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ECE 5554 SU22 – Dr. Jones – HW1

Part 2:

Animals img size: (768, 1024, 3)

Stonehenge img size: (768, 1024, 3)

Part 3:

Animals red avg: 92.87458928426106

Animals green avg: 100.50979868570964

Animals blue avg: 128.48477045694986

Stonehenge red avg: 92.87458928426106

Stonehenge green avg: 100.50979868570964

Stonehenge blue avg: 128.48477045694986

Part 5:



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Part 6:



Part 7:



Code

Homework1.py:

```
import cv2

import numpy as np

###

# Part 1

animals = cv2.imread("animals.png")

# Part 2

height = len(animals)

width = len(animals[0])

depth = len(animals[0, 0])

print(f"Animals img size: {animals.shape}")

# Part 3

animals_red = animals[:, :, 2]

animals_green = animals[:, :, 1]

animals_blue = animals[:, :, 0]

print(f"Animals red avg: {np.mean(animals_red)}")

print(f"Animals green avg: {np.mean(animals_green)}")

print(f"Animals blue avg: {np.mean(animals_blue)}")

###

# Part 1

stonehenge = cv2.imread("Stonehenge_1024x768.png")

# Part 2
```

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```
height = len(stonehenge)
width = len(stonehenge[0])
depth = len(stonehenge[0, 0])
print(f"Stonehenge img size: {stonehenge.shape}")
```

Part 3

```
stonehenge_red = stonehenge[:, :, 2]
stonehenge_green = stonehenge[:, :, 1]
stonehenge_blue = stonehenge[:, :, 0]
print(f"Stonehenge red avg: {np.mean(stonehenge_red)}")
print(f"Stonehenge green avg: {np.mean(stonehenge_green)}")
print(f"Stonehenge blue avg: {np.mean(stonehenge_blue)}")
```

Pixel by Pixel Avg

```
def avg_pixel_by_pixel(img1, img2):
    # Assuming both images are the same size
    height = len(img1)
    width = len(img1[0])
    new_image = np.zeros((height, width), dtype = "uint8")
    for y_pix in range(height):
        for x_pix in range(width):
            img1_value = img1[y_pix][x_pix]
            img2_value = img2[y_pix][x_pix]
            avg_value = np.mean([img1_value, img2_value])
            new_image[y_pix, x_pix] = avg_value
    return new_image
```

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Part 4

```
animals_grayscale = cv2.cvtColor(animals, cv2.COLOR_BGR2GRAY)
```

```
stonehenge_grayscale = cv2.cvtColor(stonehenge, cv2.COLOR_BGR2GRAY)
```

Part 5

```
avg_image = avg_pixel_by_pixel(animals_grayscale, stonehenge_grayscale)
```

show images

```
cv2.namedWindow('INPUT', flags=cv2.WINDOW_NORMAL)
```

```
cv2.imshow('INPUT', avg_image)
```

```
cv2.waitKey(0)
```

```
cv2.destroyAllWindows()
```

```
cv2.imwrite("part5_img.png", avg_image)
```

Pixel by Pixel Max

```
def max_pixel_by_pixel(img1, img2):
```

```
    # Assuming both images are the same size
```

```
    height = len(img1)
```

```
    width = len(img1[0])
```

```
    new_image = np.zeros((height, width), dtype = "uint8")
```

```
    for y_pix in range(height):
```

```
        for x_pix in range(width):
```

```
            img1_value = img1[y_pix][x_pix]
```

```
            img2_value = img2[y_pix][x_pix]
```

```
            max_value = np.max([img1_value, img2_value])
```

```
            new_image[y_pix, x_pix] = max_value
```

```
    return new_image
```

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Part 6

```
max_image = max_pixel_by_pixel(animals_grayscale, stonehenge_grayscale)
```

```
# show images
```

```
cv2.namedWindow('INPUT', flags=cv2.WINDOW_NORMAL)
```

```
cv2.imshow('INPUT', max_image)
```

```
cv2.waitKey(0)
```

```
cv2.destroyAllWindows()
```

```
cv2.imwrite("part6_img.png", max_image)
```

Pixel by Pixel Difference

```
def diff_pixel_by_pixel(img1, img2):
```

```
    # Assuming both images are the same size
```

```
    height = len(img1)
```

```
    width = len(img1[0])
```

```
    new_image = np.zeros((height, width), dtype = "uint8")
```

```
    for y_pix in range(height):
```

```
        for x_pix in range(width):
```

```
            img1_value = img1[y_pix][x_pix]
```

```
            img2_value = img2[y_pix][x_pix]
```

```
            diff_value = cv2.absdiff(np.array(img1_value), np.array(img2_value))
```

```
            new_image[y_pix, x_pix] = diff_value
```

```
    return new_image
```

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```
diff_image = diff_pixel_by_pixel(animals_grayscale, stonehenge_grayscale)
```

```
# show images
```

```
cv2.namedWindow('INPUT', flags=cv2.WINDOW_NORMAL)
```

```
cv2.imshow('INPUT', diff_image)
```

```
cv2.waitKey(0)
```

```
cv2.destroyAllWindows()
```

```
cv2.imwrite("part7_img.png", diff_image)
```