Blank Side

Aim: Display images in various formats using different color models.

Software Required: Any Python IDE (e.g., PyCharm, Jupyter Notebook, Google Colab)

Flowchart:

```
+----------------------+
|        Start         |
+----------------------+
           |
           v
+----------------------+
|   Import Libraries   |
+----------------------+
           |
           v
+----------------------+
|   Set Image Path     |
+----------------------+
           |
           v
+----------------------+
| Read Image using     |
|      OpenCV          |
+----------------------+
           |
           v
+----------------------+
| Convert Image to     |
|   RGB Color Model    |
+----------------------+
           |
           v
+----------------------+
| Convert Image to     |
| Grayscale Color      |
|      Model           |
+----------------------+
           |
           v
+----------------------+
| Convert Image to     |
|   HSV Color Model    |
+----------------------+
           |
           v
+----------------------+
| Convert Image to     |
|    Lab Color Model   |
+----------------------+
           |
           v
+----------------------+
| Display RGB Image    |
| using Matplotlib     |
+----------------------+
           |
           v
+---------------------+
| Display Grayscale   |
| Image using         |
|   Matplotlib        |
+---------------------+
           |
           v
+---------------------+
| Display HSV Image   |
| using Matplotlib    |
+---------------------+
           |
           v
+---------------------+
| Display Lab Image   |
| using Matplotlib    |
+---------------------+
           |
           v
+---------------------+
| Save Grayscale      |
| Image using OpenCV  |
+---------------------+
           |
           v
+---------------------+
| Save HSV Image      |
| using OpenCV        |
+---------------------+
           |
           v
+---------------------+
| Save Lab Image      |
| using OpenCV        |
+---------------------+
           |
           v
+---------------------+
|        End          |
+---------------------+
```

Code:

```
python
# Import necessary libraries
import cv2
import matplotlib.pyplot as plt

# Function to display images using Matplotlib
def display_image(title, image, cmap=None):
    plt.imshow(image, cmap=cmap)
    plt.title(title)
    plt.axis('off')
    plt.show()

# Path to the input image
image_path = 'C:/Users/YourUsername/Desktop/images/example.jpg'  # Update
this path to your image
```

```
# Step 1: Read the image file
image = cv2.imread(image_path)

# Step 2: Convert the image to different color models
# RGB (OpenCV reads images in BGR by default)
image_rgb = cv2.cvtColor(image, cv2.COLOR_BGR2RGB)

# Grayscale
image_gray = cv2.cvtColor(image, cv2.COLOR_BGR2GRAY)

# HSV
image_hsv = cv2.cvtColor(image, cv2.COLOR_BGR2HSV)

# Lab
image_lab = cv2.cvtColor(image, cv2.COLOR_BGR2Lab)

# Step 3: Display each converted image using Matplotlib
# Display original image (RGB)
display_image('RGB Image', image_rgb)

# Display grayscale image
display_image('Grayscale Image', image_gray, cmap='gray')

# Display HSV image
display_image('HSV Image', image_hsv)

# Display Lab image
display_image('Lab Image', image_lab)

# Step 4: Optionally, save the processed images
cv2.imwrite('image_gray.jpg', image_gray)
cv2.imwrite('image_hsv.png', image_hsv)
cv2.imwrite('image_lab.bmp', image_lab)
```

Output: Include printed screenshots or sample outputs of the images displayed by the code in different color models.

Ruled Side

Aim: Display images in various formats using different color models.

Software Required: Any Python IDE (e.g., PyCharm, Jupyter Notebook, Google Colab)

Algorithm:

1. **Start**
2. **Import Libraries:** Import OpenCV and Matplotlib.
3. **Set Image Path:** Define the path to the input image.
4. **Read Image using OpenCV:** Use `cv2.imread()` to read the image file.
5. **Convert Image to RGB Color Model:** Convert the image to RGB using `cv2.cvtColor()`.
6. **Convert Image to Grayscale Color Model:** Convert the image to grayscale using `cv2.cvtColor()`.

7. **Convert Image to HSV Color Model:** Convert the image to HSV using `cv2.cvtColor()`.
8. **Convert Image to Lab Color Model:** Convert the image to Lab using `cv2.cvtColor()`.
9. **Display RGB Image using Matplotlib:** Display the RGB image using `plt.imshow()`.
10. **Display Grayscale Image using Matplotlib:** Display the grayscale image using `plt.imshow()` with grayscale colormap.
11. **Display HSV Image using Matplotlib:** Display the HSV image using `plt.imshow()`.
12. **Display Lab Image using Matplotlib:** Display the Lab image using `plt.imshow()`.
13. **Save Grayscale Image using OpenCV:** Save the grayscale image using `cv2.imwrite()`.
14. **Save HSV Image using OpenCV:** Save the HSV image using `cv2.imwrite()`.
15. **Save Lab Image using OpenCV:** Save the Lab image using `cv2.imwrite()`.
16. **End**

Steps:

1. **Setup and Installation:**
   - Install Python, OpenCV, and Matplotlib.
   - Use pip to install the libraries:

     ```
     pip install opencv-python matplotlib
     ```

2. **Read the Image:**
   - Use `cv2.imread()` to read the image from the specified path.
3. **Convert to Different Color Models:**
   - Convert the image to RGB, grayscale, HSV, and Lab color models using `cv2.cvtColor()`.
4. **Display Images:**
   - Use Matplotlib's `imshow()` to display the images in different color models.
5. **Save Processed Images:**
   - Use `cv2.imwrite()` to save the images in various formats.

Conclusion:

This experiment demonstrates how to read, convert, display, and save images in different color models using Python. Understanding these basic operations is crucial for more advanced image processing tasks. By practicing these steps, students can deepen their understanding of image representation and manipulation, which are fundamental concepts in computer vision and image processing.