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Android Application on Face Detection and Eye Tracker

Shubham Singh[1], Sourabh Sharma[1], Shreyansh Shrivastava[1], Vineet Jain[1], Sourabh Dave[2], Preetesh Purohit[2]

Student, Dept. of Computer Science, Medi-Caps University, Indore, India[1]

Faculty, Dept. of Computer Science, Medi-Caps University, Indore, India[2]

ABSTRACT: Face and eye detection are one of the most challenging problems in the computer vision area. The goal of this paper is to present a different applications and implementation where face detection and eye tracking can be useful. With the rapid change in technology, Face and eye detection has gained much more attention in many different areas like the educational and industrial areas. Many different studies have been performed on a regular basis for advancement in face detection and eye-tracking. Besides having many challenging problems like having different lighting conditions, having glasses, facial hair on face, different orientation pose or occlusion of face, face and eye detection methods performed great progress. Face detection and eye tracking are widely used in areas like security and medical. In this paper, we have used this concept to create an android application that detects face and eye and perform operation accordingly.

KEYWORDS: Face detection, Eye tracking, Google vision API, Cloud vision API, Android, Mobile phone.

I. INTRODUCTION

With the rapid advancement in technology on a daily basis, we are also getting dependent on these technologies from doing small things to create any large project. We use these technologies as per our requirement but with advantages, there are some disadvantages also. In this digital world, we all are surrounded by gadgets that help us or build for our conveniences like mobile phones, laptops, and television which we use on a daily basis for entertainment and work.

Face detection is one of the most challenging problems in disciplines such as image processing, pattern recognition, and computer vision. With the improvements in information technology, face detection/recognition has wide usage in applications such as personal identity, video surveillance, witness face reconstruction, computerized aging, control systems (like tracing fatigue of drivers to avoid traffic accidents), HCI (Human-Computer Interaction, which provides control of computer-based system, with no need of interaction through the usage of the mouse, keyboard, etc.), video game controllers. Therefore, implementations of the face and eye detection have received a great deal of attention in the recent literature.

For the last 15 years, face detection has become a popular subject for researchers in psychophysics, neural sciences (especially in the uniqueness of faces; whether face recognition is done holistically or by local feature analysis) and engineering, image processing, analysis, and computer vision. A formal method of classifying faces was first proposed by Francis Galton in 1888. He proposed a method that collects facial profiles as curves and then finds their norms. This method was able to classify other profiles by using their deviations from the norms. The classification was multi-modal resulting in a vector of independent measures that could be compared with other vectors in a database.

Face recognition is a very challenging task because of the variability of features in the photo taken. Different variations of scaling the faces in image, location, the orientation of images (like rotated or not), pose of faces (like frontal, by side or profile) make face recognition difficult to achieve to build a performance system with practical usage for needs mentioned above.

Fig.1.1. Eye gaze system block diagram.

The processes used and working of face and eye detection is shown by block diagram in Fig.1.1.

Now working on these problems we have created an android application which basically detects face and track eye and if a person found sleepy than it stops the current action or we can say in our case the video that was playing. Now this face detection and eye tracking concept help us to build this application, In which we have used google vison API having pre-trained data of many facial gestures and also having the ability to track eyes. Using this we have created an application in which we can play any video like we used to watch on any media player. Similarly, In this application, you can play or pause any video not only by tapping the play and pause button but you can also play or pause video with your eye movement. If the system detects that your eyes are closed it will automatically pause the video and if it detects open eyes then again play that video from where it was paused.

This simple use of face detection and eye tracking can help a person to save their data wastage also the mobile battery drainage will be reduced and there will be reduced chances of any kind of the accidents that can happen when your device is switched on while you are sleeping.

II. METHODOLOGY

This application is created using the latest version of theAndroid Studio (version 4.0) and supports the android operating system version above 5.0.It can detect our face or track if our eyes are closed or open. This application is created using google vision API.

Cloud Vision API enables developers to understand the content of an image by encapsulating powerful machine learning models in an easy-to-use REST API. It quickly classifies images into thousands of categories (such as, "sailboat"), detects individual objects and faces within images, and reads printed words contained within images. You can build metadata on your image catalogue, moderate offensive content, or enable new marketing scenarios through image sentiment analysis.
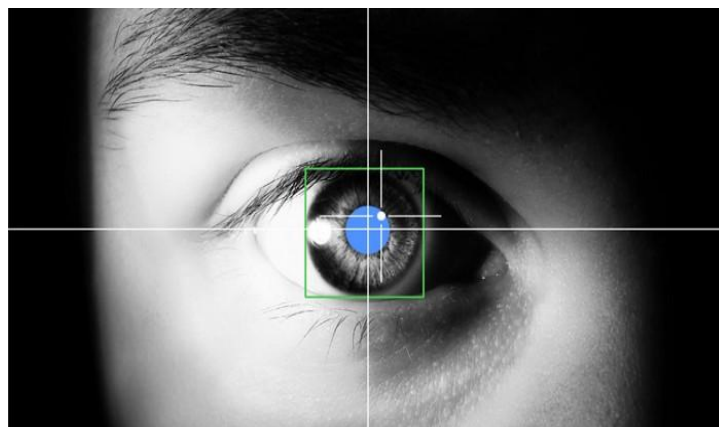

Fig.2.1. Cloud vision API

To use google vision API in the android application we have to import the dependencies of google vision API in our project and after successfully importing it we can use the features accordingly.

In this application, we have used simple video view and text view layouts provided by the android studio to work with videos and text. Video view simply holds the video format and by using text view we are showing the current status that whether the face is detected or not, eyes are detected or not and if detected then it is closed or open. To give more clarification about the process we have used text view.

III. PSEUDO CODE

Below pseudo code will explain the working of application and algorithm in brief:

Step 1: Asking for camera permission.
Step 2: If permission is not granted go to step 8.
Step 3: If permission is granted, the application opened and a video can be played.

Step 4: Setting up a threshold value of 0.75f for each eye.

Step 5: Video will be played till face not detected.

Step 6: After detecting the face, Check the below condition for each eye and play the video till the open eye is detected.

If(face.getIsLeftEyeOpenProbability()>THRESHOLD || face.getIsRightEyeOpenProbability()>THRESHOLD)

Eye detected and open, so video continues.

Else

Eye detected and closed, so video paused.

Step 7: If face not detected, go to step 5.

Step 8:End.

The above pseudocode explains the working of the application after importing dependencies from google vision API and implementing it using android studio using functions and classes to connect the layouts of code of android studio together.

IV. RESULTS

The application is able to detect face and eye very well, The only requirement is that the face should be clearly visible or should be in the proper light. The accuracy of application is also up to point and can detect even a blink of an eye very well.

Here are some results that explain the working of theapplication briefly:
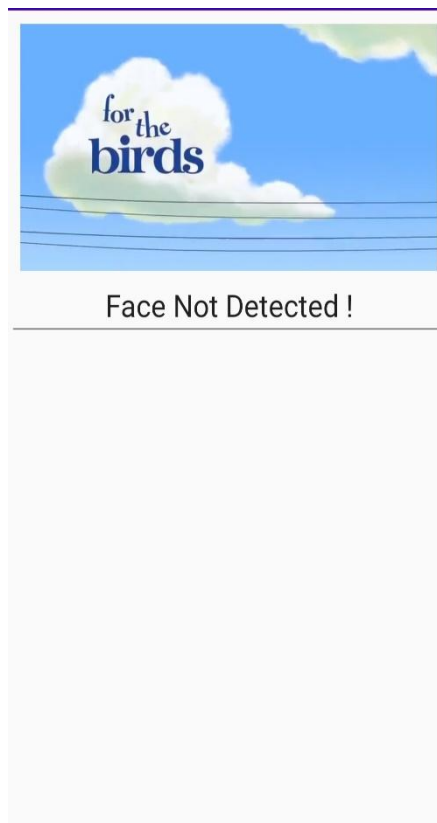

Fig.4.1. Face not detected.

Fig.4.1 shows that application is started and a video is playing in it but the face is not detected yet and till face is not detected we are showing a message using text view that face not detected.

When face is detected the next task is to detect whether eyes are opened or closed. After successfully detecting eyes the operation is performed accordingly as shown in Fig.4.2 and in Fig.4.3.
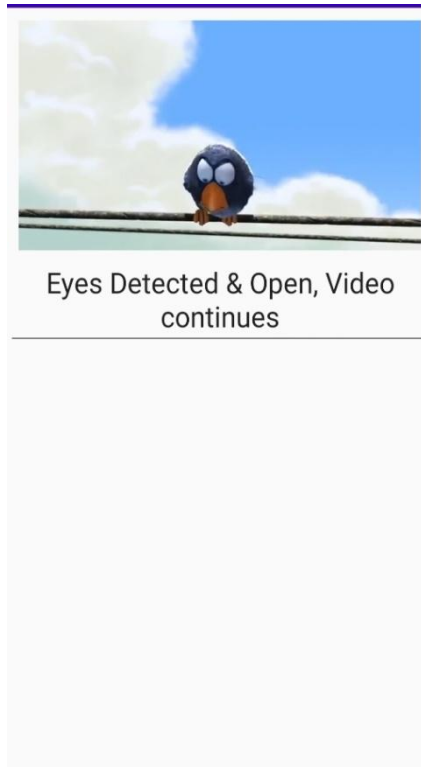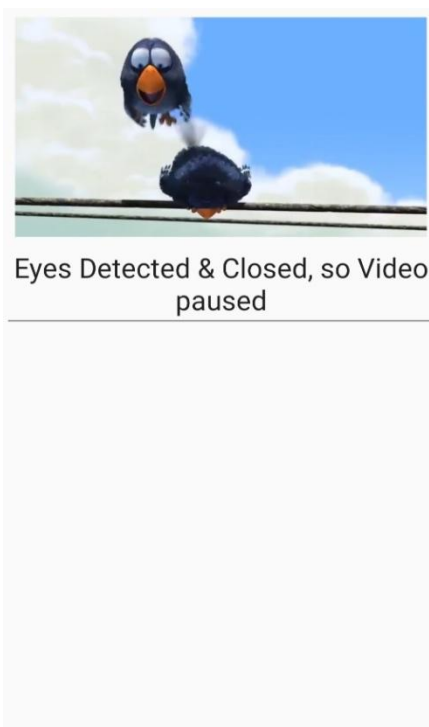

Fig.4.2. Eye detected and open.

Fig.4.3. Eye detected and closed.

V. CONCLUSION AND FUTURE WORK

It becomes way more cooler when the application can even detect if we are smiling, reading on phone, or not looking at it. We can implement this feature in many online video stream platforms like Netflix, Amazon prime shows, etc or in our local media players so that users can reduce the chances of an accident that can occur while sleeping. The more new advancement can be done in this application with the advancement in this technology.

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