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ECE 332

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MP 4 Report

INTRODUCTION

In this MP, I used Histogram-based Skin Color Detection to separate the aimed segment in the given image ‘gun1’, ‘joy1’, ‘pointer1’. The hand in all images has been drawn out and other things’ get erased. I also tried Gaussian-based Color Segmentation and it refined the image by changing the threshold to a more detailed number.

CONTENTS

Train:

In this function, I first use a MouseDraw Function as specified in the MP4 file. In this case, I can use any image from online and use my mouse to draw a rectangle area as my detected training area. Here I attacked the input image I used as a training image.

test_image

And then RGB, N-RGB and HSI can be choosed. Different methods have different effects on the image. But basically they share the same algorithm. Go over each pixel of the selected image and match them to a 2D Histogram table Mask_t. In that table we can see the frequency each color appears.

Test:

Test function should be applied after the Train Function because we need to use Mask_t as training data. Likewise, RGB, N-RGB and HSI can be separately tested although they share the same algorithm. We go through every pixel of the test image and see if the coordinate of it is above the Histogram table Mask_t. And we can also set a threshold value to it or let it be 0.05 as default. The test result is different due to different threshold values.

Here is a comparison between threshold = 0.005 and threshold = 0.05.

I also used Gaussian-based Color Segmentation and the results show a difference when I change the threshold value. Just like shown above.

RESULT ANALYSIS

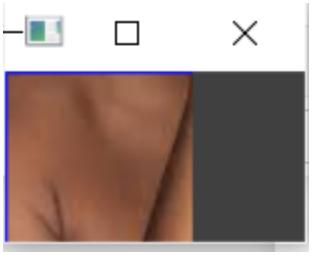
Different color space

During my test, I also used different color parts to train the data. And it shows a significant difference.

Here is my test image.

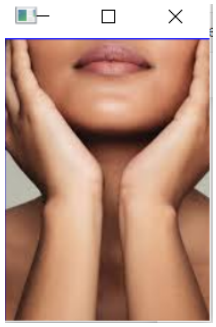
test_image

Firstly, I used the model's shoulder as an input image, since the shoulder is darker than other areas, the resulting image only shows the darker part of the hand.



gun1_HSI_0.005_part | gun1_N-RGB_0.005_part | gun1_RGB_0.005_part | joy1_HSI_0.005_part | joy1_N-RGB_0.005_part | joy1_RGB_0.005_part | pointer1_HSI_0.005_part | pointer1_N-RGB_0.005_part | pointer1_RGB_0.005_part

Then I used the model's face and hand area as input image, since the color of skin is more similar to the test case. **The result is better.**



Different Image Processing method:

Here's an example of threshold = 0.005 and color space = models face.

HSI is significantly better than the other two methods. RGB and N-RGB looks similar.