Assignment - 0

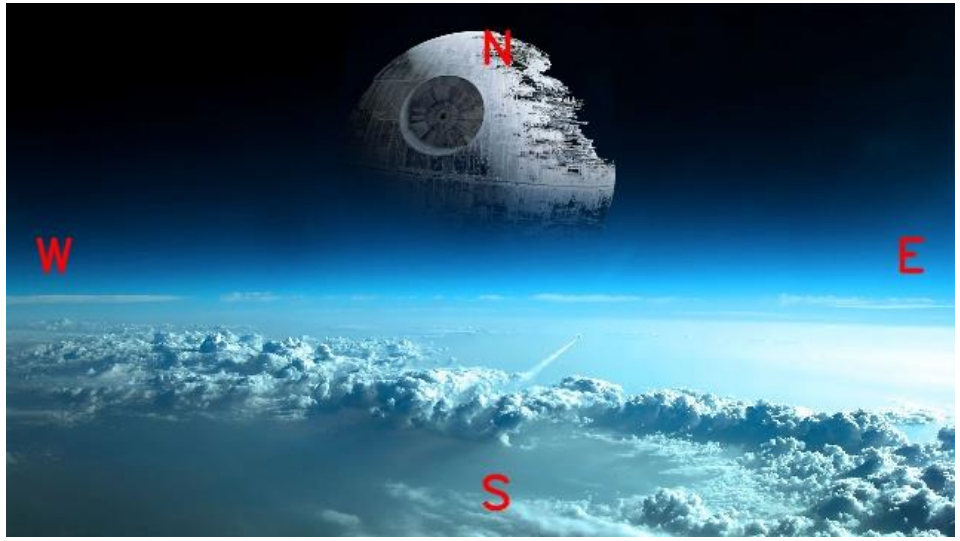
- Color Image Manipulation
  1. Flipping
  2. Chroma Keying

Due Date: Sept. 14th, 2023 (11:59 PM)

Flipping

- Flip color images horizontally or vertically.
- Input:
  - Image
  - Flip direction (“horizontal” or “vertical”)

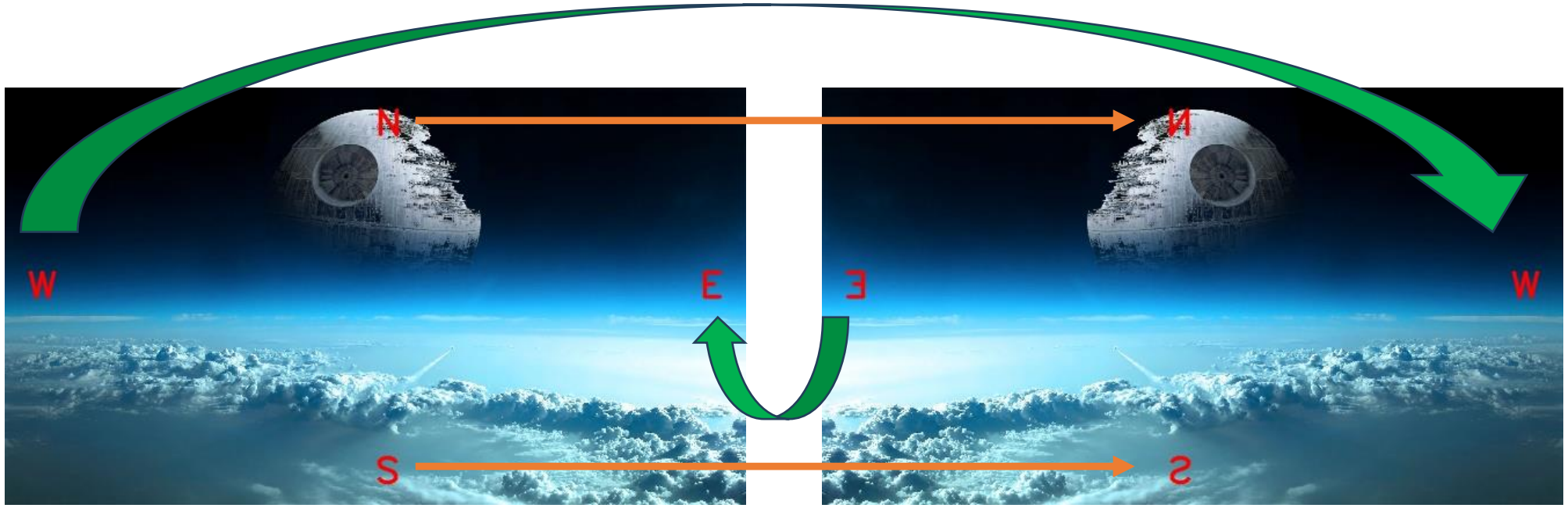
Horizontally Flip



Image

Output

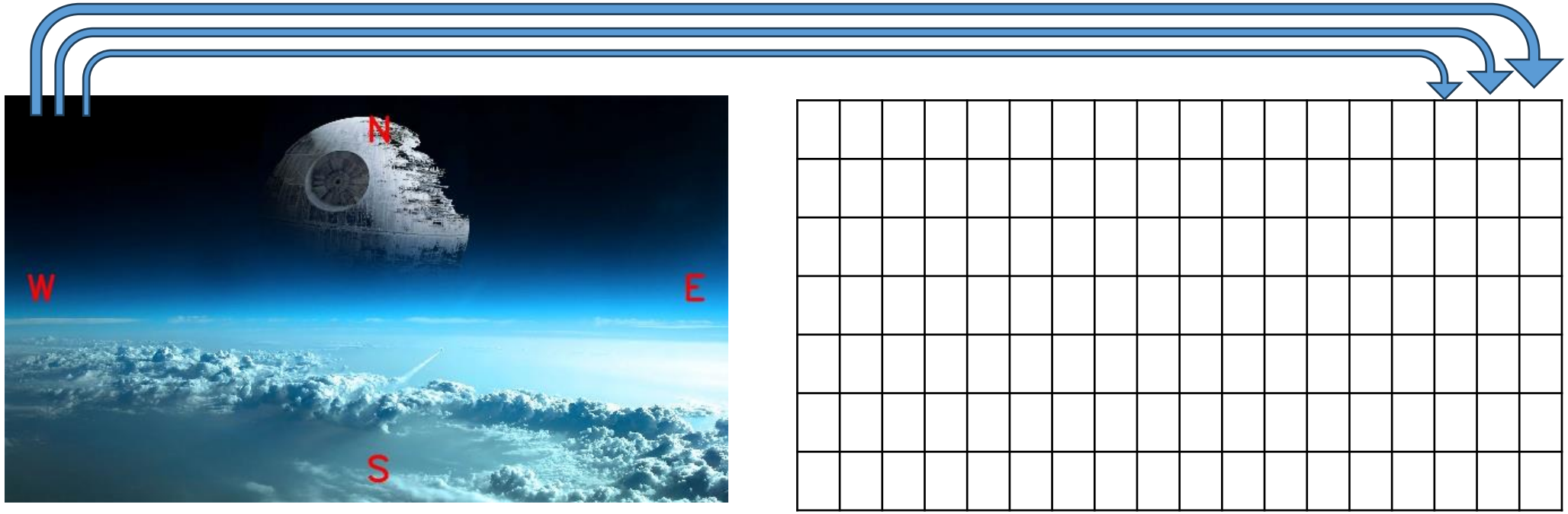
Horizontally Flip



Image

Output

Horizontally Flip (Solution)



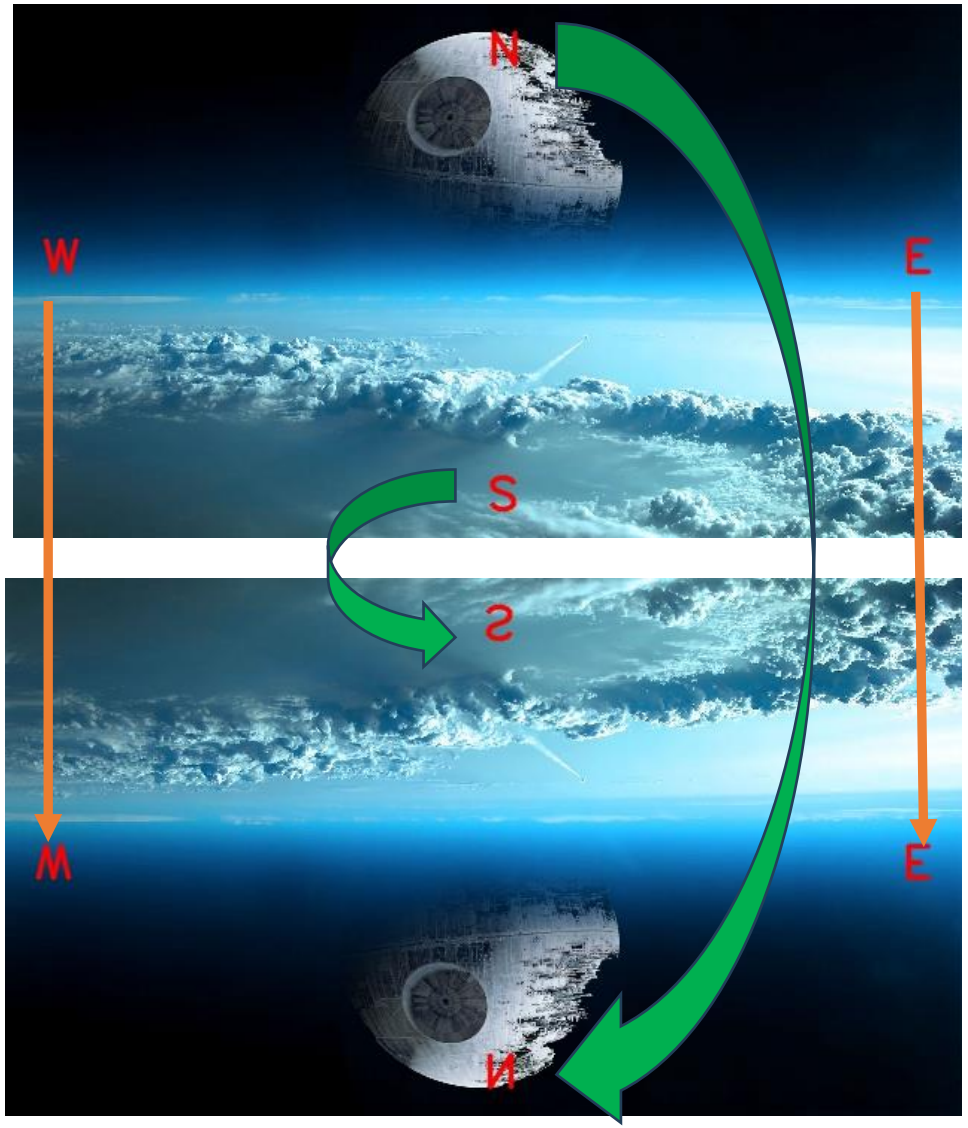
Image

1. Create empty image
2. Copy each row in reverse order

Vertical Flip

Image

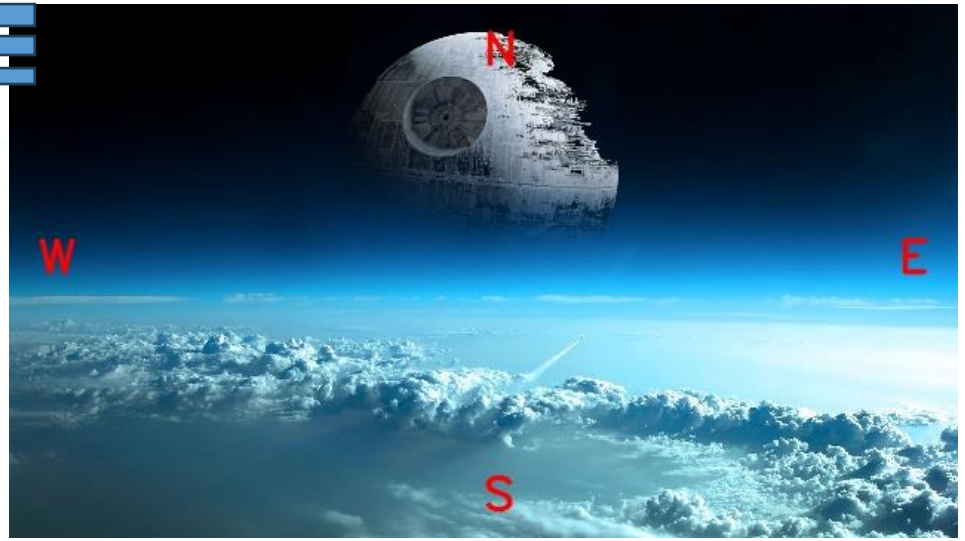
Output



Vertical Flip (Solution)

1. Create empty image
2. Copy each column in reverse order

Image



Chroma Keying

- Often used to produce visual effects in movies
- Post-production technique to compose two or more images based on color selection.
- Chroma Keying: Select a specific range of colors and isolating (replacing) them.

Chroma Keying

Foreground

Background

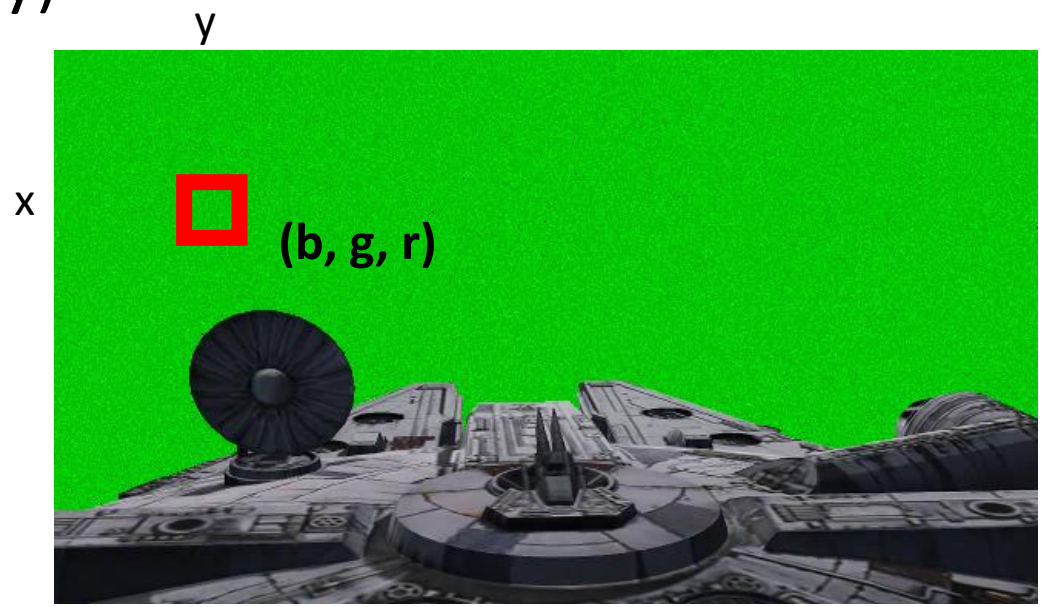
Chroma Keying Output

Chroma Keying

- Compose foreground with background using chroma keying
- Input:
  - Background image
  - Foreground image
  - Target color: color of the object of interest
  - Threshold: min distance to decide if the pixel is close to the target color

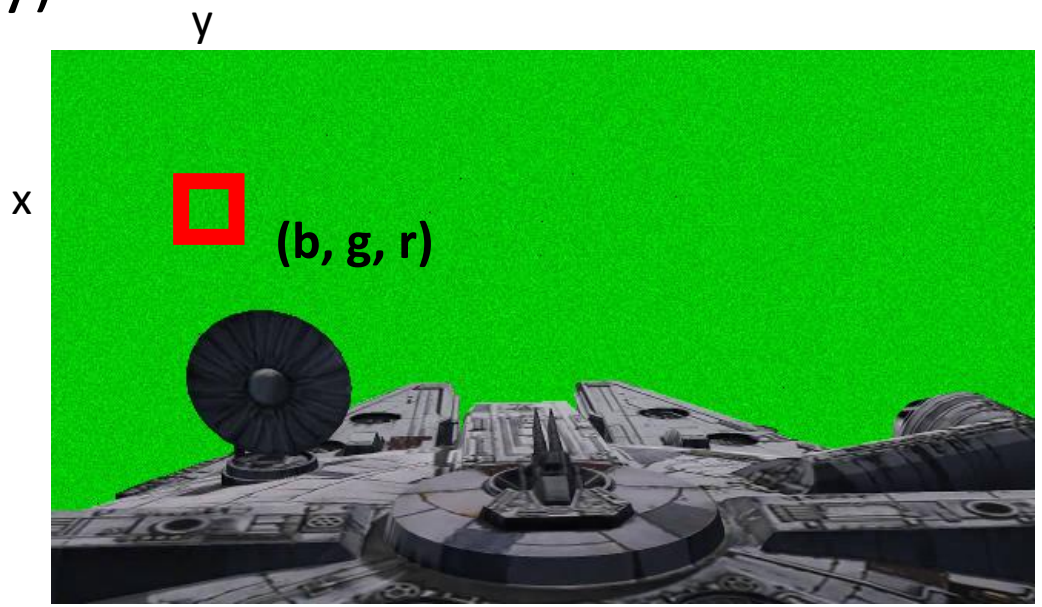
Idea

- Each pixel in the image at co-ordinate (x, y) has three values (b, g, r)
  - b – blue value
  - g – value
  - r – value



Idea

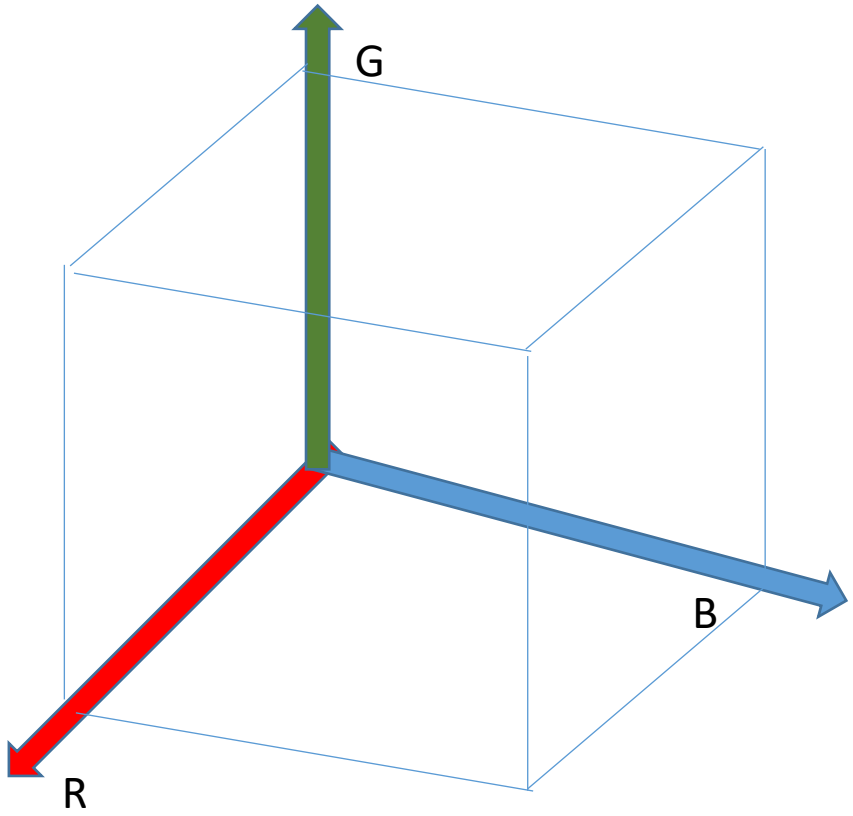
- Each pixel in the image at co-ordinate (x, y) has three values (b, g, r)
  - b – blue value
  - g – value
  - r – value



- If we think of this value as a point in 3D space where B, G, and R are three axis

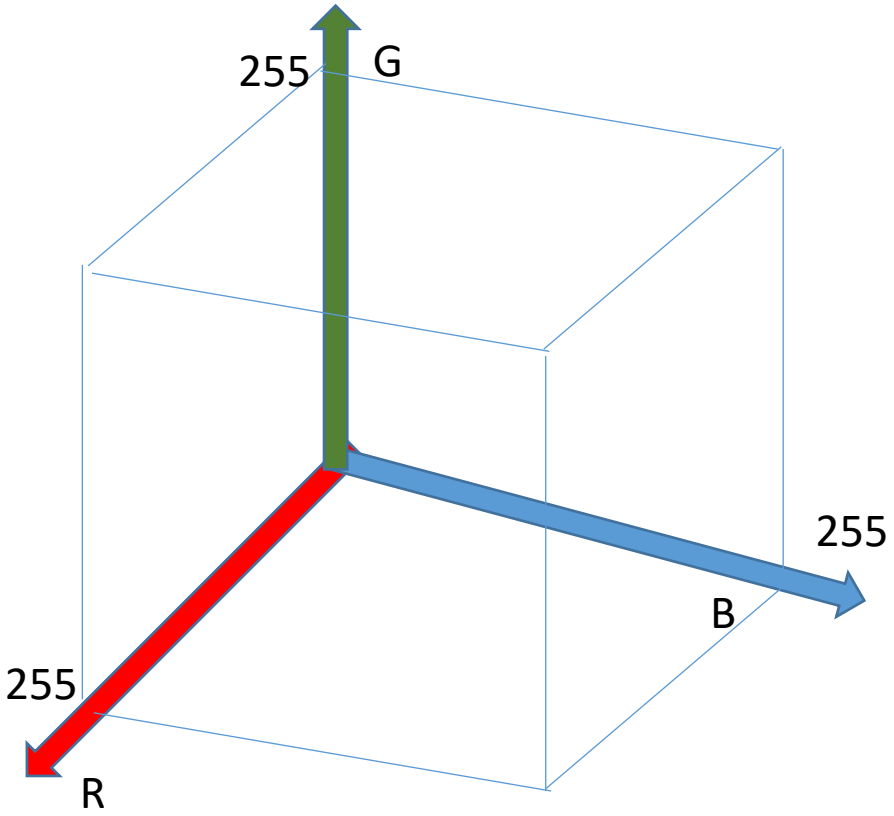
Idea

- If we think of this value as a point in 3D space where B, G, and R are three axis



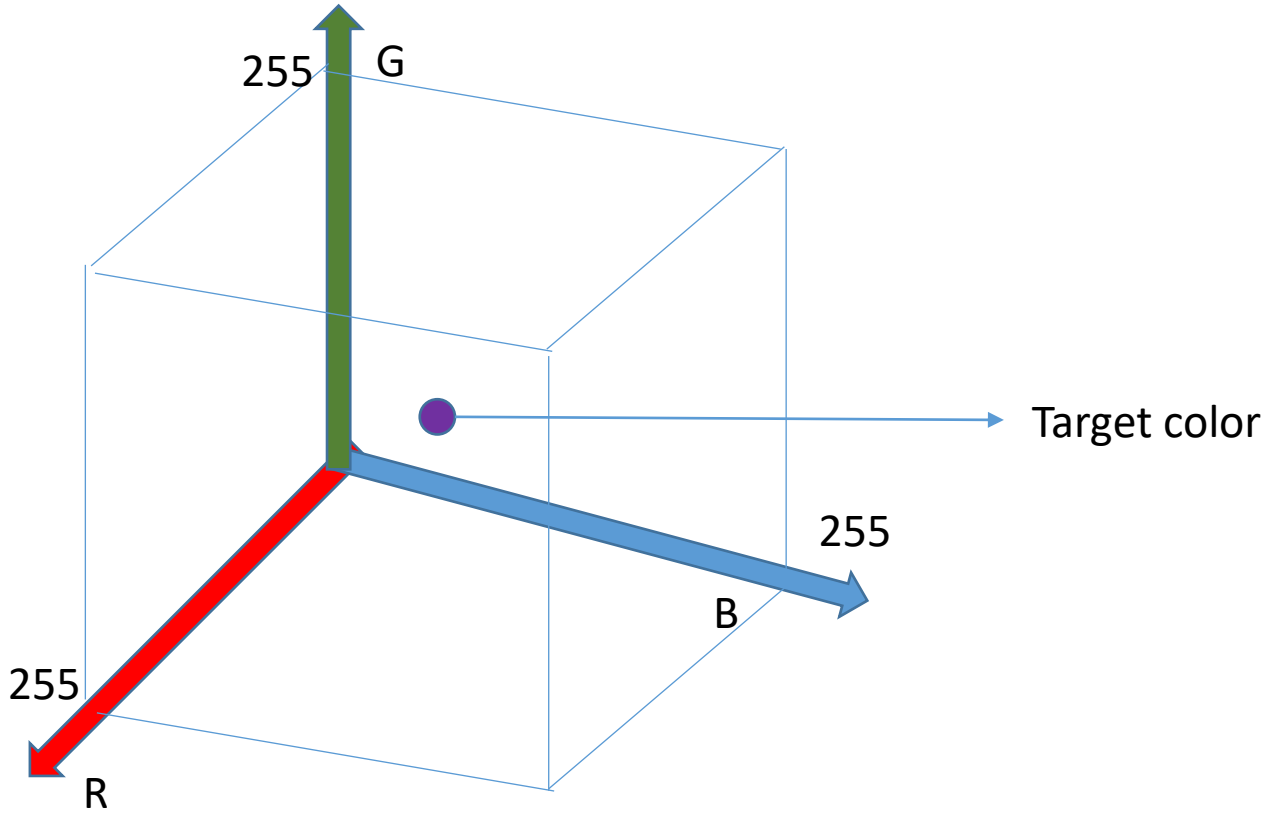
Idea

- If we think of this value as a point in 3D space where B, G, and R are three axis



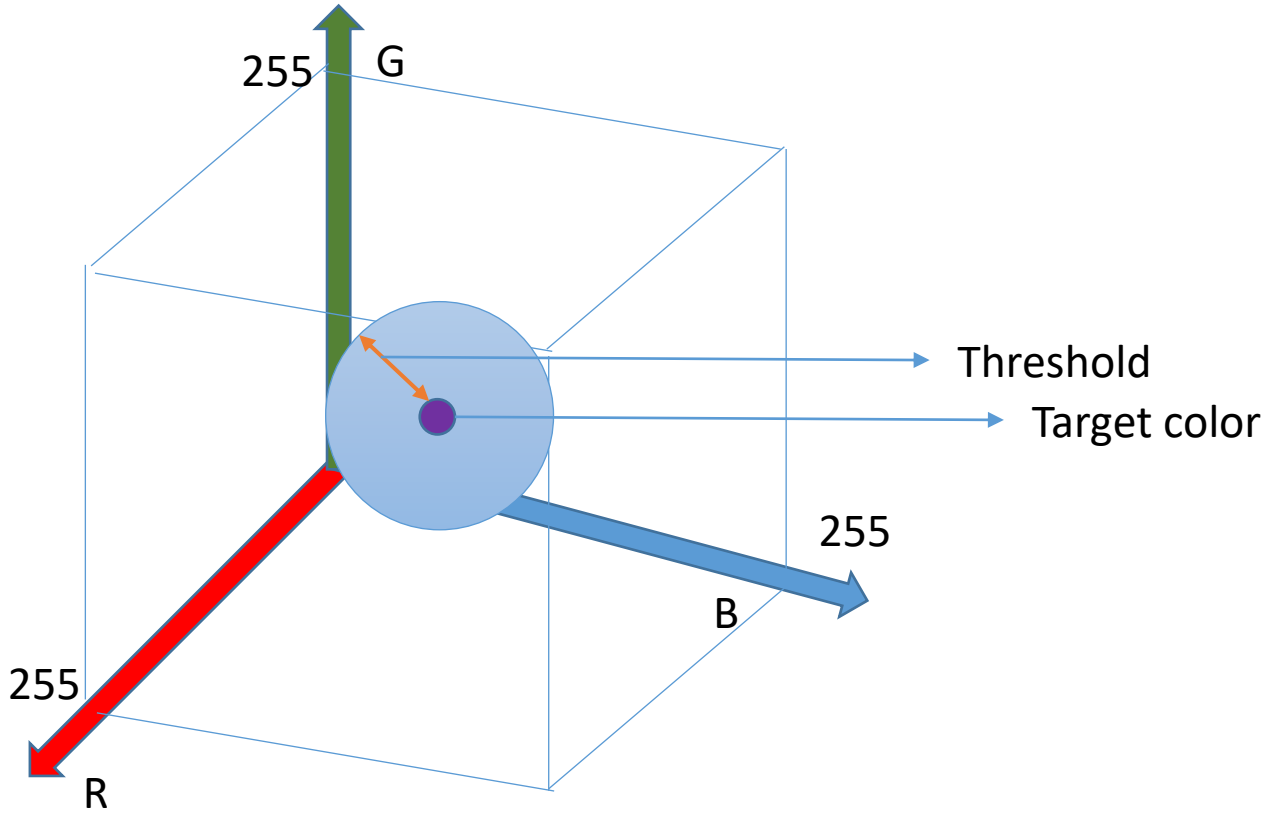
Idea

- If we think of this value as a point in 3D space where B, G, and R are three axis



Idea

- If we think of this value as a point in 3D space where B, G, and R are three axis



If a pixel value falls inside the sphere, we use the background image pixel value,
Else we use the foreground value

Method

y

x

$I_f(Foreground\ Image)$

y

x

$I_B\ (Background\ Image)$

Let t be the threshold, and $t_c = (b, g, r)$ be the target color

For each pixel (x, y) in the foreground image.

Output image
(O)

Method

y

x

I_f

y

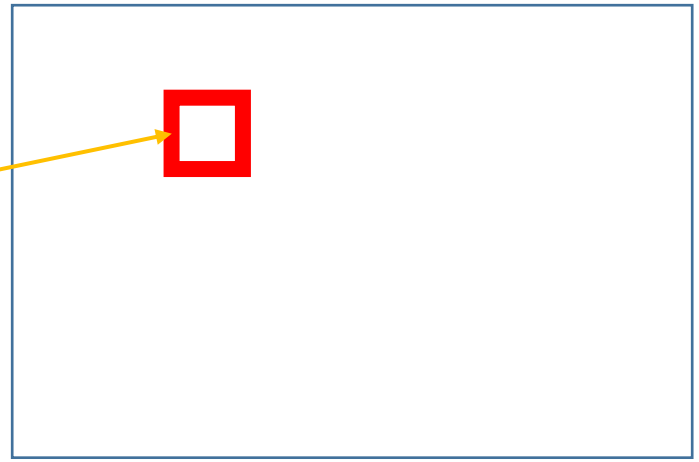
x

I_B

Let t be the threshold, and $t_c = (b, g, r)$ be the target color

For each pixel (x,y) in the foreground image.

If $\boldsymbol{dist}(\boldsymbol{I_f}(\boldsymbol{x}, \boldsymbol{y}), \boldsymbol{t_c}) \leq \boldsymbol{t}$ then O(x,y) = $I_B(x, y)$



Output image (O)

Method

y

x

I_f

y

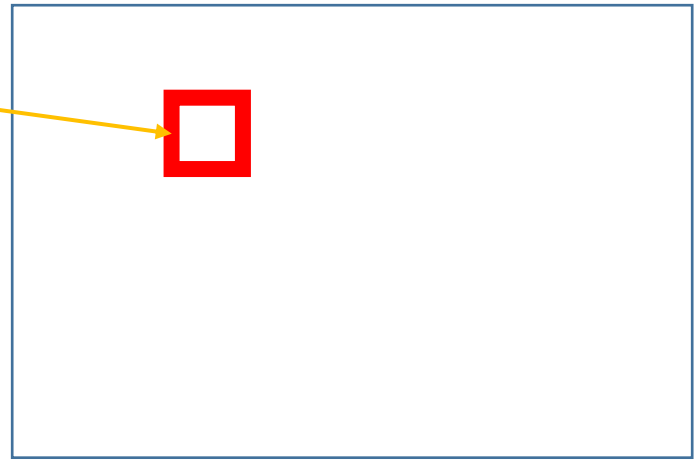
x

I_B

Let t be the threshold, and $t_c = (b, g, r)$ be the target color

For each pixel (x,y) in the foreground image.

If $\boldsymbol{dist}(\boldsymbol{I_f}(\boldsymbol{x}, \boldsymbol{y}), \boldsymbol{t_c}) > \boldsymbol{t}$ then O(x,y) = $I_F(x, y)$



Output image (O)

Chroma Keying

- Result

Assignment - 0

1. Flipping (10 Pts.)
2. Chroma Keying(20 Pts)

Total: 30 Pts.

Submission Instructions

- Must use the **starter code** available in **Github**
- Submission allowed only through **Github**
- You will receive an email with invitation to join **Github** classroom
- Start by reading the **readme.md** file.
- Instructions are available here
- Github will **automatically** save the **last commit as a submission** before the deadline