画像読み込み

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

from google.colab.patches import cv2_imshow
from google.colab import files
uploaded_file = files.upload()
```

ファイル選択 player_butt...dengen.png
- **player_button12_dengen.png**(image/png) - 17352 bytes, last modified: 2023/9/16 - 100% done
Saving player_button12_dengen.png to player_button12_dengen.png

```
uploaded_file_name = next(iter(uploaded_file))
print(uploaded_file_name)
```
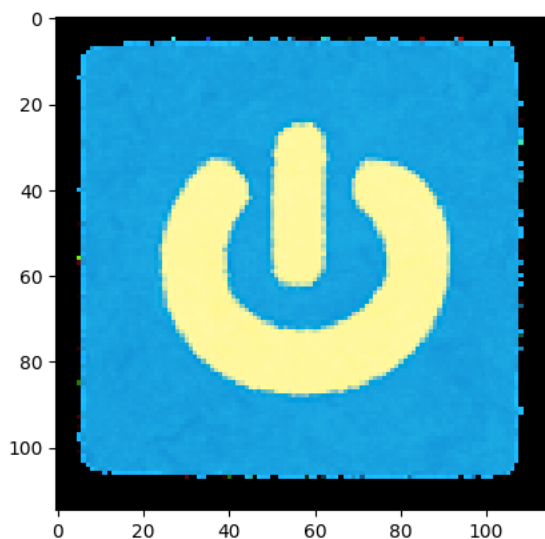
player_button12_dengen.png

```
orig = cv2.imread(uploaded_file_name)
img = cv2.cvtColor(orig, cv2.COLOR_BGR2RGB)

from matplotlib import pyplot as plt

plt.imshow(img)
```
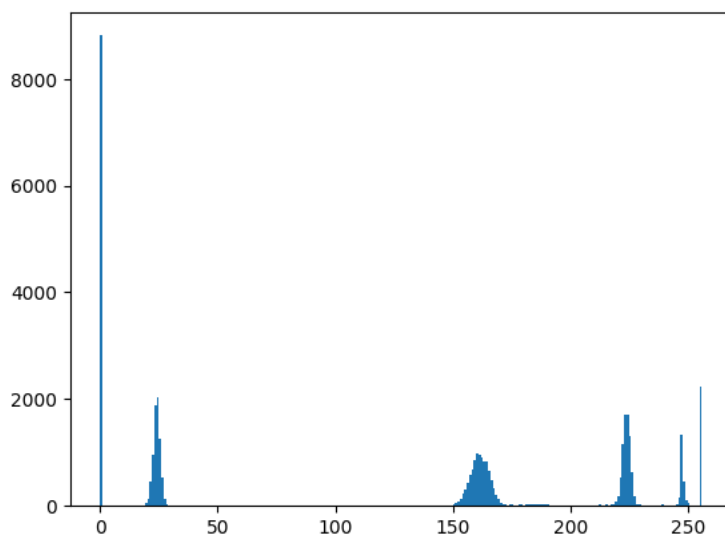
<matplotlib.image.AxesImage at 0x79aa2893a5f0>

ヒストグラム作成　方法１

```
plt.hist(img.flatten(), 256, [0,256]);
```

ヒストグラム作成　方法2 RGB
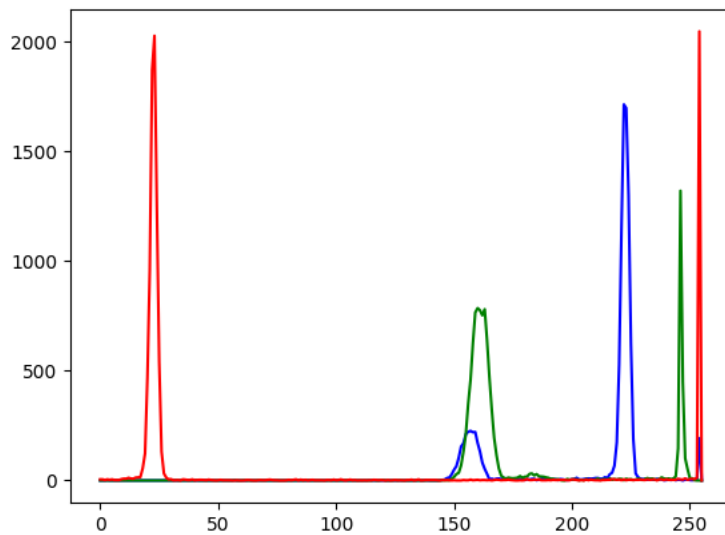
```
img = cv2.imread(uploaded_file_name)
#カラーリスト
colorList = ["blue","green","red"]

for i,j in enumerate(colorList):
    # ヒストグラム
    hist = cv2.calcHist(images   = [img],      # 画像データを指定
                        channels = [i],        # ヒストグラムを計算する画像のチャンネルのインデックス
                        mask     = None,       # マスク画像｜全画素のヒストグラムを計算する場合 "None" を指定
                        histSize = [256],      # ビン数
                        ranges   = [1,256]     # ヒストグラムの範囲
                        )
    # 可視化
    plt.plot(hist, color=j)
```


折れ線型のトーンカーブ（グレースケールで行ってください。分かりやすいです。）

```
import numpy as np


# 変換前の画素値x
x = np.arange(256)

# 200が255に変換されるように傾きを求める
a = 255 / (200 - 0)

# xを線形変換する
# 画素値の最大値は255である
y = np.clip(a * (x - 0) + 0, 0, 255)

plt.plot(x, y)
plt.xlabel('変換前 x')
plt.ylabel('変換後 y')
```
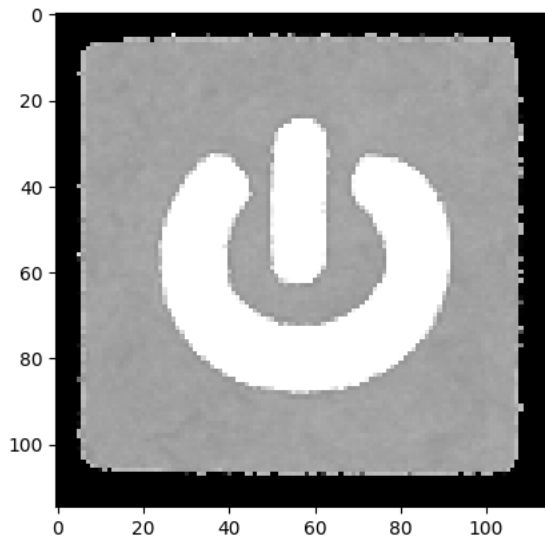
Text(0, 0.5, '変換後 y')/usr/local/lib/python3.10/dist-packages/IPython/core/events.py:89: UserWarning: Glyph 22793 (¥N{CJK UNIFIED IDEOGRAPH-590
  func(*args, **kwargs)
/usr/local/lib/python3.10/dist-packages/IPython/core/events.py:89: UserWarning: Glyph 25563 (¥N{CJK UNIFIED IDEOGRAPH-63DB}) missing from current
  func(*args, **kwargs)
/usr/local/lib/python3.10/dist-packages/IPython/core/events.py:89: UserWarning: Glyph 21069 (¥N{CJK UNIFIED IDEOGRAPH-524D}) missing from current
  func(*args, **kwargs)
/usr/local/lib/python3.10/dist-packages/IPython/core/events.py:89: UserWarning: Glyph 24460 (¥N{CJK UNIFIED IDEOGRAPH-5F8C}) missing from current
  func(*args, **kwargs)
/usr/local/lib/python3.10/dist-packages/IPython/core/pylabtools.py:151: UserWarning: Glyph 22793 (¥N{CJK UNIFIED IDEOGRAPH-5909}) missing from cu
  fig.canvas.print_figure(bytes_io, **kw)
/usr/local/lib/python3.10/dist-packages/IPython/core/pylabtools.py:151: UserWarning: Glyph 25563 (¥N{CJK UNIFIED IDEOGRAPH-63DB}) missing from cu
  fig.canvas.print_figure(bytes_io, **kw)
/usr/local/lib/python3.10/dist-packages/IPython/core/pylabtools.py:151: UserWarning: Glyph 21069 (¥N{CJK UNIFIED IDEOGRAPH-524D}) missing from cu
  fig.canvas.print_figure(bytes_io, **kw)
/usr/local/lib/python3.10/dist-packages/IPython/core/pylabtools.py:151: UserWarning: Glyph 24460 (¥N{CJK UNIFIED IDEOGRAPH-5F8C}) missing from cu
  fig.canvas.print_figure(bytes_io, **kw)
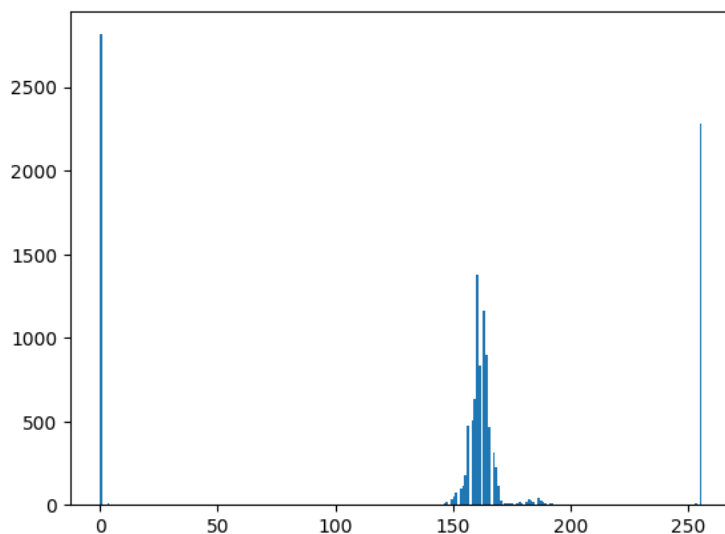


```
img = cv2.imread(uploaded_file_name ,0)
img_lut = cv2.LUT(img, y)
plt.imshow(img_lut, 'gray')
```

<matplotlib.image.AxesImage at 0x79aa28403a00>


```
plt.hist(img_lut.flatten(), 256, [0,256]);
```


ヒストグラム平坦化

```
img = cv2.imread(uploaded_file_name, 0)
# ヒストグラム平坦化
dst1 = cv2.equalizeHist(img)
```

```python
# 適応的ヒストグラム平坦化
clahe = cv2.createCLAHE(clipLimit=2.0, tileGridSize=(8,8))
dst2 = clahe.apply(img)


#描画
plt.figure(figsize=(16, 6))
plt.subplot(2, 3, 1)
plt.title('基画像')
plt.hist(img.flatten(),256,[1,256], color = 'r');

plt.subplot(2, 3, 2)
plt.title('ヒストグラム平坦化')
plt.hist(dst1.flatten(),256,[1,256], color = 'r');

plt.subplot(2, 3, 3)
plt.title('適応的ヒストグラム平坦化')
plt.hist(dst2.flatten(),256,[5,256], color = 'r');

plt.subplot(2, 3, 4)
plt.imshow(img, 'gray');
plt.xticks([]);
plt.yticks([]);

plt.subplot(2, 3, 5)
plt.imshow(dst1, 'gray');
plt.xticks([]);
plt.yticks([]);

plt.subplot(2, 3, 6)
plt.imshow(dst2, 'gray');
plt.xticks([]);
plt.yticks([]);
```

↪

```python
# 適応的ヒストグラム平坦化
clahe = cv2.createCLAHE(clipLimit=2.0, tileGridSize=(8,8))
dst2 = clahe.apply(img)


#描画
plt.figure(figsize=(16, 6))
plt.subplot(2, 3, 1)
plt.title('基画像')
plt.hist(img.flatten(),256,[1,256], color = 'r');
```

```
/usr/local/lib/python3.10/dist-packages/IPython/core/events.py:89: UserWarning: Glyph 22522 (¥N{CJK UNIFIED IDEOGRAPH-57FA}) missing from curren
  func(*args, **kwargs)
/usr/local/lib/python3.10/dist-packages/IPython/core/events.py:89: UserWarning: Glyph 30011 (¥N{CJK UNIFIED IDEOGRAPH-753B}) missing from curren
  func(*args, **kwargs)
/usr/local/lib/python3.10/dist-packages/IPython/core/events.py:89: UserWarning: Glyph 20687 (¥N{CJK UNIFIED IDEOGRAPH-50CF}) missing from curren
  func(*args, **kwargs)
/usr/local/lib/python3.10/dist-packages/IPython/core/events.py:89: UserWarning: Glyph 12498 (¥N{KATAKANA LETTER HI}) missing from current font.
  func(*args, **kwargs)
/usr/local/lib/python3.10/dist-packages/IPython/core/events.py:89: UserWarning: Glyph 12473 (¥N{KATAKANA LETTER SU}) missing from current font.
  func(*args, **kwargs)
/usr/local/lib/python3.10/dist-packages/IPython/core/events.py:89: UserWarning: Glyph 12488 (¥N{KATAKANA LETTER TO}) missing from current font.
  func(*args, **kwargs)
/usr/local/lib/python3.10/dist-packages/IPython/core/events.py:89: UserWarning: Glyph 12464 (¥N{KATAKANA LETTER GU}) missing from current font.
  func(*args, **kwargs)
/usr/local/lib/python3.10/dist-packages/IPython/core/events.py:89: UserWarning: Glyph 12521 (¥N{KATAKANA LETTER RA}) missing from current font.
  func(*args, **kwargs)
/usr/local/lib/python3.10/dist-packages/IPython/core/events.py:89: UserWarning: Glyph 12512 (¥N{KATAKANA LETTER MU}) missing from current font.
  func(*args, **kwargs)
/usr/local/lib/python3.10/dist-packages/IPython/core/events.py:89: UserWarning: Glyph 24179 (¥N{CJK UNIFIED IDEOGRAPH-5E73}) missing from curren
  func(*args, **kwargs)
/usr/local/lib/python3.10/dist-packages/IPython/core/events.py:89: UserWarning: Glyph 22374 (¥N{CJK UNIFIED IDEOGRAPH-5766}) missing from curren
  func(*args, **kwargs)
/usr/local/lib/python3.10/dist-packages/IPython/core/events.py:89: UserWarning: Glyph 21270 (¥N{CJK UNIFIED IDEOGRAPH-5316}) missing from curren
  func(*args, **kwargs)
/usr/local/lib/python3.10/dist-packages/IPython/core/events.py:89: UserWarning: Glyph 36969 (¥N{CJK UNIFIED IDEOGRAPH-9069}) missing from curren
  func(*args, **kwargs)
/usr/local/lib/python3.10/dist-packages/IPython/core/events.py:89: UserWarning: Glyph 24540 (¥N{CJK UNIFIED IDEOGRAPH-5FDC}) missing from curren
  func(*args, **kwargs)
/usr/local/lib/python3.10/dist-packages/IPython/core/events.py:89: UserWarning: Glyph 30340 (¥N{CJK UNIFIED IDEOGRAPH-7684}) missing from curren
  func(*args, **kwargs)
/usr/local/lib/python3.10/dist-packages/IPython/core/pylabtools.py:151: UserWarning: Glyph 22522 (¥N{CJK UNIFIED IDEOGRAPH-57FA}) missing from c
  fig.canvas.print_figure(bytes_io, **kw)
/usr/local/lib/python3.10/dist-packages/IPython/core/pylabtools.py:151: UserWarning: Glyph 30011 (¥N{CJK UNIFIED IDEOGRAPH-753B}) missing from c
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/usr/local/lib/python3.10/dist-packages/IPython/core/pylabtools.py:151: UserWarning: Glyph 20687 (¥N{CJK UNIFIED IDEOGRAPH-50CF}) missing from c
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  fig.canvas.print_figure(bytes_io, **kw)
/usr/local/lib/python3.10/dist-packages/IPython/core/pylabtools.py:151: UserWarning: Glyph 12512 (¥N{KATAKANA LETTER MU}) missing from current f
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```