photo lighting, face condition, etc.), while the other images (images under a certain filter, some cosmetics on the face, etc.) were 85%. The application distinguished the ages from (0 children less than 1 year - 75 years). Figure (4a-4b) shows samples for application readings.

Figure 4.(a)

Children age
recognition

Figure 4.(b)

Multiple face
detection and age
recognition age
recognition

Figure 4. Face detection and age recognition

5.3 Face detection and age recognition results

There are many applications designed to determine the age of the face is located on the official store for applications of android (Google Play). The performance of this application was compared with those applications by testing the same images. This application gave 90% more accurate results. 500 images were tested to compare application performance for other applications. For example, a child image was tested in this application. The reading was 2 years while the same image was tested in another application and the reading was 33 years.

As a result, the accuracy ratio in this application is 95%.

6. Conclusion and future works

When Google release Android as open source OS and free SDK, Google consider minimum level of developers, who may be do not care for device resources, so Android defeated this issue by smart management for resources.

Developing applications for this platform has become a very profitable On the contrary, in other systems. In addition to this, Availability and multiplicity of applications markets on the web. This led us to introduce this paper to keep up with the evolution in the world.

The How Old Application has been introduced to detect faces and guess the physical age. We use smartphone platform because the user carrying it most the time.

This application easy to use, and simply you can use it to detect the age of your friends. In future we can add some features at How Old application such as , insert the save image feature after guess age , add sharing feature to share the results on social media, add select photo from camera feature, this feature allows the user to take photo by camera and upload this photo to the application directly.

7. References

[1]   S. Soman, and A. Austine, "A Survey on Age Estimation Techniques", International Journal of Computer Applications (0975 – 8887) Volume 161 – No 4, 2017 .

[2]   C. Doukas, and I. Maglogiannis , "A Fast Mobile Face Recognition System for Android OS Based on Eigenfaces Decomposition", Conference Paper in IFIP Advances in Information and Communication Technology · 2010 .

[3]   R. Jafri and H. Arabnia, "A Survey of Face Recognition Techniques," Journal of Information Processing Systems, vol. 5, no. 2, pp. 41-68, 2009.

[4]   Kévin Letupe, "Android application for Face Recognition", 2013.

[5]   M. Chillaron, L. Dunai, G. Fajarnes, and I. Lengua, "Face detection and recognition application for Android", Valencia, Spain, IECON2015-Yokohama, 2015.

[6]   O. DOSPINESCU, and I. POPA, " Face Detection and Face Recognition in Android Mobile Applications", Informatics Economic vol. 20, no. 1/2016.

[7]   L. Khobanizad, M. Khobanizad, B. Vaseghi, and H. Chegini, "Implement of Face Recognition in Android Platform by Using Opencv and LBT Algorithm", International Journal of Wireless Communications and Mobile Computing 2016; 4(2): 25-31

[8]   L.Elrefaei, A. Alharthi, H. Alamoudi, S. Almutairi, and F. Al-rammah "Real-time Face Detection and Tracking on Mobile Phones for Criminal Detection" Saudi Arabia, 2017 IEEE.