Reconstructing a colored image from grayscale channels

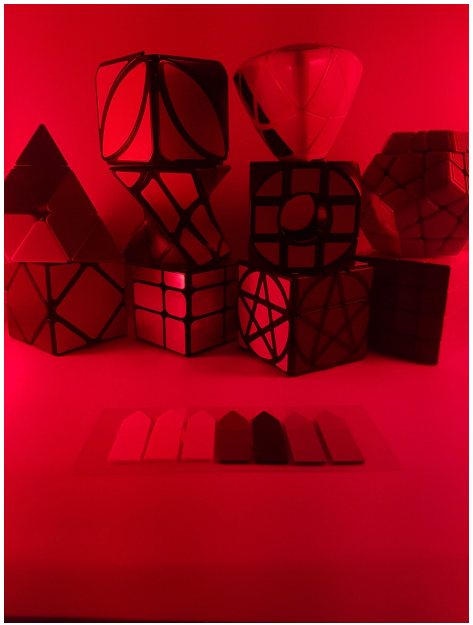
Principe, R., Ramos, R., Ramos, R., Reloza, C.J., Reyes, EJV

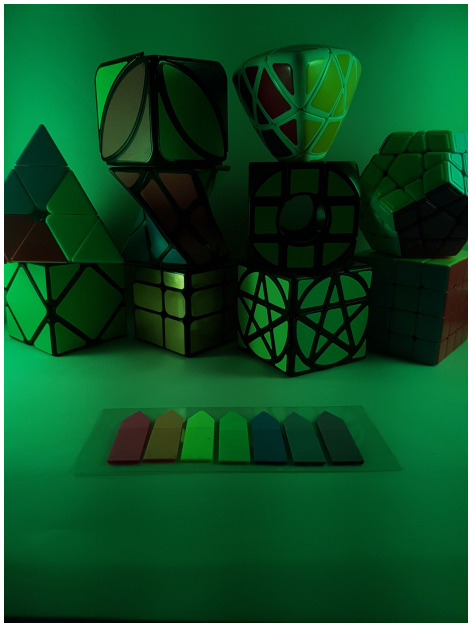
Objectives

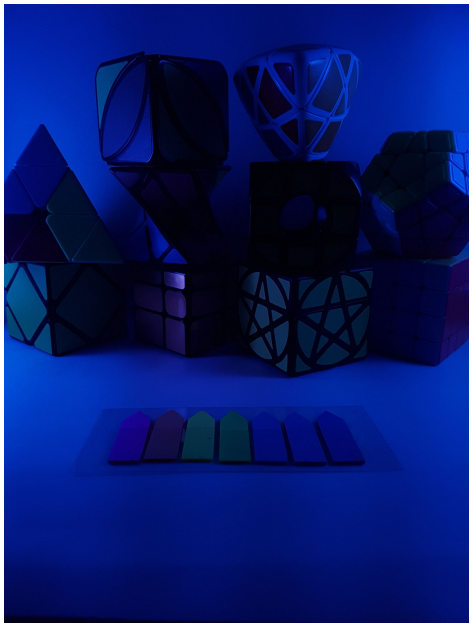
This activity aims to reconstruct a colored image by overlaying filtered images of the same object by the use of an image processing software, Gimp, and by programming using Python. It also aims to compare the post-processed, white-balanced images from the two methods by its quality.

[GIMP]

Image captured with RGB filters



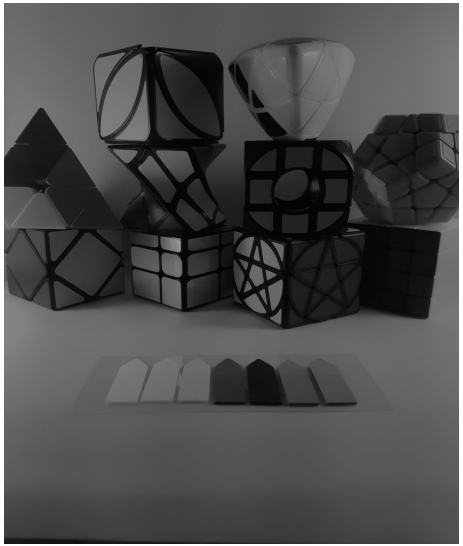


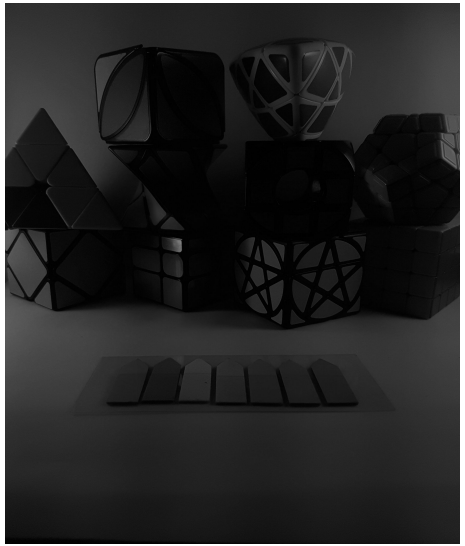


[GIMP]

Convert to grayscale

Left to right: Red, Green, Blue



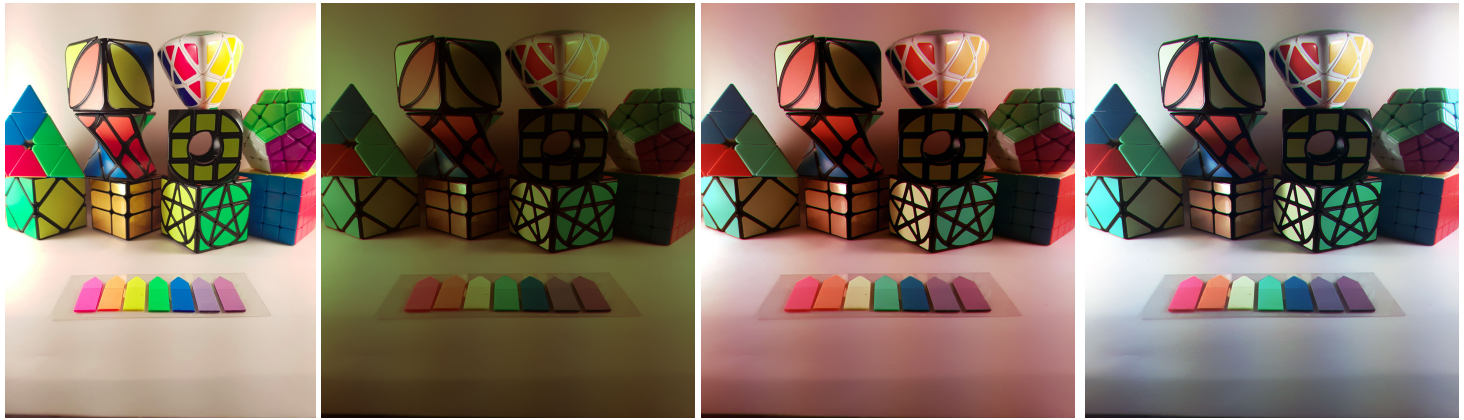


[GIMP]

It can be observed that the closest images are the results of auto-white balancing

Recompose and auto-white balance

Left to right: (a) original image (b) composed image; (c) auto-white balance composed image; (d) auto-white balanced and equalized histogram composed image.



(a) (b) (c) (d)

[GIMP]

Recompose and auto-white balance

- An image composed of the images from the original photo has a dominant light green touch
- Knowing that the photo has a white area meant that the white area can be used for adjusting the colors; Every color available in the image can be seen more clearly by scaling the image to the white area of the original image (leading up to auto action for each channel of the device)
- White interference i.e. the overlap of the different channels leads to the appearance of interference like patterns (letter d). Instead of having all channels completely aligned and mixed, the misplaced pixels form the isolated colors seen in the interference pattern (letter d)

[PYTHON]

Programming recomposition of image in Python

A new truecolor matrix I, which is the size of MxNx3, was made by assigning the red, green, and blue channels to each corresponding grayscale image of the filtered scene. Image I was then shown.

[PYTHON]

Applying White-balancing Algorithms

Contrast-sketched

Gray World Algorithm

White Patched

Actual color image vs. contrast-sketched

Actual color

Contrast-sketched

The white-balanced photo compared to the actual color image has more of an orange tint and is a low intensity image.

Actual color image vs. contrast-sketched

Actual color

Gray World Algorithm

SImilarly, this white-balanced photo compared to the actual color image is close to a bluish tint and is also a low intensity image.

Actual color image vs. contrast-sketched

Actual color

White Patched

Like the first three white-balanced images, it has low intensity. The image leans to a pinkish tint far from the evident white-light actual color image.