

# **MACHINE**

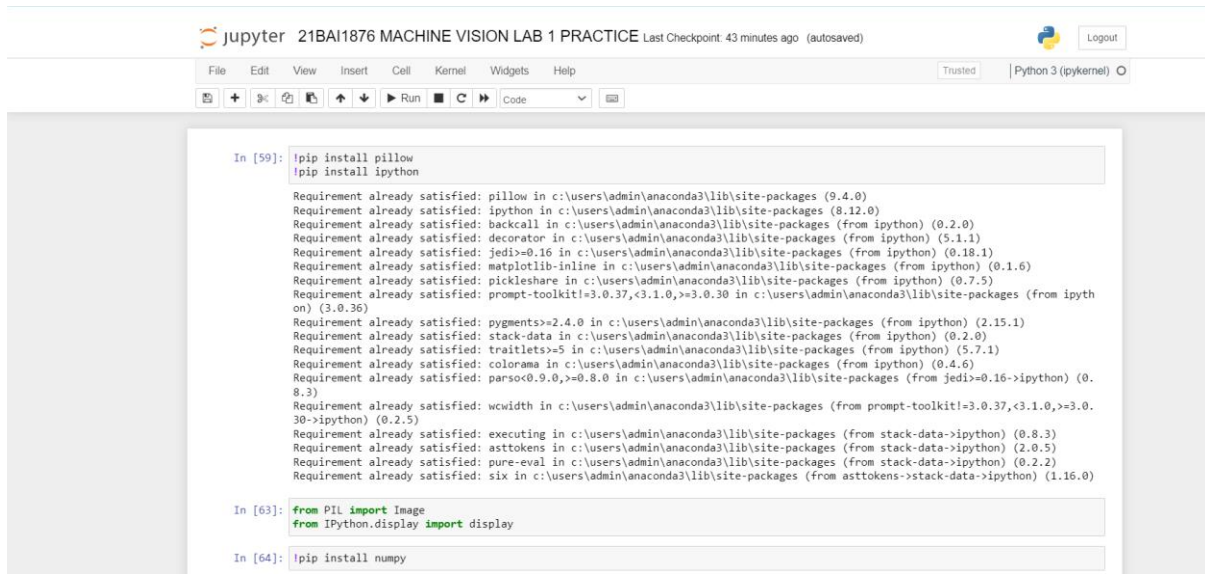
# **VISION**

## **LAB 1**

**NAME : OM SUBRATO DEY**

**REGISTER NUMBER: 21BAI1876**

# **1. READ A BLACK AND WHITE IMAGE AND DISPLAY THE BLACK AND WHITE PIXELS OF THE IMAGE READ RESPECTIVELY. ALSO DISPLAY THE IMAGE IN BLACK AND WHITE CHANNELS SEPERATELY.**



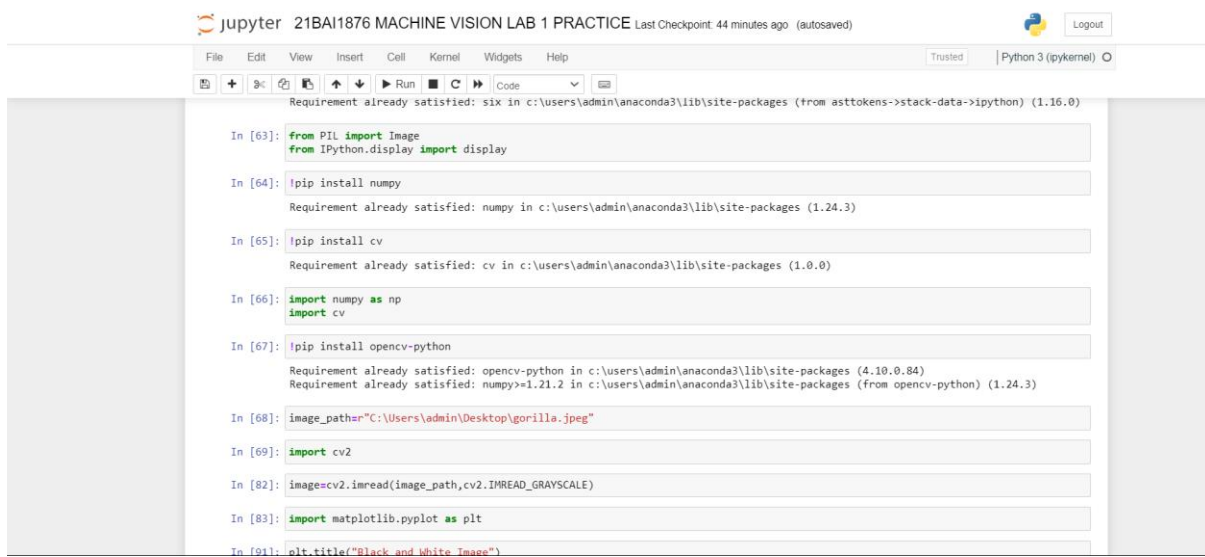
A screenshot of a Jupyter Notebook interface. The top bar shows 'jupyter 21BA1876 MACHINE VISION LAB 1 PRACTICE' and 'Last Checkpoint: 43 minutes ago (autosaved)'. The notebook has a menu bar with 'File', 'Edit', 'View', 'Insert', 'Cell', 'Kernel', 'Widgets', and 'Help'. Below the menu bar is a toolbar with icons for file operations, running, and code execution. The main area contains three code cells. The first cell (In [59]) installs 'pillow' and 'ipython'. The second cell (In [63]) imports 'Image' from 'PIL' and 'display' from 'IPython.display'. The third cell (In [64]) installs 'numpy'.

```
In [59]: !pip install pillow
!pip install ipython

Requirement already satisfied: pillow in c:\users\admin\anaconda3\lib\site-packages (9.4.0)
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Requirement already satisfied: pygments>=2.4.0 in c:\users\admin\anaconda3\lib\site-packages (from ipython) (2.15.1)
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Requirement already satisfied: asttokens in c:\users\admin\anaconda3\lib\site-packages (from stack-data->ipython) (2.0.5)
Requirement already satisfied: pure-eval in c:\users\admin\anaconda3\lib\site-packages (from stack-data->ipython) (0.2.2)
Requirement already satisfied: six in c:\users\admin\anaconda3\lib\site-packages (from asttokens->stack-data->ipython) (1.16.0)

In [63]: from PIL import Image
from IPython.display import display

In [64]: !pip install numpy
```



A screenshot of a Jupyter Notebook interface. The top bar shows 'jupyter 21BA1876 MACHINE VISION LAB 1 PRACTICE' and 'Last Checkpoint: 44 minutes ago (autosaved)'. The notebook has a menu bar with 'File', 'Edit', 'View', 'Insert', 'Cell', 'Kernel', 'Widgets', and 'Help'. Below the menu bar is a toolbar with icons for file operations, running, and code execution. The main area contains several code cells. The first cell (In [63]) imports 'Image' from 'PIL' and 'display' from 'IPython.display'. The second cell (In [64]) installs 'numpy'. The third cell (In [65]) installs 'cv'. The fourth cell (In [66]) imports 'numpy' as 'np' and 'cv'. The fifth cell (In [67]) installs 'opencv-python'. The sixth cell (In [68]) sets the image path to 'C:\Users\admin\Desktop\gorilla.jpeg'. The seventh cell (In [69]) imports 'cv2'. The eighth cell (In [82]) loads the image using 'cv2.imread'. The ninth cell (In [83]) imports 'matplotlib.pyplot' as 'plt'. The tenth cell (In [91]) titles the plot 'Black and White Image'.

```
In [63]: from PIL import Image
from IPython.display import display

In [64]: !pip install numpy

Requirement already satisfied: numpy in c:\users\admin\anaconda3\lib\site-packages (1.24.3)

In [65]: !pip install cv

Requirement already satisfied: cv in c:\users\admin\anaconda3\lib\site-packages (1.0.0)

In [66]: import numpy as np
import cv

In [67]: !pip install opencv-python

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Requirement already satisfied: numpy>=1.21.2 in c:\users\admin\anaconda3\lib\site-packages (from opencv-python) (1.24.3)

In [68]: image_path="C:\Users\admin\Desktop\gorilla.jpeg"

In [69]: import cv2

In [82]: image=cv2.imread(image_path,cv2.IMREAD_GRAYSCALE)

In [83]: import matplotlib.pyplot as plt

In [91]: plt.title("Black and White Image")
```

Jupyter 21BA1876 MACHINE VISION LAB 1 PRACTICE Last Checkpoint: an hour ago (autosaved) Python 3 (pykernel)

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In [83]: `import matplotlib.pyplot as plt`

In [91]: `plt.title("Black and White Image")  
plt.axis('off')  
plt.show()`

Black and White Image

In [85]: `black_pixels=np.argwhere(image==0)  
white_pixels=np.argwhere(image==255)`

In [86]: `print(f"Black pixels (total {black_pixels.shape[0]})")  
print(black_pixels)`

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In [85]: `black_pixels=np.argwhere(image==0)  
white_pixels=np.argwhere(image==255)`

In [86]: `print(f"Black pixels (total {black_pixels.shape[0]})")  
print(black_pixels)`

Black pixels (total 559)  
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 [ 26 42]  
 ...  
 [220 219]  
 [221 24]  
 [223 206]]

In [87]: `print(f"\n white pixels (total {white_pixels.shape[0]})")  
print(white_pixels)`


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Jupyter 21BA1876 MACHINE VISION LAB 1 PRACTICE Last Checkpoint: an hour ago (autosaved) Python 3 (pykernel)

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In [77]: `ig=Image.open('gorilla.jpeg')`

In [78]: `ig`

Out[78]: 

In [92]: `# Threshold the image to separate black and white pixels  
-> black_channel = cv2.threshold(image, 127, 255, cv2.THRESH_BINARY_INV)  
-> white_channel = cv2.threshold(image, 127, 255, cv2.THRESH_BINARY)`

`# Display the original image  
plt.subplot(1, 3, 1)  
plt.imshow(image, cmap='gray')  
plt.title('Original Image')  
plt.axis('off')`

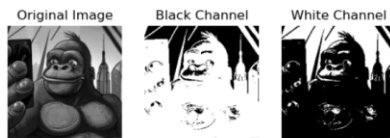
```
In [92]: # Threshold the image to separate black and white pixels
_, black_channel = cv2.threshold(image, 127, 255, cv2.THRESH_BINARY_INV)
_, white_channel = cv2.threshold(image, 127, 255, cv2.THRESH_BINARY)

# Display the original image
plt.subplot(1, 3, 1)
plt.imshow(image, cmap='gray')
plt.title('Original Image')
plt.axis('off')

# Display the black channel
plt.subplot(1, 3, 2)
plt.imshow(black_channel, cmap='gray')
plt.title('Black Channel')
plt.axis('off')

# Display the white channel
plt.subplot(1, 3, 3)
plt.imshow(white_channel, cmap='gray')
plt.title('White Channel')
plt.axis('off')

plt.show()
```



## 2. READ A COLOUR IMAGE AND SEPARATE THE RED,BLUE AND GREEN CHANNELS.

```
jupyter 21BA1876 MACHINE VISION LAB 1 PRACTICE Last Checkpoint: 2 minutes ago (autosaved)
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In [95]: """2.READ A COLOUR IMAGE AND SEPARATE THE RED,BLUE AND GREEN CHANNELS."""
Out[95]: '2.READ A COLOUR IMAGE AND SEPARATE THE RED,BLUE AND GREEN CHANNELS.'

In [96]: image_path2="C:\\Users\\admin\\Desktop\\colourimage.jpeg"

In [97]: img2=cv2.imread(image_path2)

In [102]: # Convert the image from BGR to RGB format
image_rgb = cv2.cvtColor(img2, cv2.COLOR_BGR2RGB)

# Segregate the channels
red_channel = image_rgb.copy()
red_channel[:, :, 1] = 0 # Set green channel to 0
red_channel[:, :, 2] = 0 # Set blue channel to 0

green_channel = image_rgb.copy()
green_channel[:, :, 0] = 0 # Set red channel to 0
green_channel[:, :, 2] = 0 # Set blue channel to 0

blue_channel = image_rgb.copy()
blue_channel[:, :, 0] = 0 # Set red channel to 0
blue_channel[:, :, 1] = 0 # Set green channel to 0

In [103]: # Display the images
plt.figure(figsize=(10, 7))

plt.subplot(2, 2, 1)
plt.imshow(image_rgb)
plt.title('Original Image')
plt.axis('off')


Out[103]: (-0.5, 274.5, 182.5, -0.5)
```

```
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In [103]: # Display the images
plt.figure(figsize=(10, 7))


plt.subplot(2, 2, 1)
plt.imshow(image_rgb)
plt.title('Original Image')
plt.axis('off')

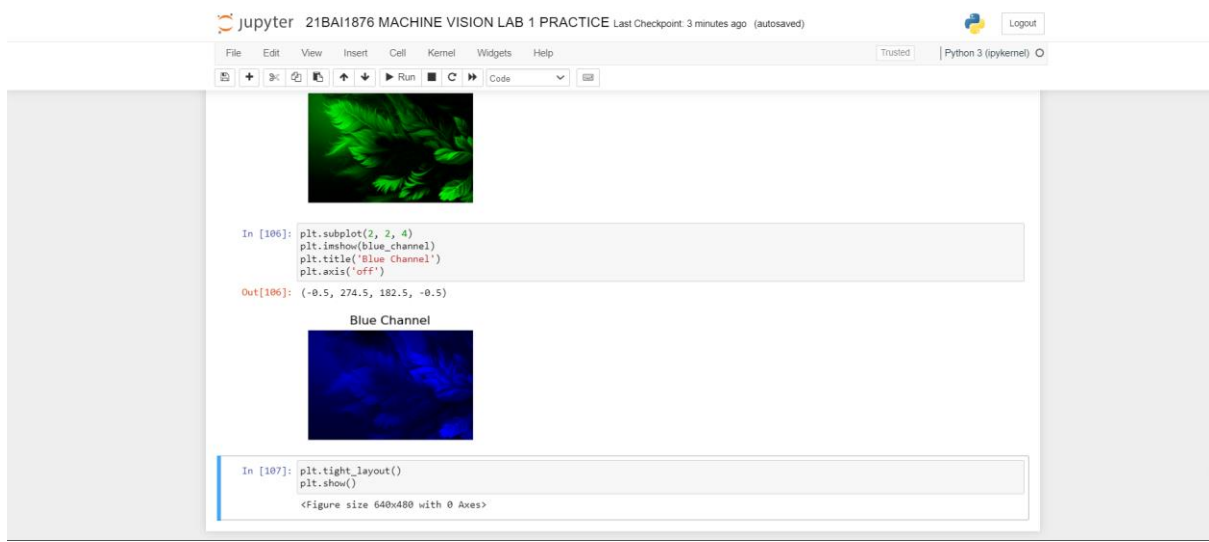
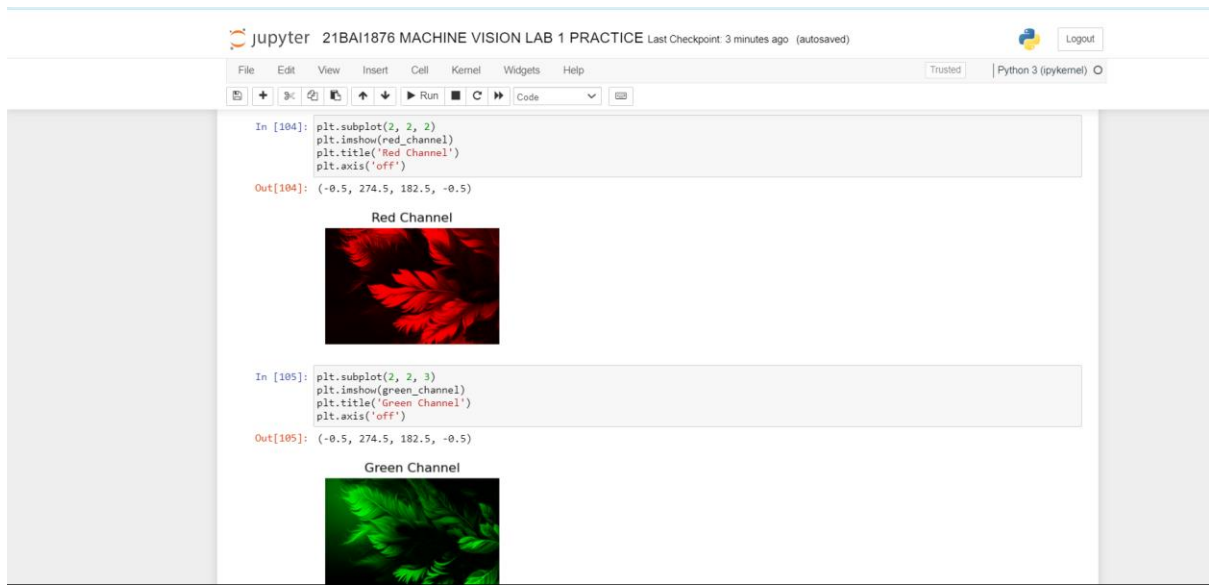
Out[103]: (-0.5, 274.5, 182.5, -0.5)

Original Image


In [104]: plt.subplot(2, 2, 2)
plt.imshow(red_channel)
plt.title('Red Channel')
plt.axis('off')

Out[104]: (-0.5, 274.5, 182.5, -0.5)

Red Channel

```



### **3. CONVERT A RGB IMAGE TO CMY IMAGE WHICH WILL BE THE NEGATIVE OF THE ORIGINAL IMAGE**

#### **CODE:**

```
import cv2
import numpy as np
import matplotlib.pyplot as plt

def rgb_to_cmy(image_path):
    # Read the image
    img = cv2.imread(image_path)
    # Convert image from BGR (OpenCV format) to RGB
    img_rgb = cv2.cvtColor(img, cv2.COLOR_BGR2RGB)
    # Normalize the RGB values to [0, 1]
    img_rgb = img_rgb / 255.0

    plt.imshow(img_rgb)
    plt.title('RGB Image')
    plt.axis('off') # Hide axes
    plt.show()

    # Perform RGB to CMY conversion
    cmy_img = 1 - img_rgb
    # Scale back to [0, 255]
    cmy_img = (cmy_img * 255).astype(np.uint8)
    return cmy_img
```

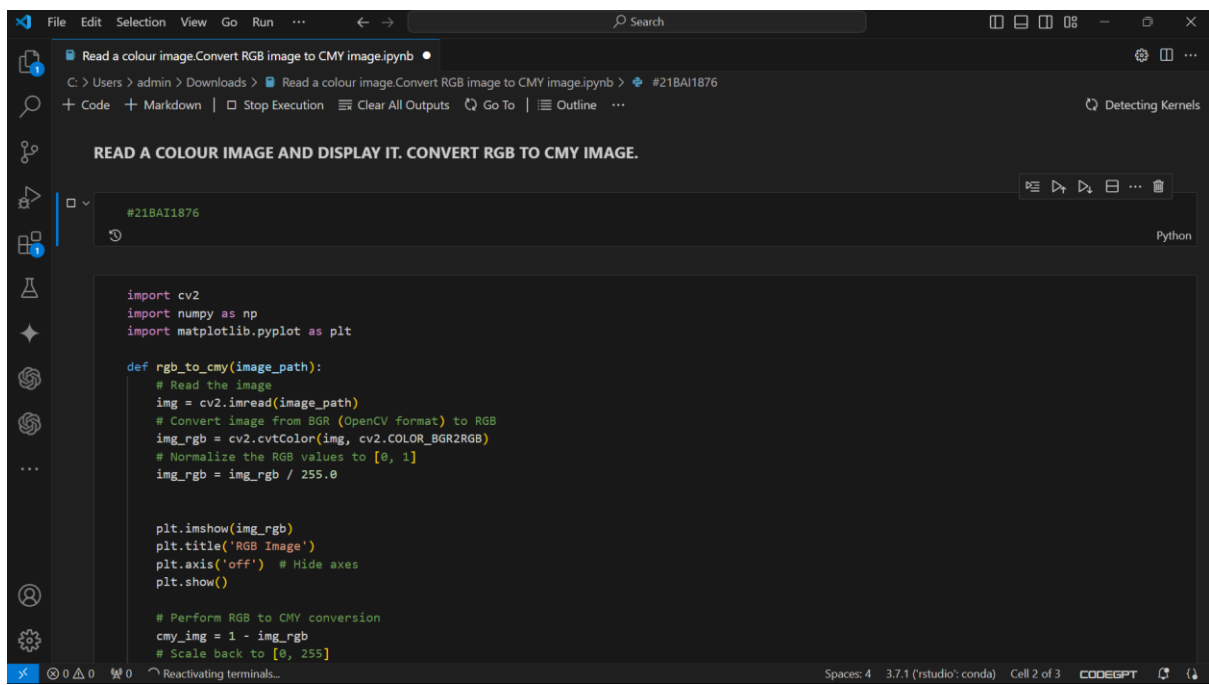
```
# Example usage

image_path = '/content/moth.jpeg'
cmy_image = rgb_to_cmy(image_path)


# Display the CMY image using Matplotlib
plt.imshow(cmy_image)
plt.title('CMY Image')
plt.axis('off') # Hide axes
plt.show()


# Save the CMY image
cv2.imwrite('/content/moth_cmy.jpg', cv2.cvtColor(cmy_image,
cv2.COLOR_RGB2BGR))
```

## **OUTPUT:**

A screenshot of a Jupyter Notebook interface. The top bar shows the file name 'Read a colour image.Convert RGB image to CMY image.ipynb'. Below the top bar, there's a search bar and a 'Detecting Kernels' button. The main area displays the title 'READ A COLOUR IMAGE AND DISPLAY IT. CONVERT RGB TO CMY IMAGE.' and a code cell with the following Python code:

```
import cv2
import numpy as np
import matplotlib.pyplot as plt

def rgb_to_cmy(image_path):
    # Read the image
    img = cv2.imread(image_path)
    # Convert image from BGR (OpenCV format) to RGB
    img_rgb = cv2.cvtColor(img, cv2.COLOR_BGR2RGB)
    # Normalize the RGB values to [0, 1]
    img_rgb = img_rgb / 255.0

    plt.imshow(img_rgb)
    plt.title('RGB Image')
    plt.axis('off') # Hide axes
    plt.show()

    # Perform RGB to CMY conversion
    cmy_img = 1 - img_rgb
    # Scale back to [0, 255]
    cmy_img = cmy_img * 255
```

The code cell is labeled '#21BAI1876' and 'Python'. The bottom status bar shows 'Spaces: 4', '3.7.1 (rstudio: conda)', 'Cell 2 of 3', and 'CODEGPT'.



```
# Normalize the RGB values to [0, 1]
img_rgb = img_rgb / 255.0

plt.imshow(img_rgb)
plt.title('RGB Image')
plt.axis('off') # Hide axes
plt.show()

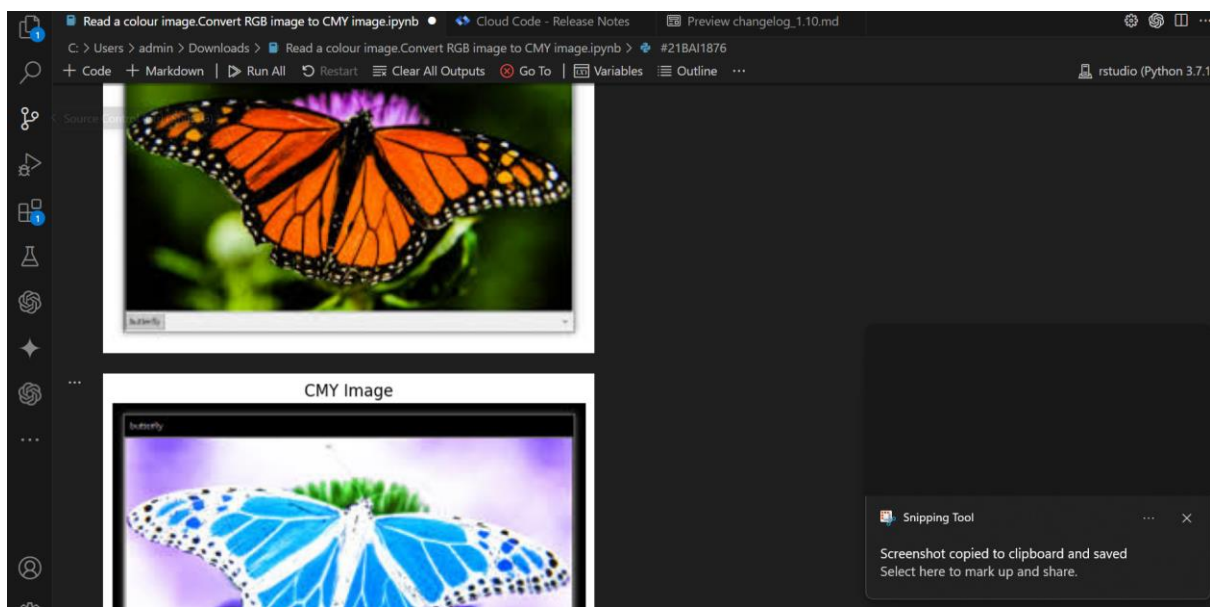
# Perform RGB to CMY conversion
cmy_img = 1 - img_rgb
# Scale back to [0, 255]
cmy_img = (cmy_img * 255).astype(np.uint8)
return cmy_img

# Example usage
image_path = '/content/moth.jpeg'
cmy_image = rgb_to_cmy(image_path)

# Display the CMY image using Matplotlib
plt.imshow(cmy_image)
plt.title('CMY Image')
plt.axis('off') # Hide axes
plt.show()

# Save the CMY image
cv2.imwrite('/content/moth_cmy.jpg', cv2.cvtColor(cmy_image, cv2.COLOR_RGB2BGR))
```

[13] Python



## **4.And 5. CONVERT A RGB IMAGE TO HSI IMAGE AND THEN BACK TO RGB**

### **CODE:**

```
import numpy as np
from PIL import Image
import matplotlib.pyplot as plt

def rgb_to_hsi(rgb):
    R, G, B = rgb
    I = (R + G + B) / 3
    min_rgb = min(R, G, B)
    S = 1 - (3 / (R + G + B)) * min_rgb if (R + G + B) != 0 else 0
    numerator = 0.5 * ((R - G) + (R - B))
    denominator = np.sqrt((R - G)**2 + (R - B) * (G - B))
    H = np.arccos(numerator / (denominator + 1e-10)) # Adding a
    small epsilon to avoid division by zero
    if B > G:
        H = 2 * np.pi - H
    H = np.degrees(H) % 360
    return I, S, H

def convert_image_to_hsi(image_path):
    # Load the image
    img = Image.open(image_path)
    img = img.convert('RGB')
    img_array = np.array(img)

    # Initialize HSI image
```

```

hsi_image = np.zeros_like(img_array, dtype=float)

# Convert each pixel from RGB to HSI
for i in range(img_array.shape[0]):
    for j in range(img_array.shape[1]):
        R, G, B = img_array[i, j]
        I, S, H = rgb_to_hsi((R, G, B))
        hsi_image[i, j] = [H, S, I]

# Normalize HSI image for visualization
hsi_image_normalized = np.zeros_like(img_array, dtype=float)
hsi_image_normalized[..., 0] = hsi_image[..., 0] / 360 #
Hue normalization
hsi_image_normalized[..., 1] = hsi_image[..., 1] #
Saturation normalization
hsi_image_normalized[..., 2] = hsi_image[..., 2] / 255 #
Intensity normalization
return img, hsi_image_normalized

# Path to your image
image_path = '/content/moth.jpeg' # Replace with your image
path

# Convert image and get HSI representation
original_image, hsi_image = convert_image_to_hsi(image_path)

# Plotting
fig, ax = plt.subplots(1, 2, figsize=(12, 6))

# Original Image
ax[0].imshow(original_image)
ax[0].set_title('Original Image')

```

```

ax[0].axis('off')

# HSI Image

ax[1].imshow(hsi_image)

ax[1].set_title('HSI Image')

ax[1].axis('off')

plt.show()

```

## OUTPUT:

```

21BA1876 LAB 1.ipynb
File Edit View Insert Runtime Tools Help
+ Code + Text
[1] 1 import numpy as np
2 from PIL import Image
3 import matplotlib.pyplot as plt
4
5 def rgb_to_hsi(rgb):
6     R, G, B = rgb
7     I = (R + G + B) / 3
8     min_rgb = min(R, G, B)
9     S = 1 - (3 / (R + G + B)) * min_rgb if (R + G + B) != 0 else 0
10    numerator = 0.5 * ((R - G) + (R - B))
11    denominator = np.sqrt((R - G)**2 + (R - B) * (G - B))
12    H = np.arccos(numerator / (denominator + 1e-10)) # Adding a small epsilon to avoid division by zero
13    if B > G:
14        H = 2 * np.pi - H
15    H = np.degrees(H) % 360
16    return I, S, H
17
18 def convert_image_to_hsi(image_path):
19     # Load the image
20     img = Image.open(image_path)
21     img = img.convert('RGB')
22     img_array = np.array(img)
23
24     # Initialize HSI image
25     hsi_image = np.zeros_like(img_array, dtype=float)
26
27     # Convert each pixel from RGB to HSI
28     for i in range(img_array.shape[0]):
29         for j in range(img_array.shape[1]):
30             R, G, B = img_array[i, j]
31             I, S, H = rgb_to_hsi((R, G, B))
32             hsi_image[i, j] = [H, S, I]
33
34     # Normalize HSI image for visualization
35     hsi_image_normalized = np.zeros_like(img_array, dtype=float)
36     hsi_image_normalized[:, :, 0] = hsi_image[:, :, 0] / 360 # Hue normalization
37     hsi_image_normalized[:, :, 1] = hsi_image[:, :, 1]
38     hsi_image_normalized[:, :, 2] = hsi_image[:, :, 2]
39
40     return img, hsi_image_normalized

```

```

21BA1876 LAB 1.ipynb
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[2] 1 return img, hsi_image_normalized
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## **CODE FOR HIS TO RGB:**

```
def hsi_to_rgb(hsi):
    I, S, H = hsi
    H = np.radians(H)
    R, G, B = 0, 0, 0

    if H < 2 * np.pi / 3:
        B = I * (1 - S)
        R = I * (1 + S * np.cos(H) / np.cos(np.pi / 3 - H))
        G = 3 * I - (R + B)
    elif H < 4 * np.pi / 3:
        H -= 2 * np.pi / 3
        R = I * (1 - S)
        G = I * (1 + S * np.cos(H) / np.cos(np.pi / 3 - H))
        B = 3 * I - (R + G)
    else:
        H -= 4 * np.pi / 3
        G = I * (1 - S)
        B = I * (1 + S * np.cos(H) / np.cos(np.pi / 3 - H))
        R = 3 * I - (G + B)

    return R, G, B

def convert_image_to_hsi_and_back(image_path):
    # Load the image
    img = Image.open(image_path)
    img = img.convert('RGB')
    img_array = np.array(img)
```

```

# Initialize HSI and RGB images
hsi_image = np.zeros_like(img_array, dtype=float)
rgb_back_image = np.zeros_like(img_array, dtype=float)

# Convert each pixel from RGB to HSI
for i in range(img_array.shape[0]):
    for j in range(img_array.shape[1]):
        R, G, B = img_array[i, j]
        I, S, H = rgb_to_hsi((R, G, B))
        hsi_image[i, j] = [H, S, I]
        R_back, G_back, B_back = hsi_to_rgb((I, S, H))
        rgb_back_image[i, j] = [R_back, G_back, B_back]

# Normalize images for visualization
hsi_image_normalized = np.zeros_like(img_array, dtype=float)
hsi_image_normalized[..., 0] = hsi_image[..., 0] / 360 #
Hue normalization
hsi_image_normalized[..., 1] = hsi_image[..., 1] #
Saturation normalization
hsi_image_normalized[..., 2] = hsi_image[..., 2] / 255 #
Intensity normalization

rgb_back_image = np.clip(rgb_back_image, 0,
255).astype(np.uint8)

return img, hsi_image_normalized, rgb_back_image

# Path to your image
image_path = '/content/moth.jpeg' # Replace with your image
path

```

```
# Convert image and get HSI and RGB back representations
original_image, hsi_image, rgb_back_image =
convert_image_to_hsi_and_back(image_path)

# Plotting
fig, ax = plt.subplots(1, 3, figsize=(18, 6))

# Original Image
ax[0].imshow(original_image)
ax[0].set_title('Original Image')
ax[0].axis('off')

# HSI Image
ax[1].imshow(hsi_image)
ax[1].set_title('HSI Image')
ax[1].axis('off')

# RGB Back Image
ax[2].imshow(rgb_back_image)
ax[2].set_title('RGB Back Image')
ax[2].axis('off')

plt.show()
```

# OUTPUT:

```

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+ Code + Text

[4]
1 def hsi_to_rgb(hsi):
2     I, S, H = hsi
3     R = np.arccos((H))
4     G, B = 0, 0
5
6     if H < 2 * np.pi / 3:
7         R = 1 + (1 - S)
8         G = 1 + (1 - S) * np.cos(H) / np.cos(np.pi / 3 - H)
9         B = 1 - (R + G)
10    elif H < 4 * np.pi / 3:
11        R = 1 + (1 - S)
12        G = 1 + (1 - S) * np.cos(H) / np.cos(np.pi / 3 - H)
13        B = 1 - (R + G)
14    else:
15        R = 1 + (1 - S)
16        G = 1 + (1 - S) * np.cos(H) / np.cos(np.pi / 3 - H)
17        B = 1 - (R + G)
18
19    return R, G, B

[5]
1 def convert_image_to_hsi_and_rgb(image_path):
2     # Load the image
3     img = image.imread(image_path)
4     img = img.convert('RGB')
5     img_array = np.array(img)
6
7     # Initialize HSI and RGB images
8     hsi_image = np.zeros_like(img_array, dtype=float)
9     rgb_image = np.zeros_like(img_array, dtype=float)
10
11    # Convert each pixel from RGB to HSI
12    for i in range(img_array.shape[0]):
13        for j in range(img_array.shape[1]):
14            R, G, B = img_array[i, j]
15            I, S, H = rgb_to_hsi(R, G, B)
16            hsi_image[i, j] = [I, S, H]
17            R_back, G_back, B_back = hsi_to_rgb(I, S, H)
18            rgb_image[i, j] = [R_back, G_back, B_back]
19
20    # Normalize images for visualization
21    hsi_image_normalized = np.zeros_like(img_array, dtype=float)
22    hsi_image_normalized[:, :, 0] = hsi_image[:, :, 0] / 255 # Hue normalization
23    hsi_image_normalized[:, :, 1] = hsi_image[:, :, 1] # Saturation normalization
24    hsi_image_normalized[:, :, 2] = hsi_image[:, :, 2] / 255 # Intensity normalization
25
26    rgb_image = np.clip(rgb_image, 0, 255).astype(np.uint8)
27
28    return img, hsi_image_normalized, rgb_image

1 # Path to your image
2 image_path = "/content/image.jpg" # Replace with your image path
3
4 # Convert image and get HSI and RGB back representations
5 original_image, hsi_image, rgb_image = convert_image_to_hsi_and_rgb(image_path)
6
7 # Plotting
8 fig, ax = plt.subplots(1, 3, figsize=(18, 6))
9
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```

```

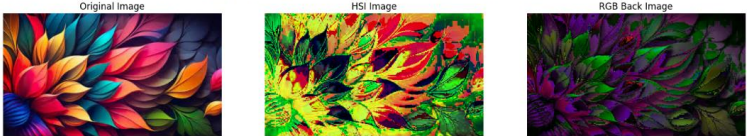
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+ Code + Text

[5]
1 def convert_image_to_hsi_and_rgb(image_path):
2     # Load the image
3     img = image.imread(image_path)
4     img = img.convert('RGB')
5     img_array = np.array(img)
6
7     # Initialize HSI and RGB images
8     hsi_image = np.zeros_like(img_array, dtype=float)
9     rgb_image = np.zeros_like(img_array, dtype=float)
10
11    # Convert each pixel from RGB to HSI
12    for i in range(img_array.shape[0]):
13        for j in range(img_array.shape[1]):
14            R, G, B = img_array[i, j]
15            I, S, H = rgb_to_hsi(R, G, B)
16            hsi_image[i, j] = [I, S, H]
17            R_back, G_back, B_back = hsi_to_rgb(I, S, H)
18            rgb_image[i, j] = [R_back, G_back, B_back]
19
20    # Normalize images for visualization
21    hsi_image_normalized = np.zeros_like(img_array, dtype=float)
22    hsi_image_normalized[:, :, 0] = hsi_image[:, :, 0] / 255 # Hue normalization
23    hsi_image_normalized[:, :, 1] = hsi_image[:, :, 1] # Saturation normalization
24    hsi_image_normalized[:, :, 2] = hsi_image[:, :, 2] / 255 # Intensity normalization
25
26    rgb_image = np.clip(rgb_image, 0, 255).astype(np.uint8)
27
28    return img, hsi_image_normalized, rgb_image

1 # Path to your image
2 image_path = "/content/image.jpg" # Replace with your image path
3
4 # Convert image and get HSI and RGB back representations
5 original_image, hsi_image, rgb_image = convert_image_to_hsi_and_rgb(image_path)
6
7 # Plotting
8 fig, ax = plt.subplots(1, 3, figsize=(18, 6))
9
10 # Original Image
11 ax[0].imshow(original_image)
12 ax[0].set_title('Original Image')
13 ax[0].axis('off')
14
15 # HSI Image
16 ax[1].imshow(hsi_image)
17 ax[1].set_title('HSI Image')
18 ax[1].axis('off')
19
20 # RGB Back Image
21 ax[2].imshow(rgb_image)
22 ax[2].set_title('RGB Back Image')
23 ax[2].axis('off')
24
25 plt.show()

<ipython-input-1-27966578ede4>:11: RuntimeWarning: overflow encountered in scalar subtract
denominator = np.sqrt((R - G)**2 + (R - B) * (G - B))
<ipython-input-1-27966578ede4>:11: RuntimeWarning: overflow encountered in scalar multiply
denominator = np.sqrt((R - G)**2 + (R - B) * (G - B))
<ipython-input-1-27966578ede4>:12: RuntimeWarning: invalid value encountered in arccos
H = np.arccos(numerator / (denominator + 1e-10)) # Adding a small epsilon to avoid division by zero
<ipython-input-1-27966578ede4>:18: RuntimeWarning: overflow encountered in scalar subtract
numerator = 0.5 * ((R - G) * (R - B) + (G - B) * (R - B))
<ipython-input-1-27966578ede4>:18: RuntimeWarning: overflow encountered in scalar add
numerator = 0.5 * ((R - G) * (R - B) + (G - B) * (R - B))
<ipython-input-1-27966578ede4>:7: RuntimeWarning: overflow encountered in scalar add
I = (R + G + B) / 3
<ipython-input-1-27966578ede4>:9: RuntimeWarning: overflow encountered in scalar add
S = 1 - ((G + B + 0) * min_rgb if (R + G + B) != 0 else 0
<ipython-input-1-27966578ede4>:26: RuntimeWarning: invalid value encountered in cast
rgb_image = np.clip(rgb_image, 0, 255).astype(np.uint8)
Warning:matplotlib.figure.Figure data for imshow with RGB data (0, 1) for floats or (0, 255) for integers.

Original Image      HSI Image      RGB Back Image

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```