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Program :

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

# ---- Read input image path from command line ----
if len(sys.argv) < 2:
    print("Usage: python color_histogram.py /path/to/image.jpg")
    sys.exit(1)

img_path = sys.argv[1]


image = cv2.imread(img_path)           # OpenCV loads images in BGR order
if image is None:
    raise FileNotFoundError(f"Image not found: {img_path}")

 # Debug: image shape and dtype
h, w = image.shape[:2]
print(f"Loaded image: {img_path}")
print(f"Image shape (H,W,Channels): {image.shape}, dtype: {image.dtype}")
print(f"Number of pixels: {h} * {w} = {h*w}")

image_rgb = cv2.cvtColor(image, cv2.COLOR_BGR2RGB)

# ---- 3) Compute histograms for each RGB channel ----
colors = ('red', 'green', 'blue')
hist_features = []
plt.figure(figsize=(10,4))

for i, col in enumerate(colors):
    # calcHist expects:
    #  images = [image], channels = [i], mask=None, bins = [256], range = [0,256]
    hist = cv2.calcHist([image_rgb], [i], None, [256], [0, 256])
    print(f"{col} hist shape: {hist.shape}, sum of bins: {int(hist.sum())}")
    hist_features.append(hist.flatten())  # store 256-bin 1D array
    plt.plot(hist, label=f'{col} channel')

plt.xlim([0,256])
plt.xlabel('Pixel intensity (0-255)')
plt.ylabel('Frequency')
plt.title('RGB Color Histograms')
plt.legend()
plt.tight_layout()
plt.savefig('rgb_histogram.png', dpi=150)  # save the plot to file
print("Saved histogram plot to rgb_histogram.png")
plt.show()

# ---- 4) Create a combined feature vector (256*3 = 768) ----
feature_vector = np.concatenate(hist_features)
print("Feature vector length:", feature_vector.shape[0])    # should be 768

# Optional: save feature vector to CSV
np.savetxt('color_feature_vector.csv', feature_vector, delimiter=',')
print("Saved feature vector to color_feature_vector.csv")
```

Output：

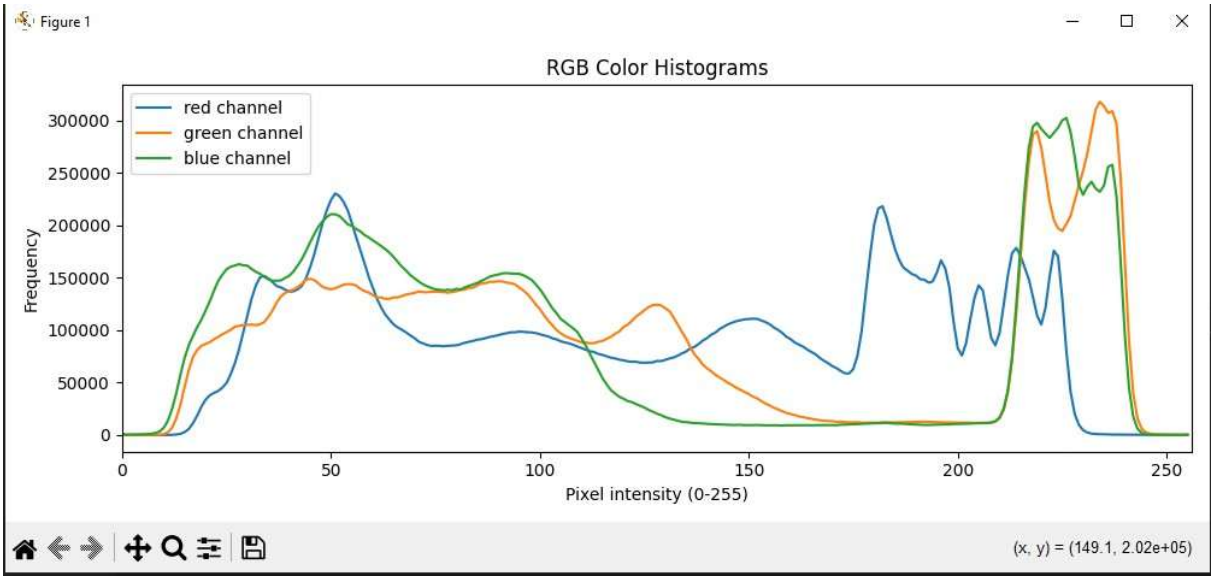
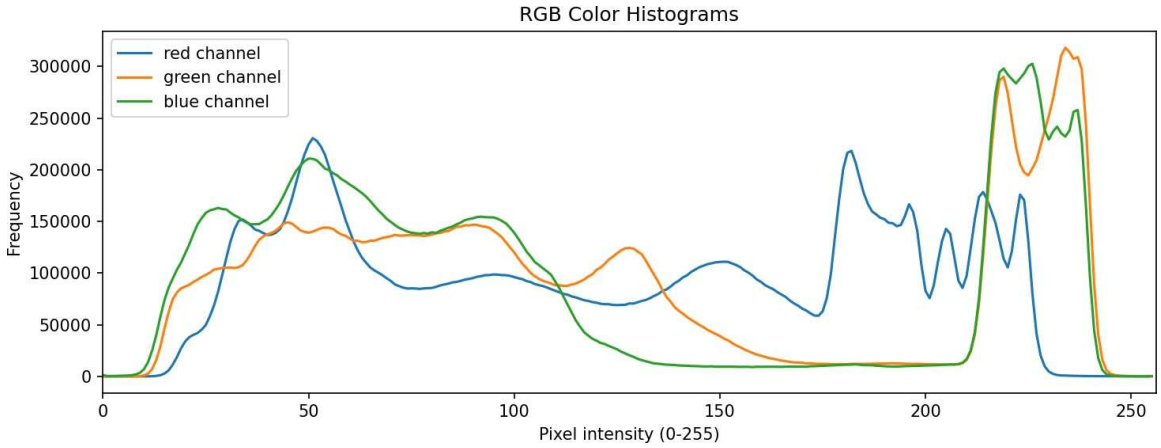


Figure 1
RGB Color Histograms
red channel
green channel
blue channel
Frequency
Pixel intensity (0-255)
(x, y) = (149.1, 2.02e+05)


RGB Color Histograms
red channel
green channel
blue channel
Frequency
Pixel intensity (0-255)