

# A Mobile Tool for Photo Editing of Special Effects

Cheng-Chieh Chiang

Department of Information Technology, Takming University of Science and Technology, No.56, Sec.1, Huanshan Rd.,  
Neihu District, Taipei, Taiwan

kevin@csie.ntnu.edu.tw

## ABSTRACT

In recent the smart phone has been widely used to deeply affect our life. Due to different sensors and devices mounted in a smart phone, more and more novel functions are developed to serve people. Camera that is one of the most popular devices in smart phone can help users to capture images and videos in life anytime and anywhere. This paper aims to design an application in smart phone to allow users easily editing their photos. This system contains several templates of special effects that can modify the user photos directly. That is to say, users can employ different templates to their photos to get corresponding special effects. We present the overall of this system, and then describe the details of the templates of special effects of this application in this paper.

**Keywords:** Smart Phone, Mobile Application, Camera, Special Effects, and Digital Image Processing.

## 1. INTRODUCTION

Due to the rapid growth of mobile/smart phones, people have paid more attention to discovering some interesting applications in phone either in google Android [2] or in Apple iOS [10]. A smart phone often supplies different devices, such as camera, accelerometer, barometer, and three-axis gyro, to support advanced functions for applications. Camera that is one of the most popular devices in smart phones can help users to capture images and videos in life anytime and anywhere. Hence, many applications of cameras have been developed in Google Play [8] and Apple Store [3].

Now people can capture photos or videos conveniently by use of their smart phones. Unfortunately, people do not always have good technologies to take excellent photos. An intuitive idea to improve bad photos is to edit them in desktop or laptop computer using photograph tools such as Photoshop. Obviously, this idea cannot be useful for most of people who may not be familiar with computer. Hence, many applications for photo editing in smart phone have been developed [4][11] to serve people easily refine their photos. When users take photos in their smart phone, they can import

these pictures into an editing application to modify them directly.

This paper aims to present our effort that designs a mobile application to allow users easily editing their photos in smart phone by applying a photo to an existed template of special effects. That is to say, our proposed application can capture images in a smart phone and then edit the photo styles according to the special effect selected by the user. We design several special effects of digital images as module templates in our system. Users can employ these templates to preview and change their photos.

The templates of special effects in our application are designed according to algorithms of digital image processing. All functions are implemented by Java (using Eclipse [5]) such that our application can be appropriate for the Android system. Hence the proposed application only has the Android version, and will extend to the iOS system in the future.

The rest of this paper is organized as the follows. Section 2 presents several works related to our proposed system. Section 3 discusses the details of the special effects that are provided as templates in our system. Then, the system implementation is shown in Section 4 in details. Finally, we draw our conclusions of this paper and provide possible directions for extension in Section 5.

## 2. RELATED WORKS

Digital image processing contains a wide range of technologies that can edit the contents of images. In market many applications provide different kinds of editing functions for digital functions; for example Photoshop [1] is one of the most famous. The editing function for digital image is called "Filter" in Photoshop. Users can easily achieve special effects for a digital image in Photoshop by employing a specific Filter.

Photoshop is a big system in computer. People have paid attention to developing similar but light systems in mobile phone. Instagram [9] is a leading system of



image and video editing in either iOS or Android. Many kinds of editing functions are included in Instagram. Indeed, users of Instagram can join the official social network to share their photos and videos.

Many mobile applications can be found to edit photos or videos in smart phone. Here we illustrate two interesting applications: PIP Camera [11] and Art Collage [4]. PIP Camera is designed for making user photos extra fun with creative shots. Several templates have been provided in PIP Camera to auto generate picture-in-picture mode, two examples show as Fig. 1. Users can make interesting photos by PIP Camera and then upload them to other social networks such as Facebook [6] and Instagram [9].

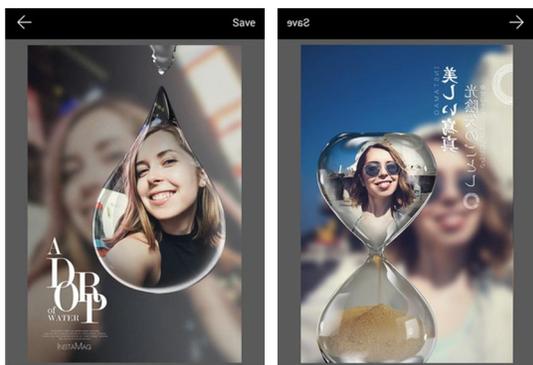


Fig. 1. Two photo examples of PIP Camera, given from the official website.

People often capture many photos in their smart phone, but, unfortunately, hard to browse interesting ones in hundred photos. Art Collage [4] can take user photos into a whole view by collaging. There are more than 70 creative collage templates in this Application. Fig. 2 shows an example of photo collection as well as their templates.

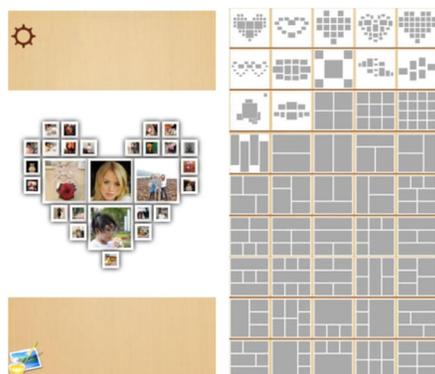


Fig. 2. Art Collage. Left: an example of photo collection; Right: a list of templates; given from the official website.

### 3. SYSTEM OVERVIEW

Fig. 3 draws the overall flowchart of our proposed system. When the users start this application, the first task is to import a picture for editing, mainly including taking a photo by camera, selecting a picture from an existed album, and getting an image file in local storage. Next, a template of special effects should be determined for this photo editing. This system provides several kinds of templates of special effects to users. The users can preview the editing result of this photo by applying the selected template. If this editing result is confirmed, the users can export the new image into another position in either album or local storage.

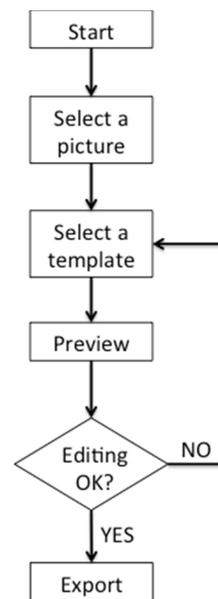


Fig. 3 The overall flowchart of our proposed system.

This system is designed as simple but useful for users. Pictures that users try to edit can be selected from photos in the smart phone. Also, it is not necessary for users to understand any complex operations of image processing. Instead, they need only to select a specific type of special effect to edit/preview the pictures. Any edited picture can be stored as a new picture in the smart phone. Note that this application can work only in the Android in the current version.

### 4. SYSTEM IMPLEMENTATION

Digital image processing includes many techniques that can modify the contents either in image or in video with special effects by applying specific algorithms. Our proposed system implements several useful algorithms of image processing as templates that can fast apply

specific special effects to a picture in smart phone. This section introduces our implementation and shows the functions of the proposed system.

When this application is launched, the first task is to select a picture to edit. The system will ask the user (in Fig. 4(a)) for the authorization of using existed albums if the user wants to import a picture, or the mounted camera is enabled (in Fig. 4(b)) if the user wants to take a photo for editing. Getting a picture, the user can edit it with the pre-designed templates.

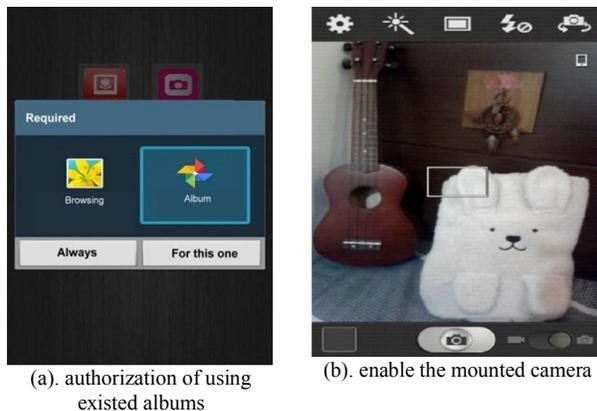


Fig. 4. Pictures can be selected in an existed album or taken by the mounted camera.

This system provides some templates for special effects including grey image, binary image, embossment, old style, rotation, and direct editing with saturation, luminance, and contrast. The details are described in the follows.

#### 4.1 Grey Image

Although this world is colorful, a grey photo can still present a special style either in scene or in human. The transformation from color to grey image is simple: each grey pixel can be averaged by the three channels (RGB) of the corresponding color pixel. The effect of grey image is shown in Fig. 5.

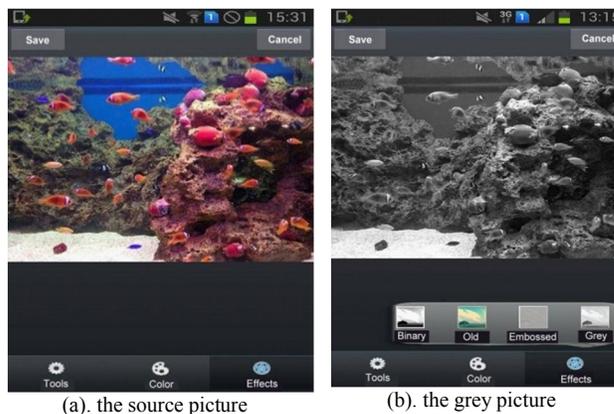


Fig. 5. The effect of the grey image.

#### 4.2 Binary Image

Binary image can be viewed as a special case of grey image. In a binary image, each pixel can only be 0 (as white) or 255 (as black). That is to say, there are only white and black in a binary image. In general, a binary image is transformed by a grey image by deciding 0 or 1 for each pixel. The simplest way to determine the binary values of pixels is to choose a threshold for the grey image. Fig. 6 illustrates an example for the binary image.

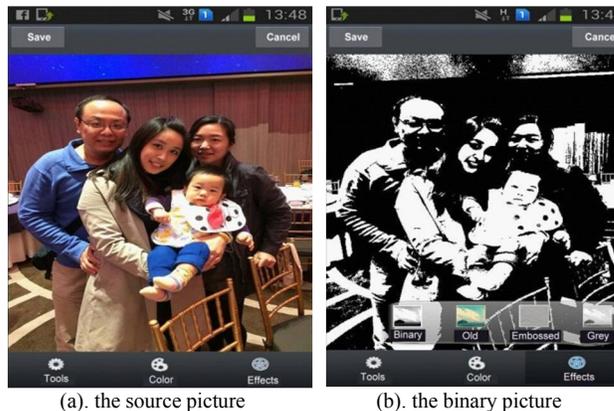


Fig. 6. The effect of the binary image.

### 4.3 Embossment

Embossment is an interesting style in special effects. Basically, we can perform a method of edge detection, e.g., Canny edge detector [7], to depict contours of objects and then enhance the object areas in image. An image with the embossment is grey. An example of embossment is given in Fig. 7.



Fig. 7. The effect of the embossment.

### 4.4 Old Style

The old style of image is to change the whole presentation by changing the color hue and the saturation. In implementation, we first transform the RGB channels of image to the HSV space. Then, the hue and saturation are tuned by a fixed percentage. Finally the image is converted to the RGB space to achieve the old style in presentation. Fig. 8 illustrates an example of old style of image.

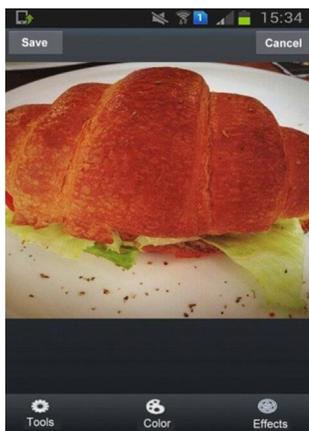


Fig. 8. The effect of the old style.

### 4.5 Rotation

Rotation is an important function that can allow users take their photos without the limitation of camera orientation. An example of photo rotation is shown in Fig. 9.

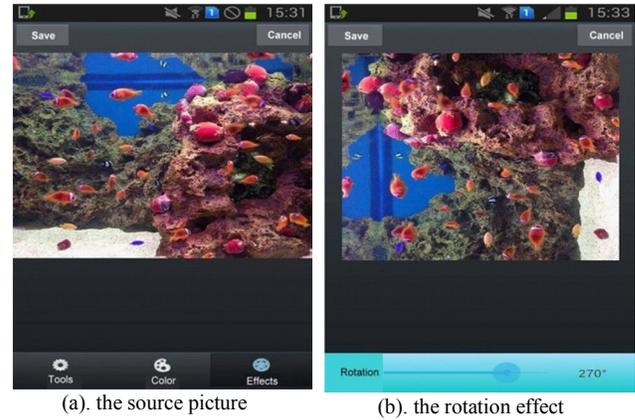


Fig. 9. The effect of the rotation.

### 4.6 Editing with Saturation, Luminance, and Contrast

Besides these templates that have been mentioned above, we also provide a simple tool that allow users directly editing the saturation, luminance, and contrast in picture. Also, users can preview the results in this editing form before they save the results.

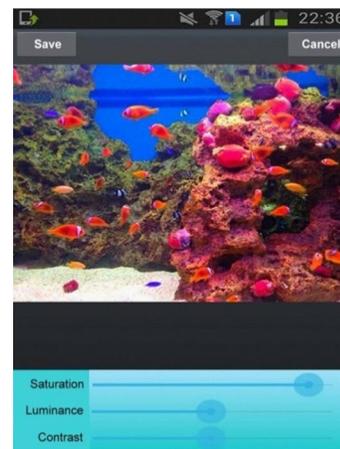


Fig. 10. Editing of the saturation, luminance, and contrast.

## 5. CONCLUSIONS

This paper presents our effort to design a mobile application that can allow users easily editing their photos in smart phone by applying a photo to an existed template of special effects. We describe the implementation of this system such as the details of the templates in this paper. Two main directions can be considered to extend this work. First, we still plan more templates in this system such to provide more effects of photos. Second, we hope to design an iOS version of this system. Another minor plan is to refine the user interface that can more fit human intuition.

## REFERENCES

- [1] Adobe Photoshop family, <http://www.adobe.com/products/photoshopfamily.html>
- [2] Android, <https://www.android.com/>
- [3] Apple, <https://www.apple.com/>
- [4] Art Collage, <https://itunes.apple.com/tw/app/art-collage-free/id685405266?mt=8>
- [5] Eclipse, <https://eclipse.org/>
- [6] Facebook, <https://www.facebook.com/>
- [7] R. C. Gonzalez and R. E. Woods, Digital Image Processing, 3rd Edition, Prentice Hall, 2007.
- [8] Google Play, <https://play.google.com/store>
- [9] Instagram, <https://instagram.com/>
- [10] iOS, <http://www.apple.com/tw/ios/>
- [11] PIP Camera, <https://itunes.apple.com/tw/app/pip-camera-selfie-cam-photo/id521922264?mt=8>

## AUTHOR PROFILES:

**Cheng-Chieh Chiang** received a Ph.D. degree in Computer Science from National Taiwan Normal University, Taipei, Taiwan, in 2007. He is currently an Assistant Professor at the Department of Information Technology, Tamkang University of Science and Technology, Taipei, Taiwan. His research interests include multimedia system, pattern recognition, and computer vision.

