

Photo Categorizer Mobile Application

Nurul Adilah Che Ismail¹ and Jumail Taliba²

Faculty of Computing, Universiti Teknologi Malaysia (UTM),
81310 Johor Bharu, Johor, Malaysia
{¹nadilah44@utm.my, ²jumail@utm.my}

Abstract. *Most of photo categorizer applications in the market today are using folder based method for each different category of image. It does not make any easier or save time at all if the user had to sort the image manually. A new developed application called “Photo Categorizer Mobile Application” is proposed to automatically sort the image of a face only image and a whole body image into two different folders respectively by applying image-processing technique for face and human body detection. The development of this application can help user to save time to look for image accordingly to its category and also improve photo management for the smartphone user. Android studio is the software used to develop this application. The image processing technique is applied through the use of openCV Library and Google Vision API. All the coding parts in this project used Java.*

Keywords: Face Detection, Human Body Detection, Photo Categorizer.

1 Introduction

The need to keep your photo gallery in organize can be very time consuming. It often gives people trouble to choose and view which photo is in which category. Even for some of the smartphone, they only have their own ways of categorizing the picture such as picture from phone camera is separate from the downloaded picture and the Bluetooth picture. This way it gives a little help for people to look up where their pictures are being stored.

This project focuses on categorizing two different type of images by applying image processing techniques onto the image. It attempts to detect a face and human body if it exist in the image. This photo categorizer is a mobile application that will be using android-based as its platform. Thus, only user who is currently using and android smartphone will be able to use it.

The objectives for this developed project are to analyze how an application can categorize images based on face only and full body features and to design a mobile application that can determine if the image assigned is a face-only image or a full body image by implementing image processing technique. To evaluate the application in performing the image categorization into two different folders based on two categories which are a ‘face-only’ and a ‘full-body’ image is the last objective that need to be achieved in this project.

2 Literature

2.1 Face Detection

Detecting a face is sure does simpler than recognizing a face of a specific person. In order to be able to determine that a certain picture contains a face, it needs to be able to define the general structure of a face. Luckily, human faces do not greatly differ from each other; and all of these compose the general structure of a face which are noses, eyes, foreheads, chins and mouths (Arubas, 2013)

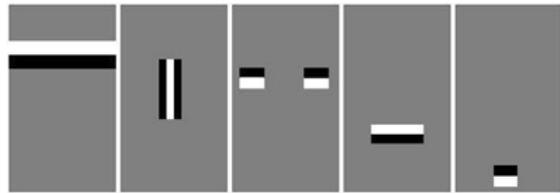


Figure 1 Five Representation of Human Faces (Arubas, 2013)

After determining if each of these features is similar to some part of the particular picture, it can be conclude that either the picture contains a face or not. Notice that this does not have to be an accurate match. Roughly, user has to acknowledge that each of these features corresponds to some part of the image (Arubas, 2013)



Figure 2 How Viola-Jones Method Detecting Face (Arubas, 2013)

These scalar numbers form an over complete feature set for the intrinsically low-dimensional face pattern. A feature is a scalar calculated by summing up the pixels in the white region and subtracting those in the dark region (M.-H. Yang, 2002)

2.2 Human Body Detection

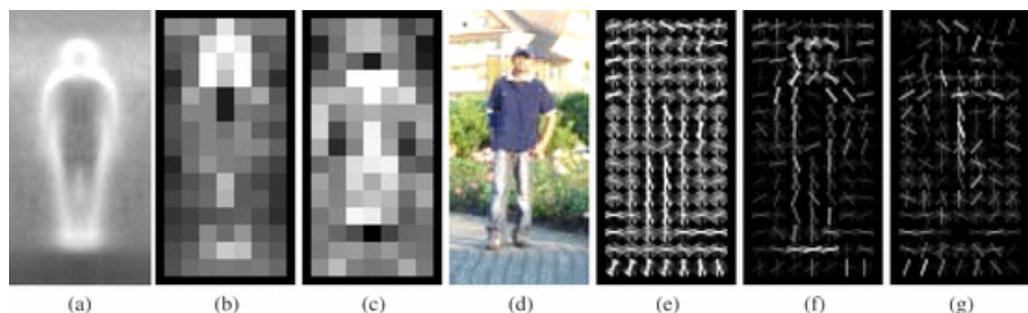


Figure 3 HOG Detector Applied (Dalal et al.,2005)

Figure above shown the images taken from Dalal et al.(2005) when the HOG Detector applied onto the image. The HOG Detectors cue mainly on silhouette contours

(especially the head, shoulders and feet). The most active blocks are centred on the image background just outside the contour.

Research by Dalal et al.(2005), shown that using locally normalized histogram of gradient orientations features similar to SIFT descriptors in a dense overlapping grid gives very good results for person detection, reducing false positive rates by more than an order of magnitude relative to the best Haar wavelet based detector. The influence of various descriptor parameters and concluded that fine-scale gradients, fine orientation binning, relatively coarse spatial binning, and high-quality local contrast normalization in overlapping descriptor blocks are all important for good performance.

All of the above discussed techniques were applied in this project as it is supported by the use of OpenCV library and Google Vision API.

3 Methodology

The Figure illustrates three main segments to guide this project on its design and development cycles.

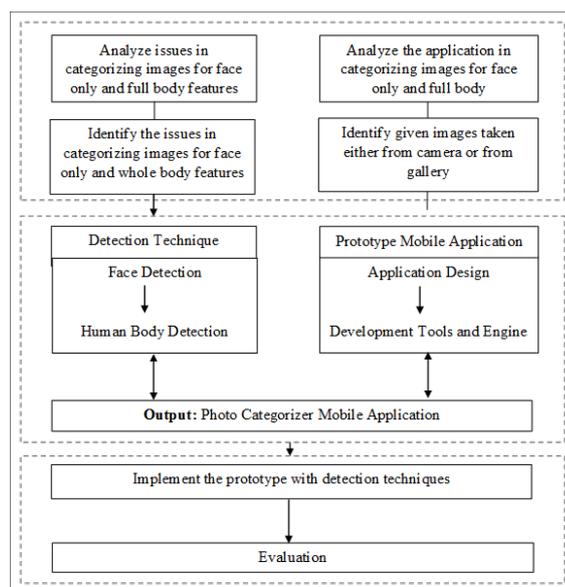


Figure 4 Project Methodology

In order to construct an application that can categorize two type of images which are face only an full body type of image, face detection and human body detection techniques need to be included in the development. Several phases of project development are planned which are:

Phase 1. Preliminary investigation and data collection of detection technique for photo categorizer mobile application.

In this phase, project will be focused on exploring prior approaches of the image processing techniques that provide for face detection and human body detection that can be used to categorize the two type of images that are face only and full body. Moreover, the

face detection and human body detection can be applied onto the image to gain precise information and improve the application itself to categorize the image.

Phase 2. Design the well-suited detection technique for the mobile application

Based on the information explored and gathered in the previous phase, a design phase of detection technique, effectively help to overcome the problem addressed in categorizing image into two different type of image. The main challenge in detection technique is that to ensure that both the face detection technique and human body detection technique is well functioned and successfully applied to categorize the image.

Phase 3. Develop Photo Categorization Mobile Application

After the design phase is completed, the frameworks of the photo categorization mobile application included with the detection technique can be prototyped. The prototype applies face detection and human body technique is being developed in this phase.

Phase 4. Implement detection technique with the Photo Categorizer Mobile Application

After the development phase is completed, the detection techniques is implemented in the application. The face detection technique will be the first to be implemented to make sure that the detection is well functioned and can detect the face in the image. After that, the human body detection technique is implemented on the same assigned image to detect if there is human body in it.

Phase 5. Testing and evaluation

This phase will test and evaluate the mobile application to categorize the image for two different type of image using face detection and human body detection technique. This will include comparison with other techniques and packages as well as making additional improvement if needed.

4 Implementation

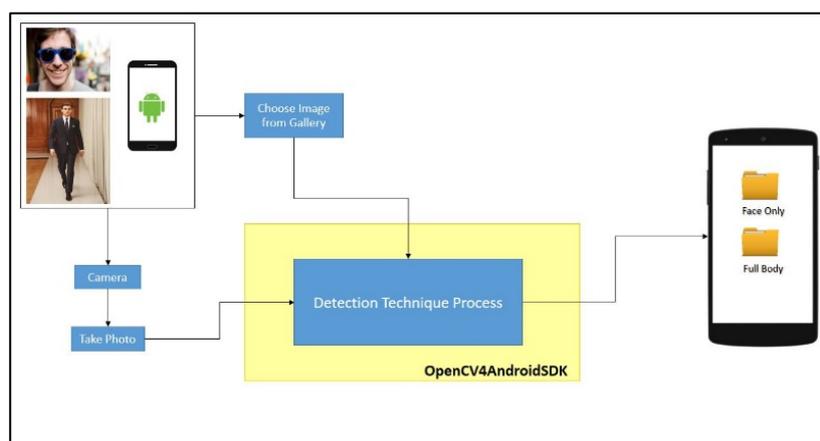


Figure 5 Framework Flow

Figure 5 above presented the full framework flow for this Photo Categorizer Mobile Application.

From the framework flow, the assigned image which will be analyzed and saved can come from two different source. The first source is from the camera. This is where user will need to take a photo and confirmed it to proceed for the analyzing part. Next, the assigned image also can be chosen from the phone gallery. This means the existing photos in the phone can also be used for the detection instead of taken a new one.

After an image has been assigned, the image will go through two detection part to analyze whether the image is a face only image or a full body image. Face detection will take place first, and extracting the feature of the face to obtain the detection area. Whether the face exist or not in the image, it will still proceed to apply the body detection onto the image. During the human body detection, the application will study the details of the image to prove the existence of a body in the image.

The features extracted from both detection technique applied will then be used to categorize the image. An image will be stored according to their respective folder based on the categorize result. The result will be decided by the existence of the face or the human body in the assigned image. User now can view the successfully saved and sorted image in their external storage with folder labelled as 'Face Only' and 'Full Body'.

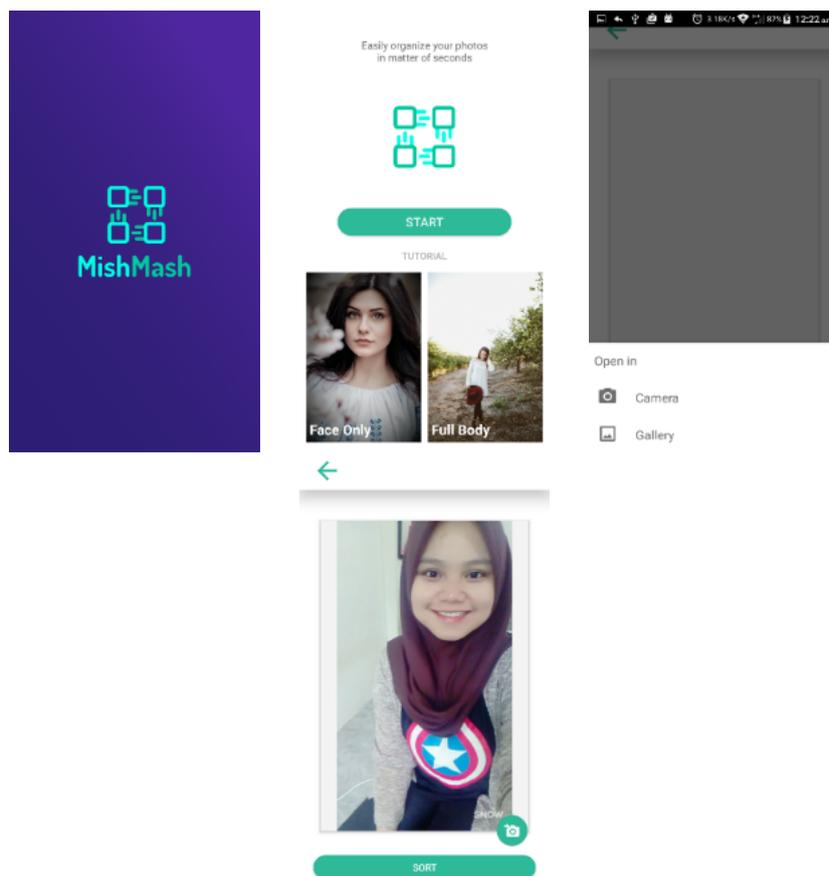


Figure 6 User Interface Design

5 Result

5.1 Face Detection Result

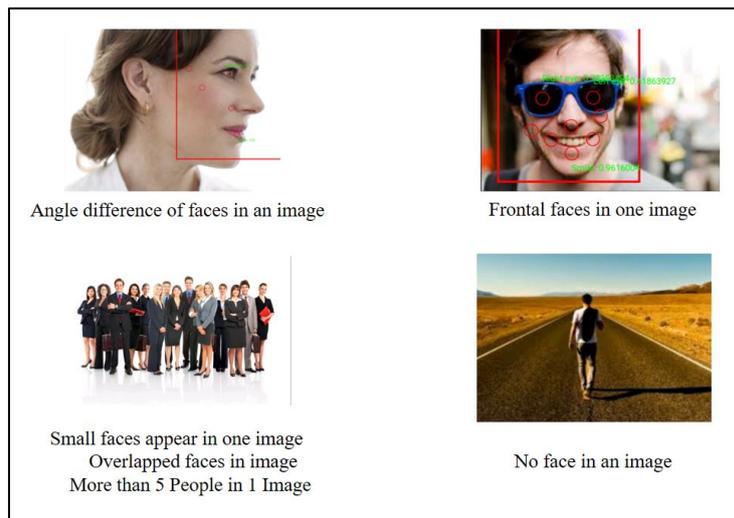


Figure 7 Face Detection Result

Face detection can be performed well if the image are frontal face or angle different of face in an image. If the face in the image appear to be small or overlapped with other people faces, the face detection having trouble to detect the existence of the face in the image. Furthermore, if there are more than 5 people in one image, the face also cannot be detected as the face may appear to be too small to be able for the application to detect it. The application also able to identify some human body image as image that do not have face in it.

5.2 Human Body Detection Result

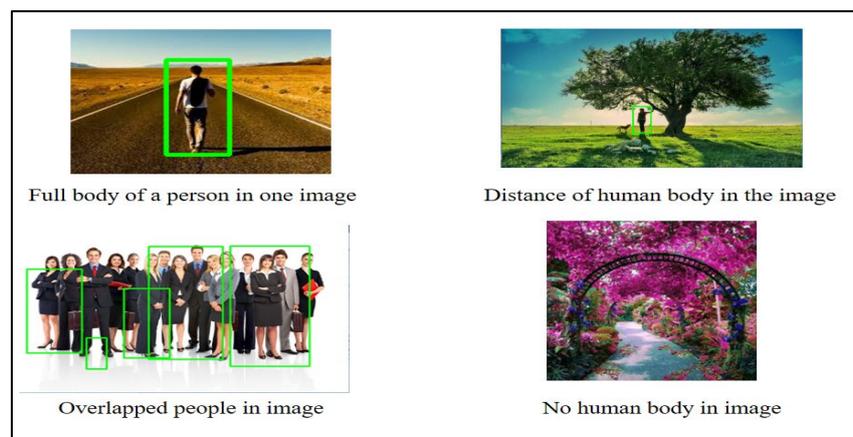


Figure 8 Human Body Detection Result

Result for human body detection testing on different type of image. To conclude, it is obvious that human body detection can detect human body in almost all type of image as long as the image consists of human body in it. However, the position of the colored rectangle which visualize the area of the detected human body in the image are quite messed up. Despite it can detect human body in any type of image, we know that this method is still accurate as it did not detect any human body in an image that do not have human body in it.

6 Conclusion

In conclusion, all the studies for this project have been implemented and all the objectives have been achieved. A photo categorizer mobile application is successfully developed. Eventhough this system has some limitations, this can be improve in the future works with sufficient resources.

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