CSC320 Report

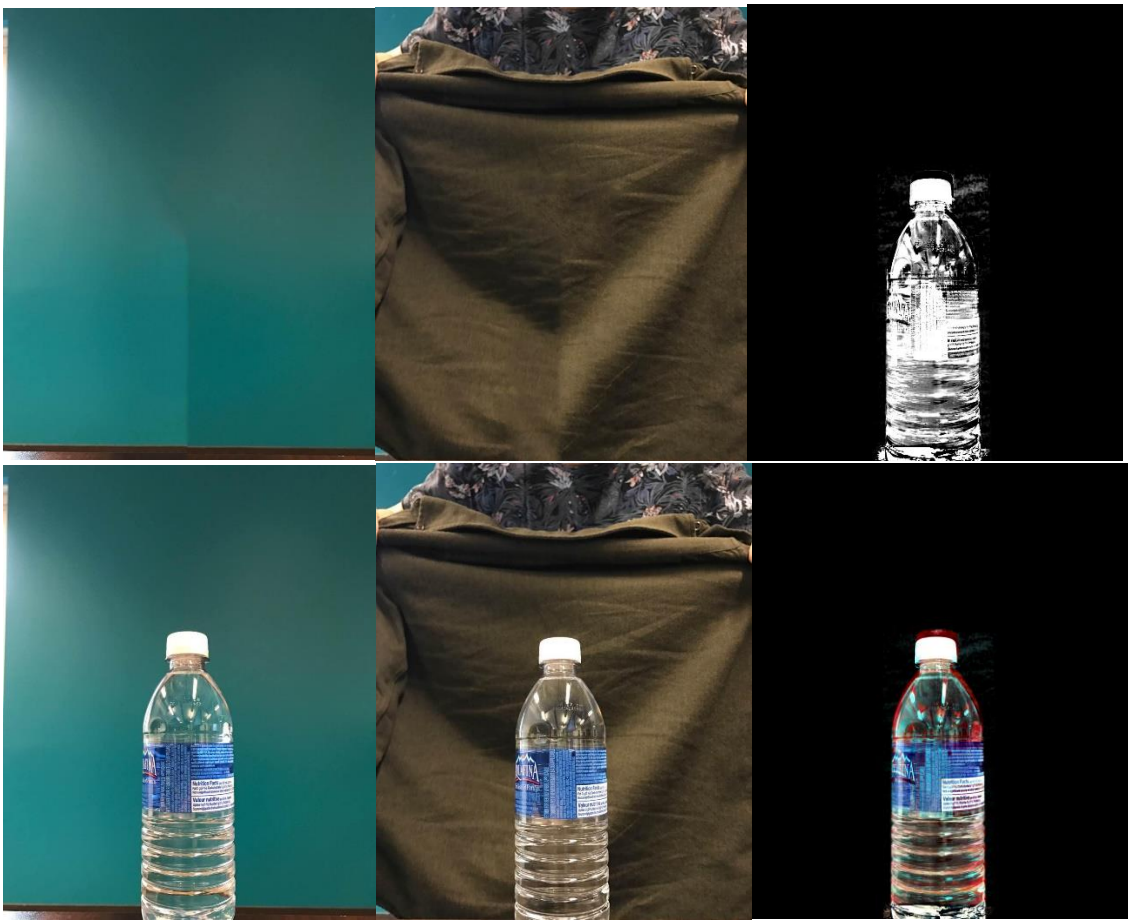
Part 3 Experimental evaluation and report

Based on my implementation of triangulation matting equation, I got several sets of photos showing the triangulation matting technique with different conditions. Some of them looks successful while others are not. I would explain details of each set of pictures following.

Picture Set 1: Bottle
Foreground Object: Bottle as the foreground object have two properties – translucent and light reflection. It is interesting to explore how the techniques work on this kind of materials
Environment: BA's computer lab

Notice: Since this is the first set of image, in order to test if my function works right or not, I photoshoped the background pictures to be the same as composed one (Just took the object out). It would only be applied in this set.

Picture Set:

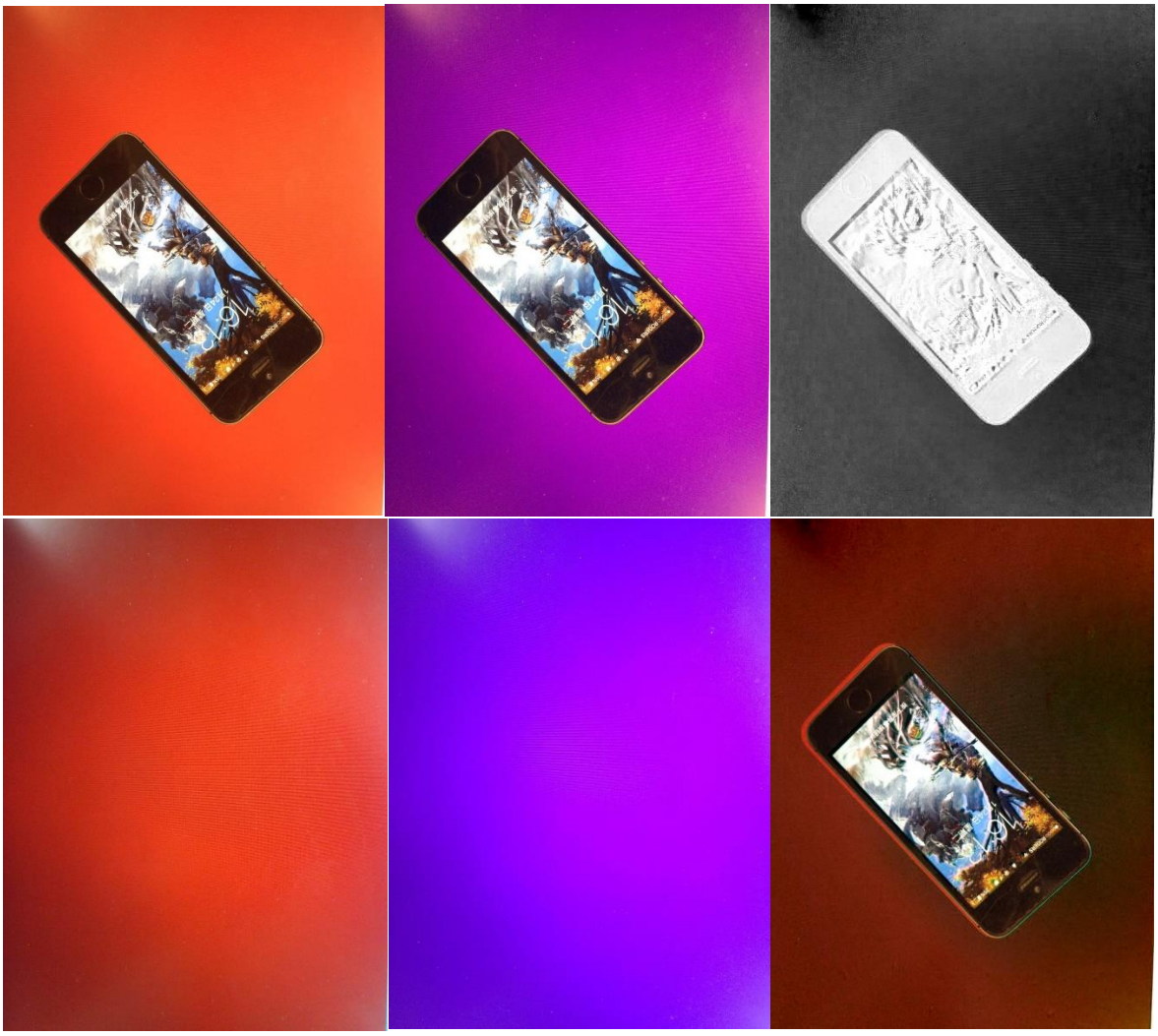


Procedure: The pictures are taken by iPhone 5s with normal setting.

Analysis: First of all, this is a successful attempt. The final result looks decent. This is partially because we use photoshop to keep the background exactly the same as foreground. As a result, the alpha image has a very nice background (because they have same RGB value in most pixels). The final composite pictures show the object's translucent property as we can see the handrail's pillar behind the bottle. The wired part is that the bottle appears to be "red" at some part of the edge. The reason is there are still some differences between the front object from two pictures. This lead to the unwanted values of the RGB value of those parts. Moreover, this technique cannot handle light reflection. It regards the bottle's light reflection as part of its own nature. The point would be further verified with other sets of pictures.

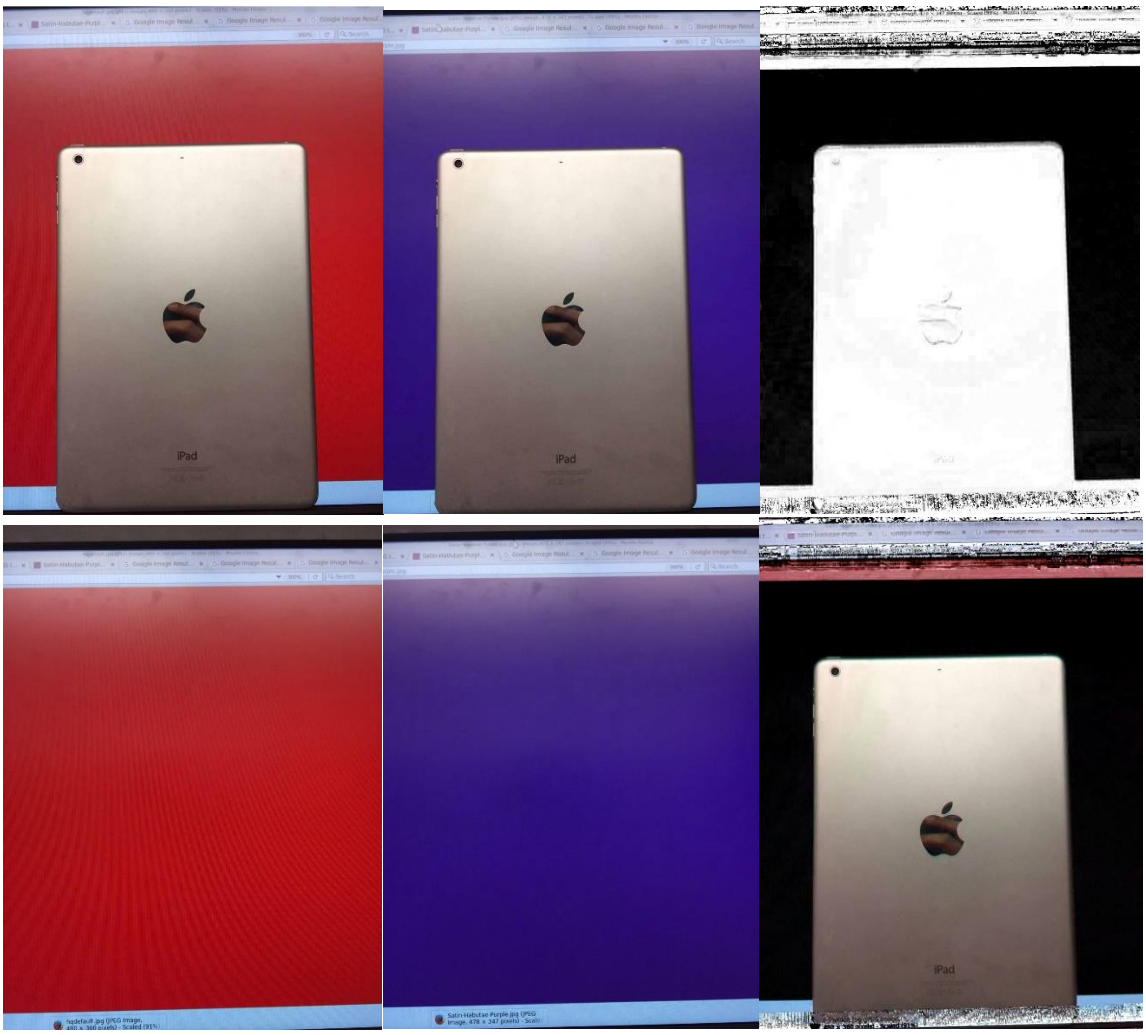
Picture Set 2: phone
Foreground Object: iPhone – a foreground
Environment: at my home with different light condition

Picture Set:



Procedure: The pictures are taken by iPhone 5s with normal setting, the light's position is changed between shooting composite pictures and background pictures
Analysis: Since there are some differences between light condition, the background pictures do not look the same as background in foreground picture. In the equation we subtract the composite image to background image, the difference in color would lead to some non-zero value and be carried to the foreground image. This is why the final result have a "red filter" left in background.

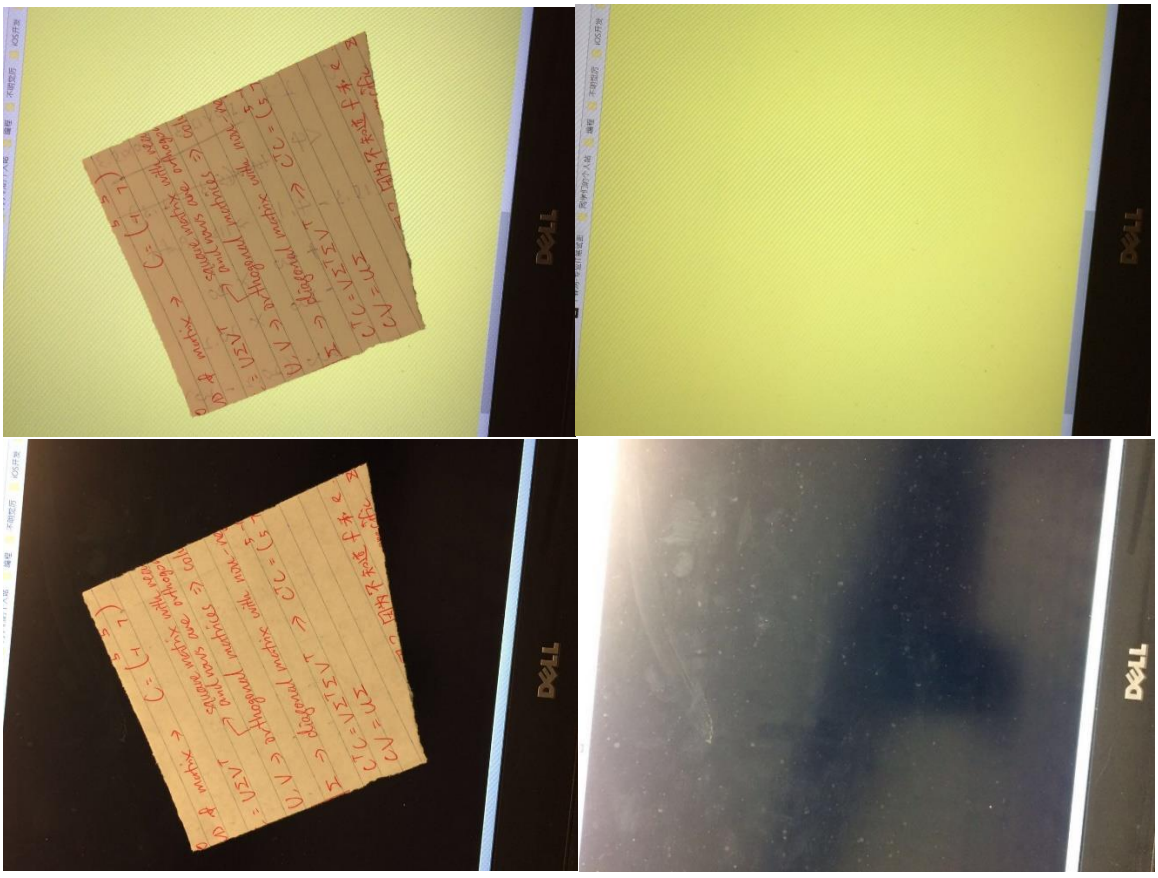
Picture Set 3: iPad's back side
Foreground Object: iPad's backside has the texture of metal. It is interesting to show how the light reflection would be dealt.
Environment: at BA's lab, normal setting
Picture Set:

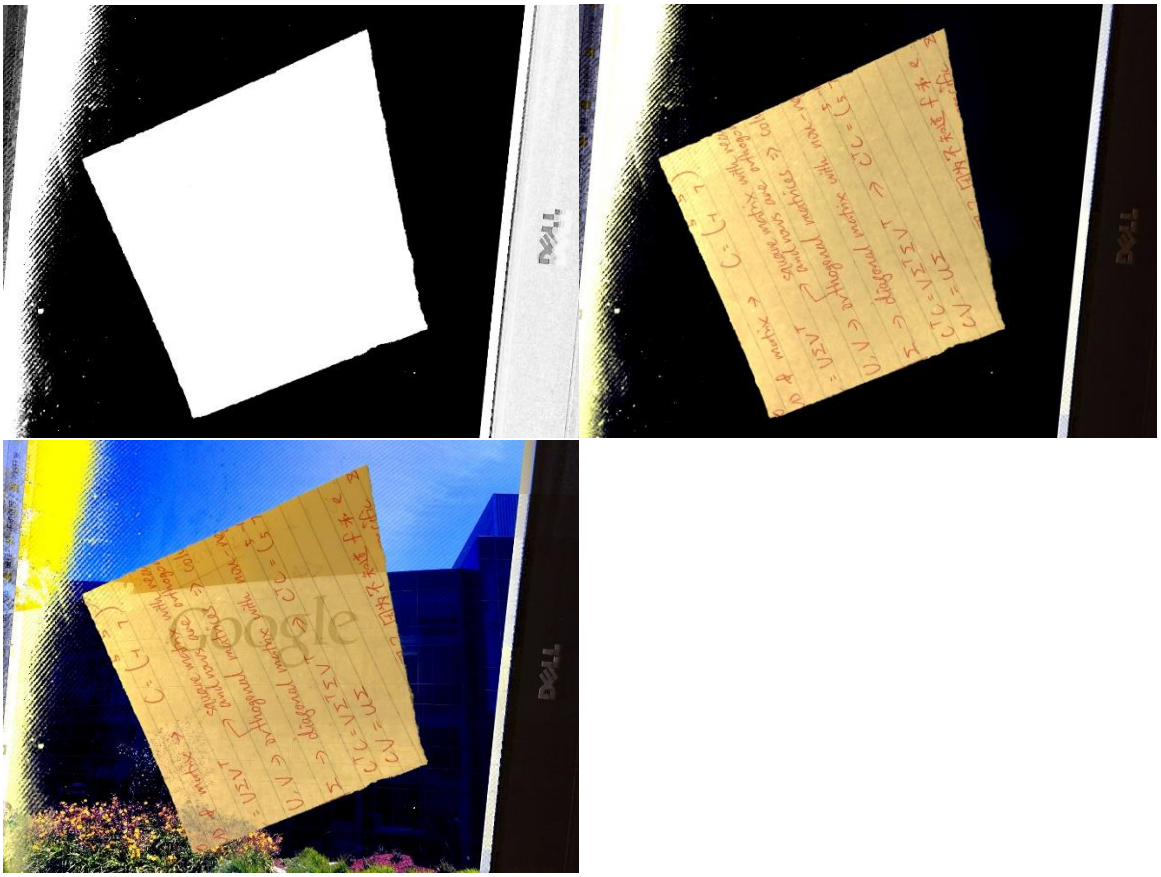


Procedure: The pictures are taken by iPhone 5s with normal setting. The object is placed on a computer screen with different background colors

Analysis: In terms of the foreground object, it is a successful matting as for most part it looks pretty decent. However, the top and bottom of final result is in a mess. Clearly the reason is that the top and bottom parts are not in constant background color. When calculating the alpha the different background pixels cannot be subtracted to zero which leave the original picture's pattern. Moreover, it regards my hands holding the phone

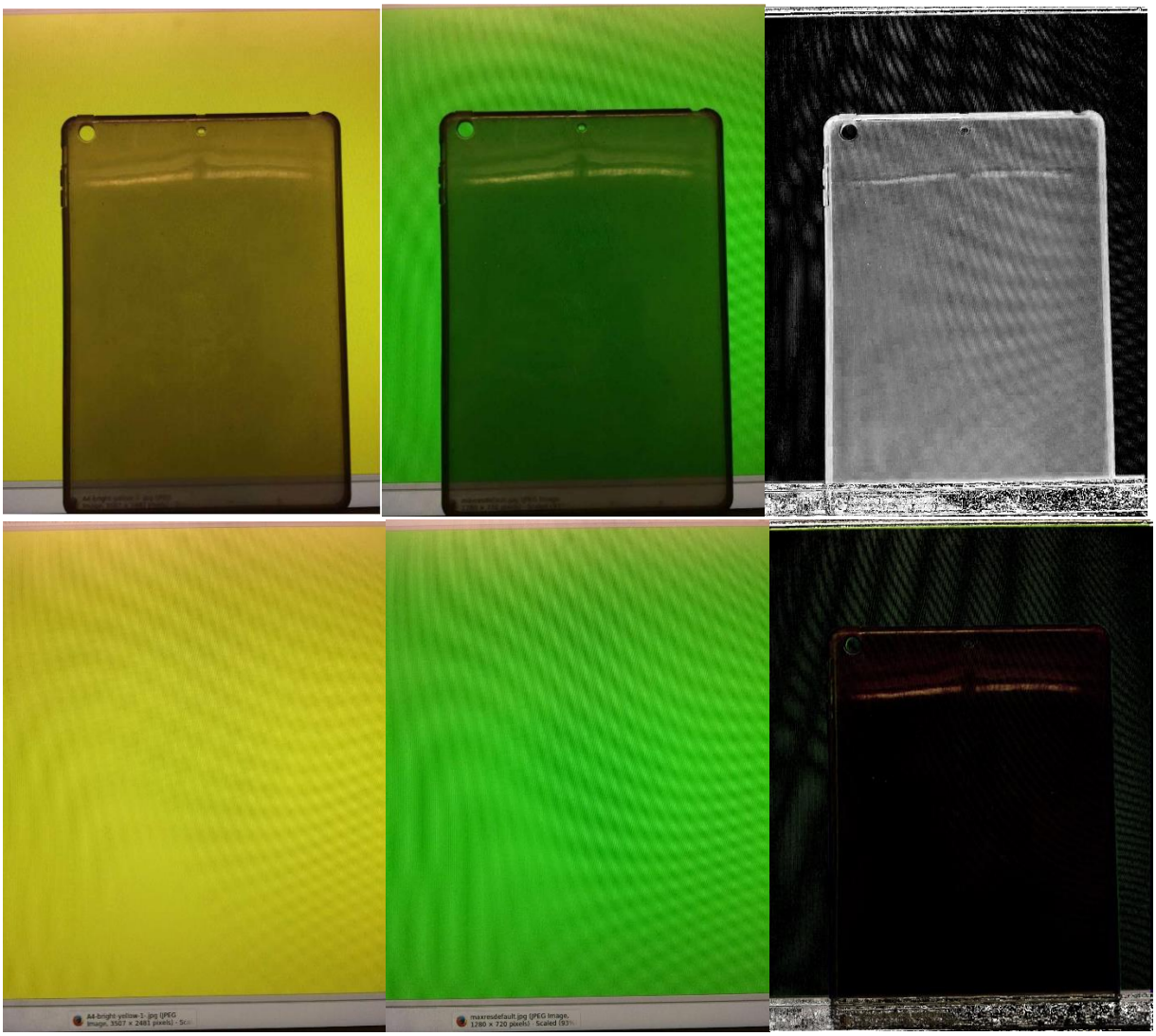
Picture Set 4: paper with words
Foreground Object: a paper full of words. I want to see how triangulating matting works on foreground object full of details and to check if the words are still read
Environment: at my home
Picture Set:





Procedure: The pictures are taken by iPhone 5s with normal setting. The object is placed on a computer screen with different background colors. However, I forgot to lock the focus when taking the black screen background picture.
Analysis: The camera automatically changes the focus and color for that background image. This makes the background darker than it should be. The most interesting observation in this picture set is that the paper is actually translucent, this property can hardly be recognized if we simply look at the paper, but it turns out to be very obvious by viewing the final result. The google's logo could be found behind the paper.

Picture Set 5: iPad cover
Foreground Object: iPad cover with its own color/ some light reflection and translucent property
Environment: at BA's lab
Picture Set:



Procedure: The pictures are taken by iPhone 5s with normal setting
Analysis: This is more like a combination of former experiments. The overall quality looks good. The final result reflects the ipad cover's own color and its translucent property fairly well. However, the color is a bit twisted. I guess without perfectly taking the foreground and background picture, it is hard to restore its original color, there might be some subtle color difference due to the difference in calculation.

Overall analysis:

Limits:

- Triangulating matting equation would regard some light reflections and mirrored image as the object's own property, so if you try to matte a mirror, the result would not be good since it carries what showed on mirror.

- Triangulating matting equation does not bear any subtle difference in input pictures. In terms of the foreground, the position of foreground object in two pictures must be exactly the same, otherwise it would lead to color change on edge. In terms of background, it must only contain monochrome. Otherwise the background picture would be carried to alpha and color image.

Strength:

- Triangulating matting equation could handle different textures very well.
- Triangulating matting equation could deal with different level of transparency from bottle to paper pretty good.
- Triangulating matting equation does not have any limit in terms of foreground object's color

Part 4 Written question

The main reason is the direction of light and its shadow. In our assumption, the background picture should be exactly the same as the foreground one except lacking the foreground object. However it is not true because by removing the object we also remove the shadow of that object caused by light. This leads to the change of background on vase's left. The composed pictures would have a lower brightness rather than background picture at that part. Thus, the alpha picture calculated by subtraction do not have a value of 0.