LAB EXCERCISES

##**Lab Exercise 1: Image Acquisition and Color Sensing • Objective:** Implement image acquisition and process color images.

• **Task:** Capture images from a camera or load images, and perform color space conversion (RGB, HSV, YUV). Explore the effect of different color spaces on image quality

```
!pip install opencv-python
```

```
Requirement already satisfied: opencv-python in
/usr/local/lib/python3.10/dist-packages (4.10.0.84)
Requirement already satisfied: numpy>=1.21.2 in
/usr/local/lib/python3.10/dist-packages (from opencv-python) (1.26.4)
```

```
import cv2
from google.colab.patches import cv2_imshow # Import cv2_imshow
import matplotlib.pyplot as plt

image = cv2.imread('CAT.jpg')
image = cv2.resize(image, (400, 400))
image_resized = cv2.imwrite('resized_image.jpg', image)
image = cv2.imread('resized_image.jpg')

# Convert to RGB
rgb_image = cv2.cvtColor(image, cv2.COLOR_BGR2RGB)

# Convert to HSV
hsv_image = cv2.cvtColor(image, cv2.COLOR_BGR2HSV)

# Convert to YUV
yuv_image = cv2.cvtColor(image, cv2.COLOR_BGR2YUV)

# Function to add a label to an image
def add_label(image, label):
    labeled_image = image.copy()
    cv2.putText(labeled_image, label, (10, 30),
cv2.FONT_HERSHEY_SIMPLEX, 1, (255, 255, 255), 2, cv2.LINE_AA)
    return labeled_image

# Add labels to each image
image_with_label = add_label(image, "Original Image")
rgb_image_with_label = add_label(rgb_image, "RGB Image")
hsv_image_with_label = add_label(hsv_image, "HSV Image")
yuv_image_with_label = add_label(yuv_image, "YUV Image")

# Create rows
row1 = cv2.hconcat([image_with_label, rgb_image_with_label])  # Top
```

```
row
row2 = cv2.hconcat([hsv_image_with_label, yuv_image_with_label])  #
Bottom row

# Combine rows to create a 2x2 grid
grid_image = cv2.vconcat([row1, row2])

# Display the grid with labels
cv2_imshow(grid_image)
```