

Trigulation Matting Report

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To explain as simple, the core idea of triangulation matting technique is that extracting foreground from background by using 2 kinds of image, but each image should have one background like example below



BackgroundImg01.jpg BackgroundImg02.jpg Compositelmg01.jpg Compositelmg02.jpg NewBackground01.jpg

To do this. We have to find matting the foreground image first. We find RGB of each pixel of each images assume that we declare as **back** variable, and find the delta each pixel between composite image and background image as **deltaCompAndBg** variable, then group into another array.

```
compAr, compAg, compAb = compA[:, :, 0], compA[:, :, 1], compA[:, :, 2]
compBr, compBg, compBb = compB[:, :, 0], compB[:, :, 1], compB[:, :, 2]
backAr, backAg, backAb = backA[:, :, 0], backA[:, :, 1], backA[:, :, 2]
backBr, backBg, backBb = backB[:, :, 0], backB[:, :, 1], backB[:, :, 2]
```

(Find RGB of each image)

```
for i in range(img_shape[0]):
    for j in range(img_shape[1]):
        back = np.array([
            [backAr[i, j], [backAg[i, j], [backAb[i, j],
            [backBr[i, j], [backBg[i, j], [backBb[i, j]]
        ])
        deltaCompAndBg = np.array([
            [compAr[i, j] - backAr[i, j], [compAg[i, j] - backAg[i, j], [compAb[i, j] - backAb[i, j],
            [compBr[i, j] - backBr[i, j], [compBg[i, j] - backBg[i, j], [compBb[i, j] - backBb[i, j]]
        ])
```

(Combine background and delta each pixel as array)

Next, we multiply -1 to **back** matrix and combine it to 9x3 identified matrix. Later, we solve this matrix to get the initial color and multiply it by **deltaComAndBg**. We will get the foreground image if its value more than 0, we can know this by using np.clip to find the value in interval that we define. From **deltaComAndBg**, we can know more the alpha of each pixel of image as well, then we return two values foreground and alpha.

It's that clear?

Later, easy part is a composing foreground to a new-background. From alpha that we receive from finding matting image, we use alpha to multiply a new-background each pixel of them, then we will know that what points (x,y) of images will be replaced by foreground. For the formula is

$$\text{NewBackground} * (1 - \alpha)$$

Finally, combine new-background with a foreground. That's it!!!

