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Section : 1

Triangulation Matting Project

Read all 4 images

```
bg1 = imread('bg1.png');  
bg2 = imread('bg2.png');  
fg1 = imread('fg1.png');  
fg2 = imread('fg2.png');
```

Display all 4 images

```
montage({bg1,bg2,fg1,fg2})
```



Convert to double

```
Dbg1 = double(imread("bg1.png")) / 255.0;  
Dbg2 = double(imread("bg2.png")) / 255.0;  
Dfg1 = double(imread("fg1.png")) / 255.0;  
Dfg2 = double(imread("fg2.png")) / 255.0;
```

Compute alpha

```
%{  
Alpha = 1 - (Numerator ./ Denominator)  
Numerator = (Rfg1-Rfg2)(Rbg1-Rbg2) + (Gfg1-Gfg2)(Gbg1-Gbg2) + (Bfg1-Bfg2)(Bbg1-Bbg2)  
Denominator = (Rbg1-Rbg2)^2 + (Gbg1-Gbg2)^2 + (Bbg1-Bbg2)^2  
%}  
  
Numerator = (((Dfg1(:,:,1)) - (Dfg2(:,:,1)))) .* ((Dbg1(:,:,1)) - (Dbg2(:,:,1)))) + (((Dfg1(:,:,2)) - (Dfg2(:,:,2)))) .* ((Dbg1(:,:,2)) - (Dbg2(:,:,2)))) + (((Dfg1(:,:,3)) - (Dfg2(:,:,3)))) .* ((Dbg1(:,:,3)) - (Dbg2(:,:,3))))  
Denominator = ((Dbg1(:,:,1)) - (Dbg2(:,:,1)))^2 + ((Dbg1(:,:,2)) - (Dbg2(:,:,2)))^2 + ((Dbg1(:,:,3)) - (Dbg2(:,:,3)))^2  
Alpha = 1 - (Numerator ./ Denominator)
```

```
Alpha = 720x876  
    0    0    0    0    0    0    0    0    0    0    0    0    0 ...  
    0    0    0    0    0    0    0    0    0    0    0    0    0  
    0    0    0    0    0    0    0    0    0    0    0    0    0  
    0    0    0    0    0    0    0    0    0    0    0    0    0  
    0    0    0    0    0    0    0    0    0    0    0    0    0  
    0    0    0    0    0    0    0    0    0    0    0    0    0  
    0    0    0    0    0    0    0    0    0    0    0    0    0  
    0    0    0    0    0    0    0    0    0    0    0    0    0  
    0    0    0    0    0    0    0    0    0    0    0    0    0  
    ⋮  
    ⋮
```

Compute foreground colors of object from background 1

```
foreground1 = (Dfg1 - ((1 - Alpha) .* Dbg1)) ./ Alpha
```

```
foreground1 =  
foreground1(:,:,1) =  
  
    1.0e+03 *  
    NaN    NaN    NaN    NaN    NaN    NaN    NaN    NaN    NaN    NaN  
    ⋮  
    ⋮
```

Compute foreground colors of object from background 2

```
foreground2 = (Dfg2 - ((1 - Alpha) .* Dbg2)) ./ Alpha
```

```
foreground2 =
```

```
foreground2(:,:,1) =
```

```
NaN NaN NaN NaN NaN NaN NaN NaN NaN NaN
⋮
```

Display the extracted foreground object / matte from background 1 and 2

```
imshow([foreground1,foreground2])
```



Perform the composition of extracted foreground object from background 1 and 2 with the new WHITE background image

```
new_bg = double(imread('new_bg1.png')) / 255.0;
[row, col, colorChannel] = size(Dbgl);
WhiteImg = ones(row, col, colorChannel, 'double');

imwrite(foreground1, 'White.png');
foreground1 = im2double(imread('White.png'));
WhiteBG1 = (Alpha .* foreground1) + ((1 - Alpha) .* WhiteImg);

imwrite(foreground2, 'White.png');
foreground2 = im2double(imread('White.png'));
```

```
WhiteBG2 = (Alpha .* foreground2) + ((1 - Alpha) .* WhiteImg);
```

Display the composition of extracted foreground object from background 1 and 2 with the new WHITE background image

```
imshow([WhiteBG1,WhiteBG2])
```



Read new background image to do the composition and display it.

```
NewComposite = double(imread('new_bg1.png')) / 255.0;  
imshow(NewComposite)
```



Perform the composition of extracted foreground object from background 1 and 2 with the new background image

```
imwrite(foreground1, 'NewComposite.png');  
foreground1 = im2double(imread('NewComposite.png'));  
NewImg1 = (Alpha .* foreground1) + ((1 - Alpha) .* NewComposite);  
  
imwrite(foreground2, 'NewComposite.png');  
foreground1 = im2double(imread('NewComposite.png'));  
NewImg2 = (Alpha .* foreground2) + ((1 - Alpha) .* NewComposite);
```

Display the composition of extracted foreground object from background 1 and 2 with the new background image

```
imshow([NewImg1, NewImg2])
```

