Experimental program Chroma Key

1. Idea

Input: two images of the same size, source image and background image.

Output: mixed image between source image and background image, in user-selected region.

Idea: Find regions of colour to split in the source image, two of the selected colour space should have the lowest and highest intensity in order to be easily separated. Replace old background with the new one.

2. Libraries

In our code, we import libraries

- cv2: library of Python is designed to solve CV problems. https://opencv.org/releases/
- numpy: package for scientific computing with Python. https://numpy.org/
- PIL: as known as pillow, Python Imaging Library. https://pypi.org/project/Pillow/
- tkinter: Python interface to the Tk GUI toolkit. https://docs.python.org/3/library/tkinter.html

3. Implementation

Step 1: Select the regions of colour that need to be separated from the object.

Image 1: Source image

Step 2: Remove the background based on the zoned colour regions.

Image 2: Source image after removing blue screen

Step 3: Add the background and split necessary masks of the object image in the source image and background.

Image 3: Background image

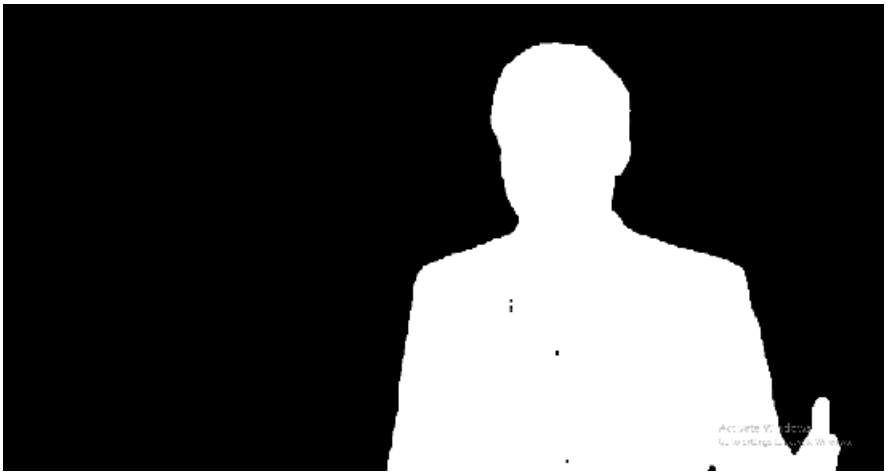

Image 4: Masks object of source image

Image 5: Masks background

Step 4: Chroma Key object in the source image with background using BITWISE_AND method

Image 6: Mixed image after using Chroma Key

Similarity, in our source code, we work with 3 sets of 3 source images and 3 background images.

4. Several methods of noise reduction

a. Morphology

As we seen, in the masks image with blue screen, there will still be small ripples that cause noise in the image. To eliminate that, we use a technique called ***Morphology***. They are simple transformations that are applied to binary or grayscale image. Morphology can be used to increase the size of objects in an image as well as reduce them or narrow distance between objects and open them.

b. Erosion and Dilation

Erosion is useful for removing tiny blobs in image or disconnecting two connected objects. ***Dilation*** is useful for joning elements together and making them cohesive.

We will use Dilation -> Erosion to suppress noise on images.

c. Image matting

When using the Chroma Key technique, there will be contours around the subject that remain when we separated from the background. This occurs as pixels of the background image are very close to the pixels of the object image to be separated, resulting in this phenomenon. ***Image matting*** is a more advanced method when it can separate very detailed borders around the object.

In photoshop, alpha matte is a technique used to insert background images and object images. The main idea of image mattching will be to predict the alpha matte value to separate the subject and background of the image.