ColorPaletteExtractionAnalysis

June 28, 2021

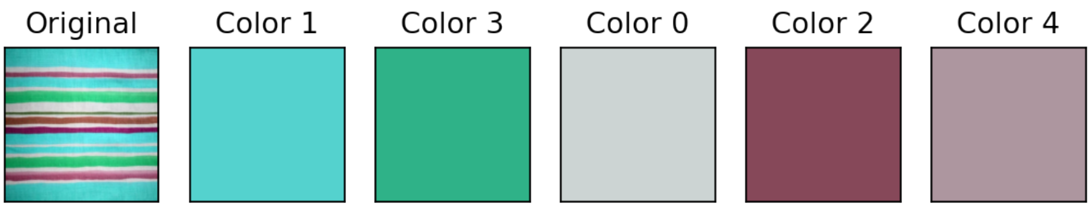
1 K Means Clustering (RGB)

[1]:

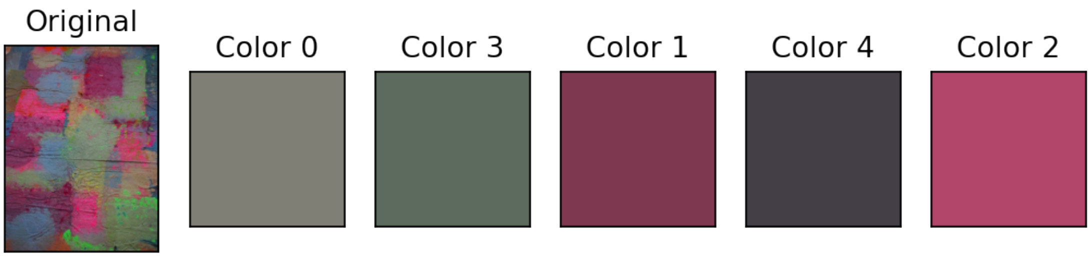
```
import numpy as np
import cv2 as cv
from matplotlib import pyplot as plt
from matplotlib.pyplot import figure
from collections import Counter
import os
from sklearn.cluster import KMeans

folder = 'sample'
for filename in os.listdir(folder):
    figure(figsize=(8, 6), dpi=160)
    img_original = cv.imread(folder+'/'+filename)
    img_original= cv.cvtColor(img_original, cv.COLOR_BGR2RGB)
    pixels = np.reshape(img_original,(-1,3))
    clustering = KMeans(init="k-means++",n_clusters=5).fit(pixels)
    labels_unique = np.unique(clustering.labels_)
    counter = Counter(clustering.labels_)
    print('Count of Labels = ',counter.most_common())
    plt.subplot(1,len(clustering.cluster_centers_)+1,1),plt.imshow(img_original)
    plt.title('Original'), plt.xticks([]), plt.yticks([])
    for i in range(len(counter.most_common())):
        color_i = [[clustering.cluster_centers_[counter.most_common()[i][0]]/
 ↪255]*400]*400
        plt.subplot(1,len(clustering.cluster_centers_)+1,i+2),plt.
 ↪imshow(color_i)
        plt.title('Color '+str(counter.most_common()[i][0])), plt.xticks([]),␣
 ↪plt.yticks([])
    plt.show()
```

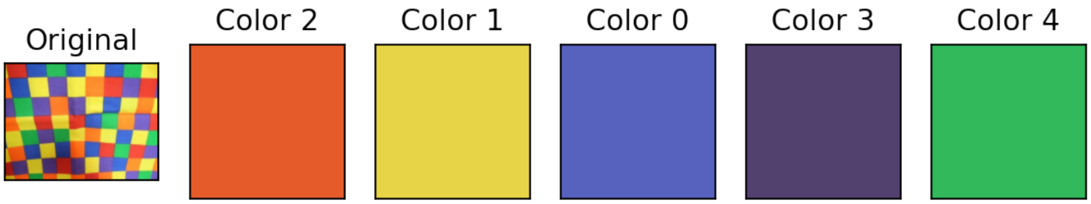
```
Count of Labels =  [(1, 94478), (3, 54171), (0, 53673), (2, 36458), (4, 23364)]
```



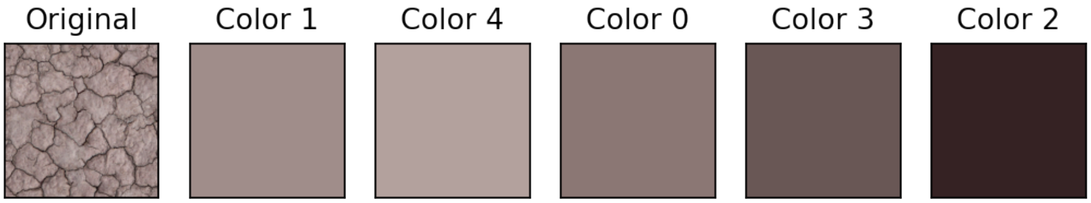
```
Count of Labels =  [(0, 88658), (3, 76722), (1, 63614), (4, 42574), (2, 35632)]
```



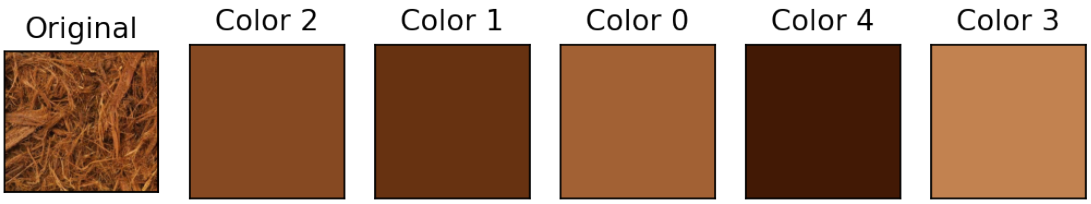
```
Count of Labels =  [(2, 32558), (1, 31309), (0, 26934), (3, 14872), (4, 14327)]
```



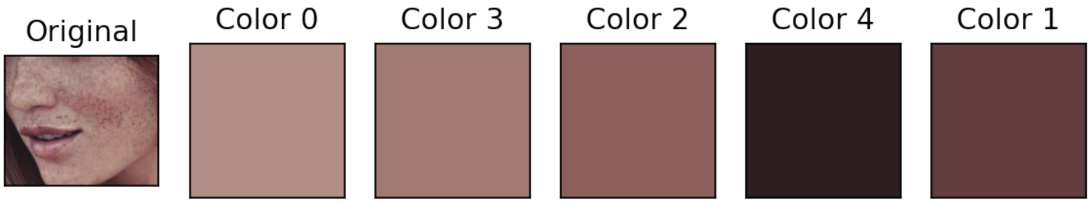
```
Count of Labels =  [(1, 155018), (4, 102657), (0, 94677), (3, 39625), (2,
17623)]
```



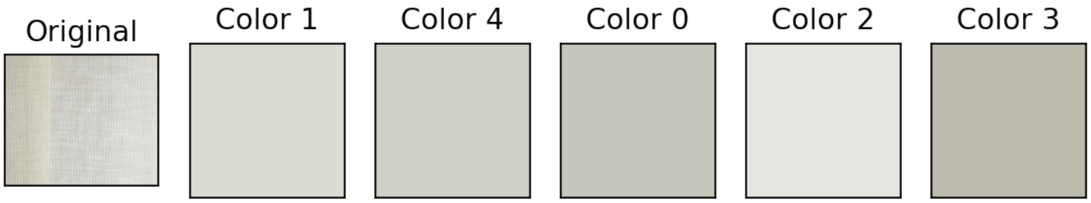
```
Count of Labels =  [(2, 63750), (1, 55436), (0, 50934), (4, 35204), (3, 21176)]
```



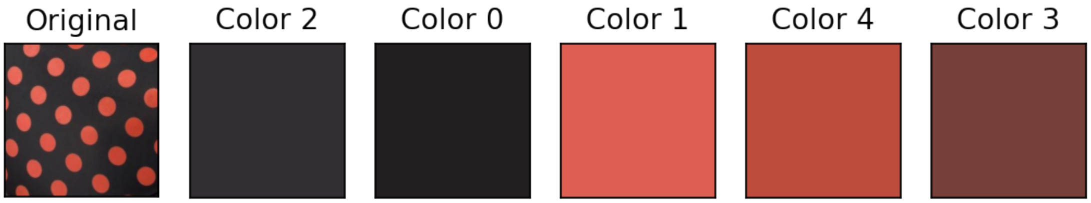
```
Count of Labels =  [(0, 73880), (3, 72152), (2, 38956), (4, 19143), (1, 16972)]
```



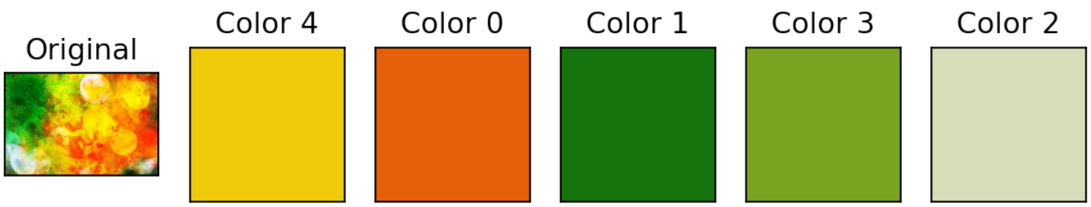
```
Count of Labels =  [(1, 54006), (4, 53254), (0, 50070), (2, 33564), (3, 28916)]
```



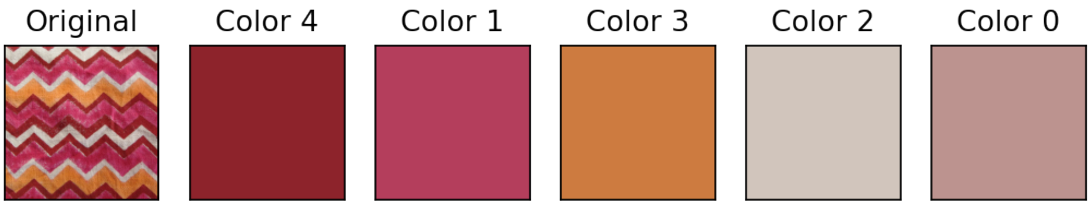
```
Count of Labels =  [(2, 54066), (0, 17491), (1, 13113), (4, 8398), (3, 3028)]
```



```
Count of Labels =  [(4, 105240), (0, 69691), (1, 46909), (3, 26091), (2, 23005)]
```



```
Count of Labels =  [(4, 53430), (1, 46673), (3, 31173), (2, 24207), (0, 19241)]
```



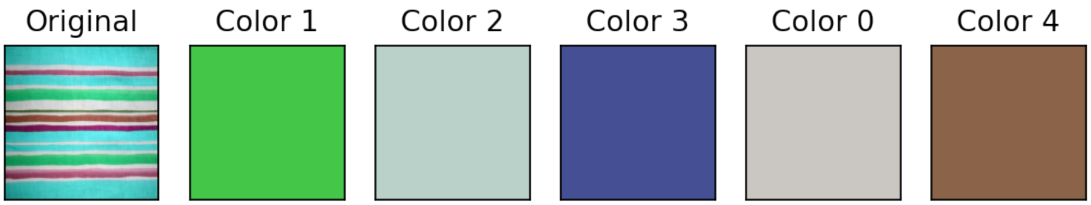
2 K Means Clustering (HSV)

[2]:

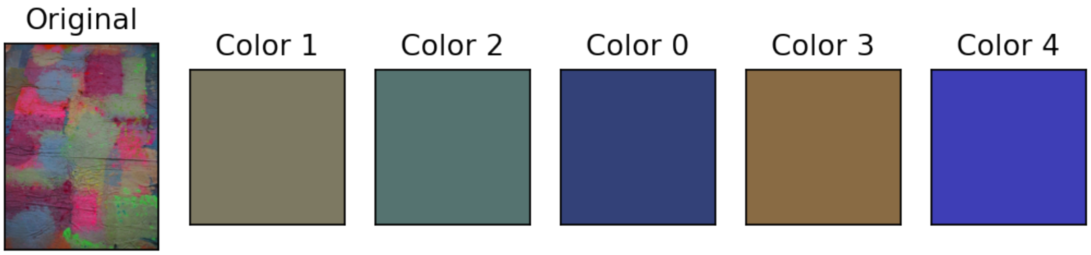
```python
import numpy as np
import cv2 as cv
from matplotlib import pyplot as plt
from matplotlib.pyplot import figure
from collections import Counter
import os
from sklearn.cluster import KMeans
from matplotlib.colors import hsv_to_rgb

folder = 'sample'
for filename in os.listdir(folder):
    figure(figsize=(8, 6), dpi=160)
    img_original = cv.imread(folder+'/'+filename)
    img_rgb= cv.cvtColor(img_original, cv.COLOR_BGR2RGB)
    img_hsv = cv.cvtColor(img_original, cv.COLOR_BGR2HSV)
    pixels = np.reshape(img_hsv,(-1,3))
    clustering = KMeans(init="k-means++",n_clusters=5).fit(pixels)
    labels_unique = np.unique(clustering.labels_)
    counter = Counter(clustering.labels_)
    print('Count of Labels = ',counter.most_common())
    plt.subplot(1,len(clustering.cluster_centers_)+1,1),plt.imshow(img_rgb)
    plt.title('Original'), plt.xticks([]), plt.yticks([])
    for i in range(len(counter.most_common())):
        color_i = hsv_to_rgb(clustering.cluster_centers_[counter.
↪most_common()[i][0]]/255)
        color_i = [[color_i]*400]*400
        plt.subplot(1,len(clustering.cluster_centers_)+1,i+2),plt.
↪imshow(color_i)
        plt.title('Color '+str(counter.most_common()[i][0])), plt.xticks([]),␣
↪plt.yticks([])
    plt.show()
```

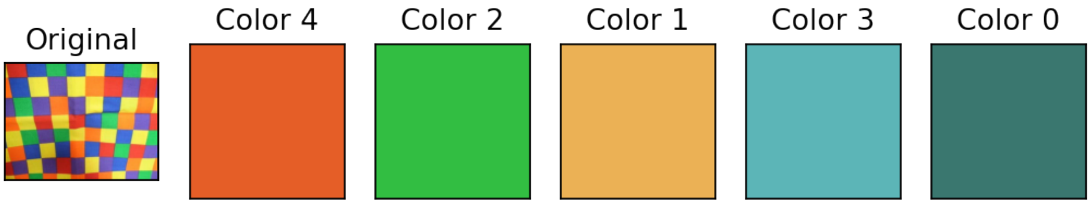
```
Count of Labels =  [(1, 146065), (2, 52592), (3, 28781), (0, 19822), (4, 14884)]
```



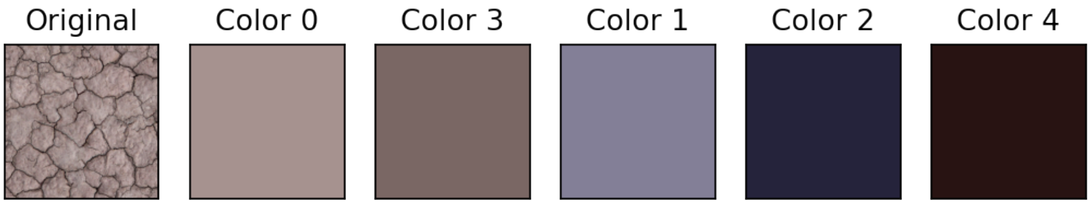
```
Count of Labels =  [(1, 92444), (2, 83731), (0, 64268), (3, 37125), (4, 29632)]
```



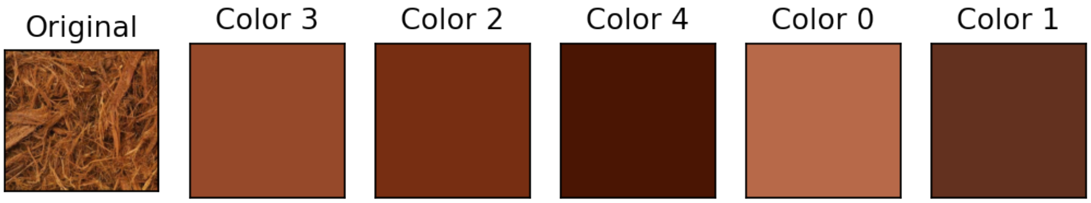
```
Count of Labels =  [(4, 40367), (2, 27316), (1, 22995), (3, 15643), (0, 13679)]
```



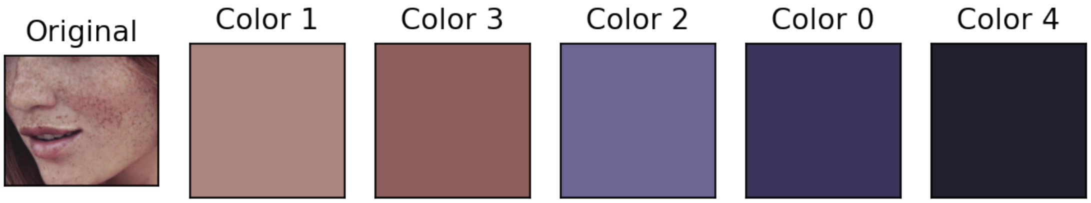
```
Count of Labels =  [(0, 248246), (3, 82630), (1, 62196), (2, 12706), (4, 3822)]
```



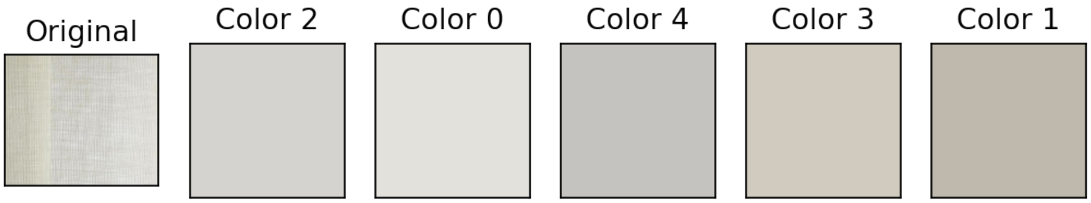
```
Count of Labels =  [(3, 67679), (2, 48325), (4, 40844), (0, 37732), (1, 31920)]
```



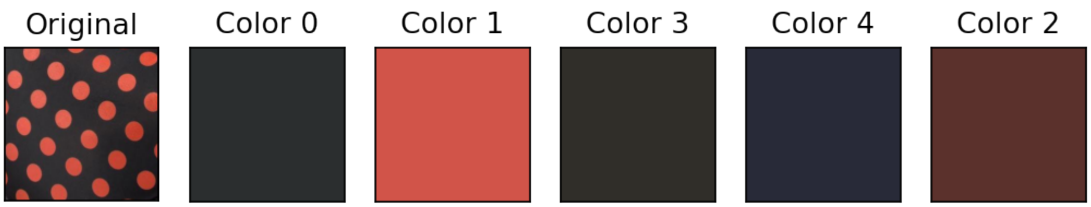
```
Count of Labels =  [(1, 126777), (3, 46313), (2, 16705), (0, 15875), (4, 15433)]
```



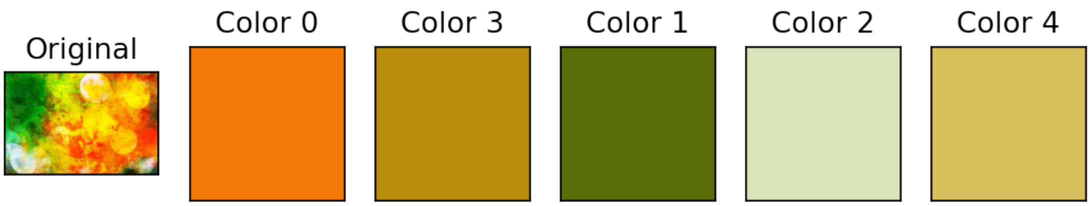
```
Count of Labels =  [(2, 60584), (0, 54995), (4, 39066), (3, 34912), (1, 30253)]
```



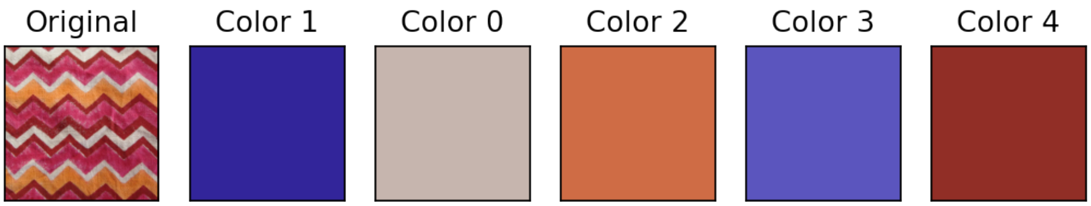
```
Count of Labels =  [(0, 51345), (1, 21183), (3, 8717), (4, 8272), (2, 6579)]
```



```
Count of Labels =  [(0, 147191), (3, 45066), (1, 44893), (2, 18241), (4, 15545)]
```



```
Count of Labels =  [(1, 59703), (0, 36065), (2, 31250), (3, 29137), (4, 18569)]
```



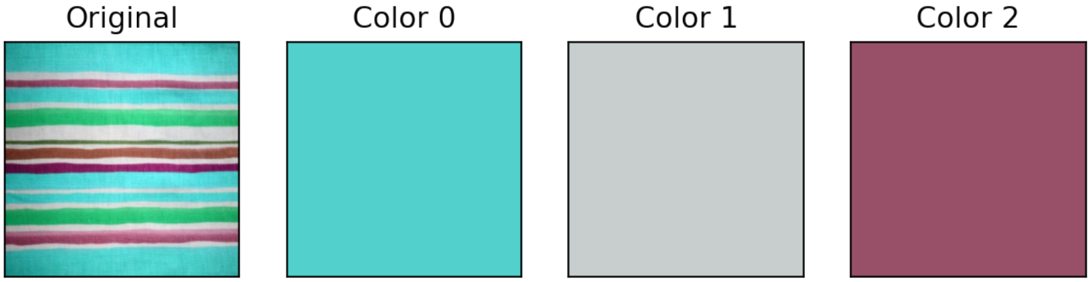
3 Mean Shift Clustering (RGB)

[3]:

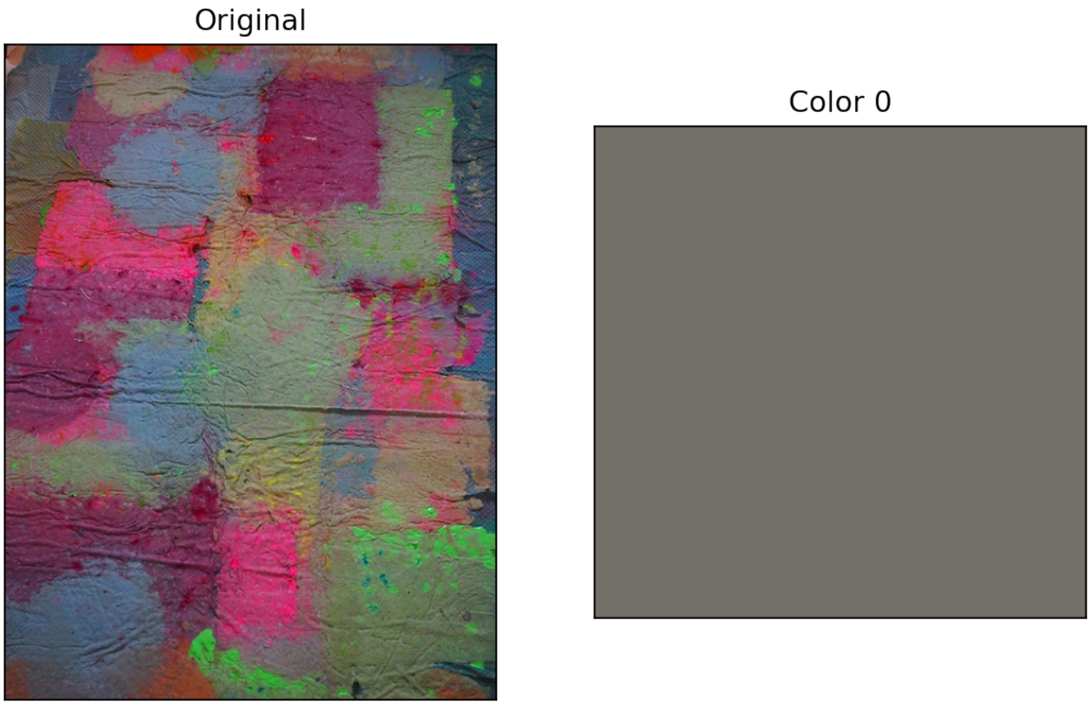
```
import numpy as np
import cv2 as cv
from matplotlib import pyplot as plt
from matplotlib.pyplot import figure
from collections import Counter
import os
from sklearn.cluster import MeanShift, estimate_bandwidth
import torch

folder = 'sample'
for filename in os.listdir(folder):
    figure(figsize=(8, 6), dpi=160)
    img_original = cv.imread(folder+'/'+filename)
    img_original = cv.cvtColor(img_original, cv.COLOR_BGR2RGB)
    pixels = np.reshape(img_original,(-1,3))
    pixels_sample = np.random.default_rng().choice(pixels,1000,replace=False)
    bandwidth = estimate_bandwidth(pixels_sample, quantile=0.2)
    clustering = MeanShift(bandwidth=bandwidth).fit(pixels_sample)
    labels_unique = np.unique(clustering.labels_)
    counter = Counter(clustering.labels_)
    print('Count of Labels = ',counter.most_common())
    plt.subplot(1,len(clustering.cluster_centers_)+1,1),plt.imshow(img_original)
    plt.title('Original'), plt.xticks([]), plt.yticks([])
    for i in range(len(counter.most_common())):
        color_i = [[clustering.cluster_centers_[counter.most_common()[i][0]]/
↪255]*400]*400
        plt.subplot(1,len(clustering.cluster_centers_)+1,i+2),plt.
↪imshow(color_i)
        plt.title('Color '+str(counter.most_common()[i][0])), plt.xticks([]),␣
↪plt.yticks([])
    plt.show()
```

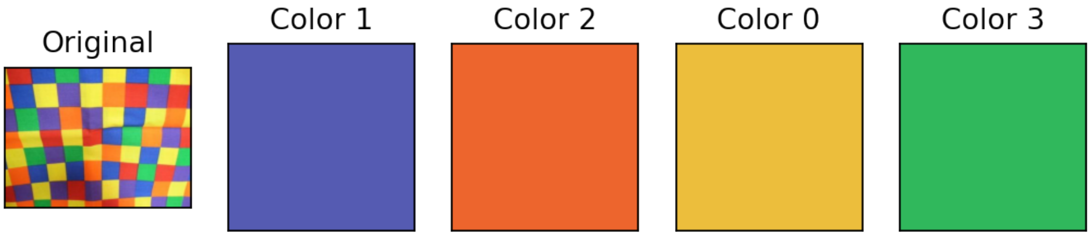
```
Count of Labels =  [(0, 565), (1, 258), (2, 177)]
```



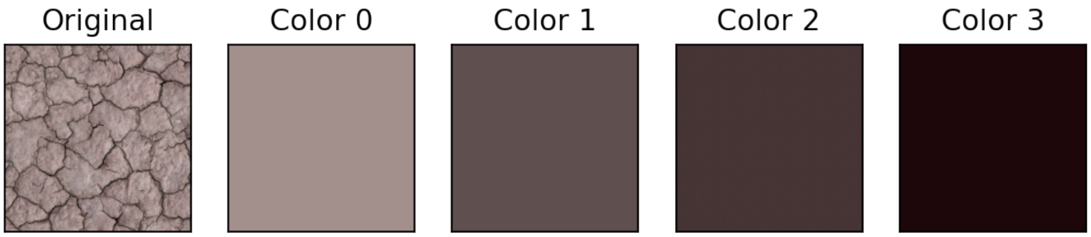
```
Count of Labels =  [(0, 1000)]
```



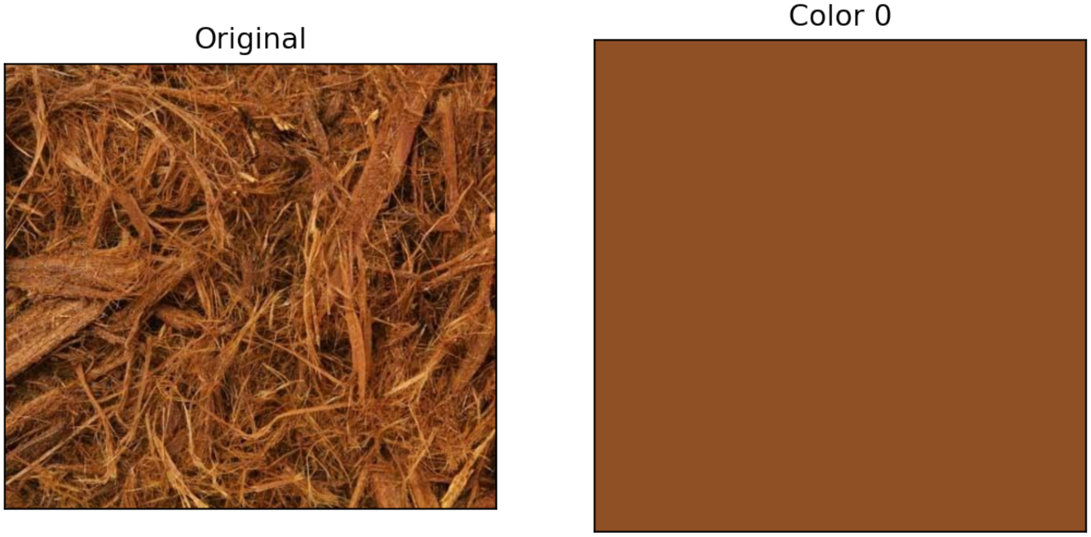
```
Count of Labels =  [(1, 355), (2, 265), (0, 253), (3, 127)]
```



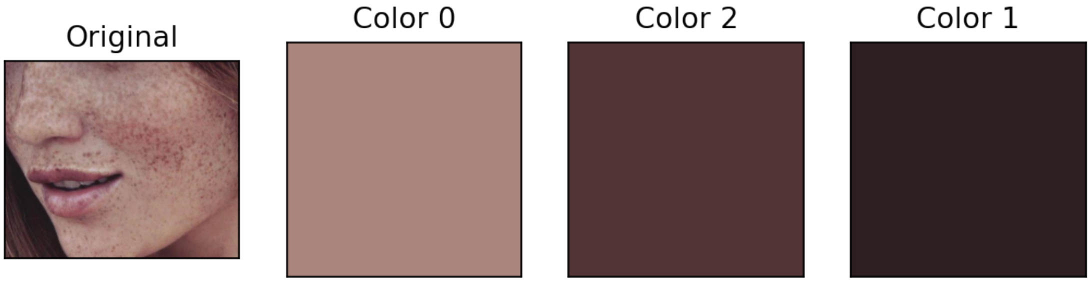
```
Count of Labels =  [(0, 815), (1, 125), (2, 38), (3, 22)]
```



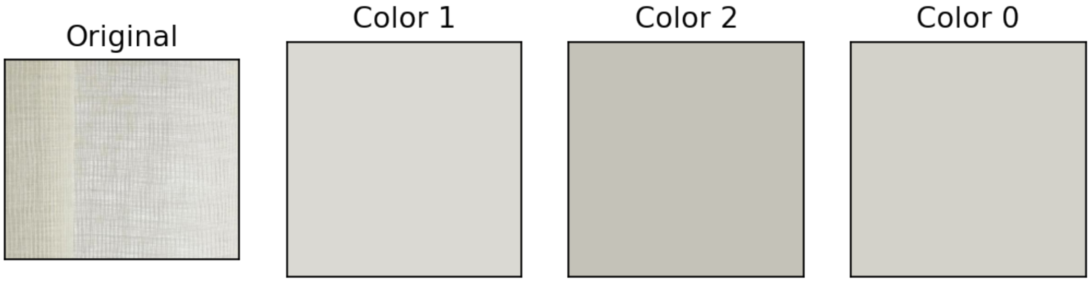
```
Count of Labels =  [(0, 1000)]
```



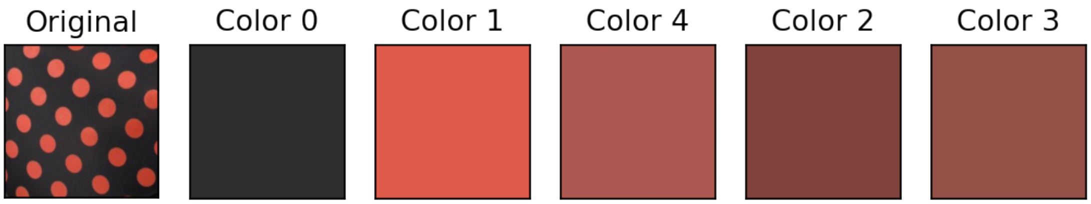
```
Count of Labels =  [(0, 817), (2, 123), (1, 60)]
```



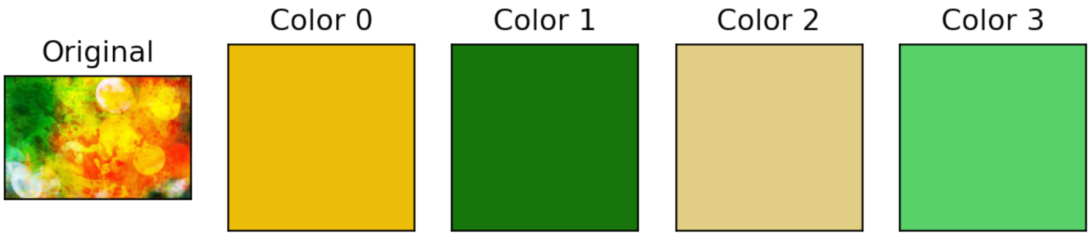
```
Count of Labels =  [(1, 372), (2, 332), (0, 296)]
```



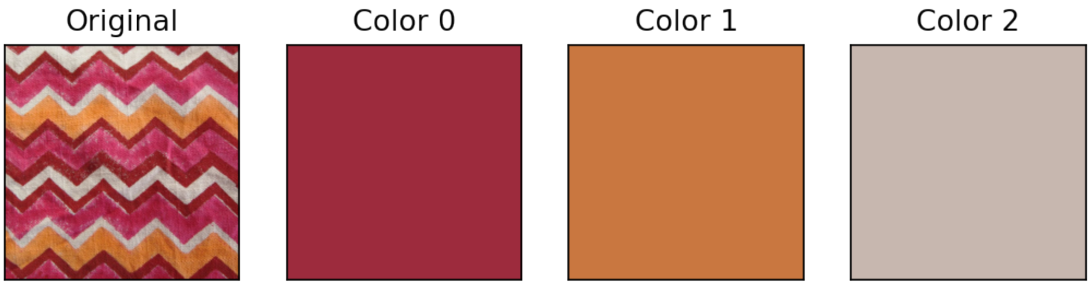
```
Count of Labels =  [(0, 773), (1, 148), (4, 37), (2, 26), (3, 16)]
```



```
Count of Labels =  [(0, 671), (1, 201), (2, 87), (3, 41)]
```



```
Count of Labels =  [(0, 504), (1, 271), (2, 225)]
```



4 Mean Shift Clustering (HSV)

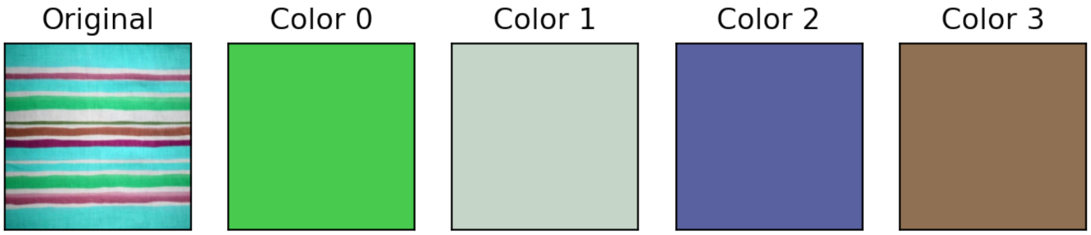
[4]:

```
import numpy as np
import cv2 as cv
from matplotlib import pyplot as plt
from matplotlib.pyplot import figure
from collections import Counter
import os
from sklearn.cluster import MeanShift, estimate_bandwidth
```

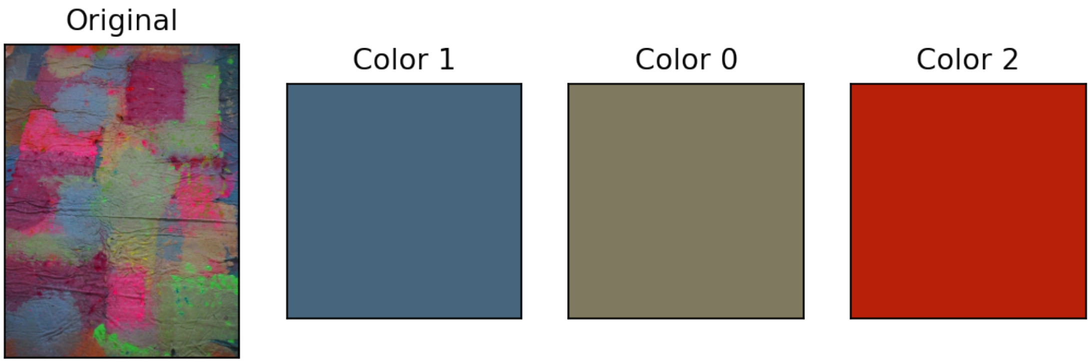
```
import torch
from matplotlib.colors import hsv_to_rgb

folder = 'sample'
for filename in os.listdir(folder):
    figure(figsize=(8, 6), dpi=160)
    img_original = cv.imread(folder+'/'+filename)
    img_hsv = cv.cvtColor(img_original, cv.COLOR_BGR2HSV)
    img_original = cv.cvtColor(img_original, cv.COLOR_BGR2RGB)
    pixels = np.reshape(img_hsv,(-1,3))
    pixels_sample = np.random.default_rng().choice(pixels,1000,replace=False)
    bandwidth = estimate_bandwidth(pixels_sample, quantile=0.2)
    clustering = MeanShift(bandwidth=bandwidth).fit(pixels_sample)
    labels_unique = np.unique(clustering.labels_)
    counter = Counter(clustering.labels_)
    print('Count of Labels = ',counter.most_common())
    plt.subplot(1,len(clustering.cluster_centers_)+1,1),plt.imshow(img_original)
    plt.title('Original'), plt.xticks([]), plt.yticks([])
    for i in range(len(counter.most_common())):
        color_i = hsv_to_rgb(clustering.cluster_centers_[counter.
 ↪most_common()[i][0]]/255)
        color_i = [[color_i]*400]*400
        plt.subplot(1,len(clustering.cluster_centers_)+1,i+2),plt.
 ↪imshow(color_i)
        plt.title('Color '+str(counter.most_common()[i][0])), plt.xticks([]),␣
 ↪plt.yticks([])
    plt.show()
```

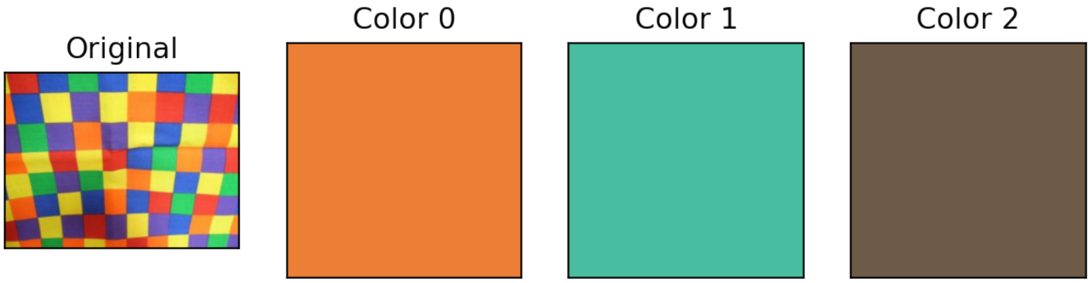
```
Count of Labels =  [(0, 568), (1, 236), (2, 139), (3, 57)]
```



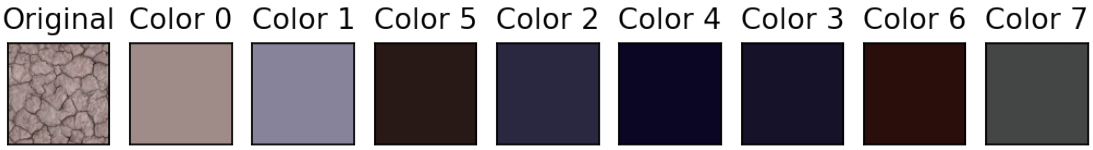
```
Count of Labels =  [(1, 526), (0, 455), (2, 19)]
```



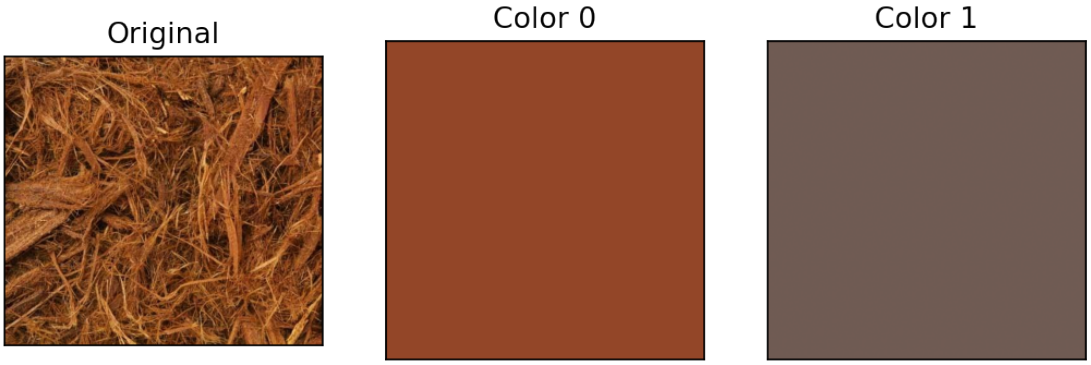
```
Count of Labels =  [(0, 571), (1, 391), (2, 38)]
```



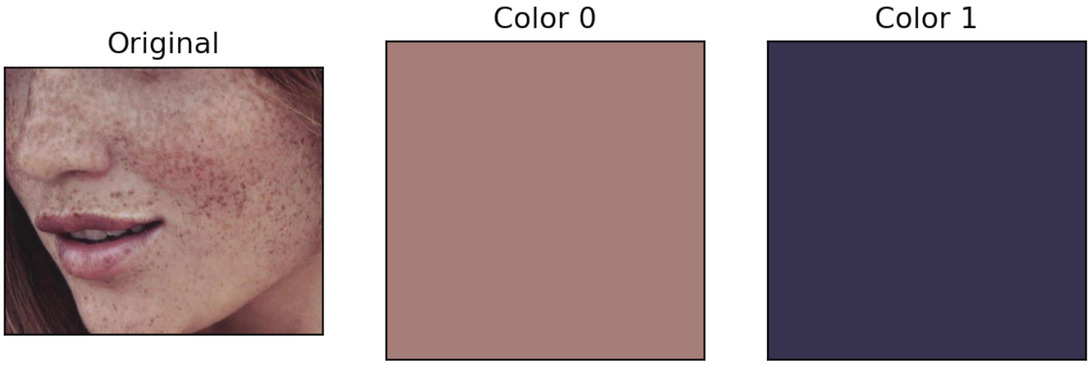
```
Count of Labels =  [(0, 790), (1, 161), (5, 21), (2, 13), (4, 6), (3, 5), (6,
2), (7, 2)]
```



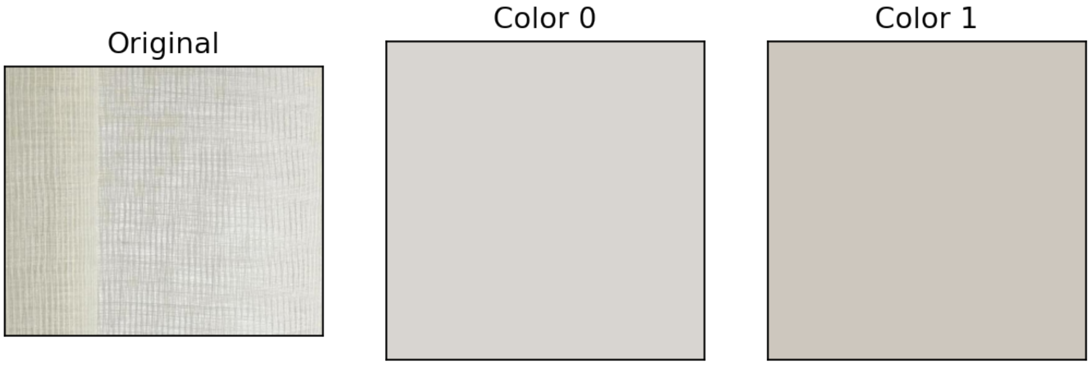
```
Count of Labels =  [(0, 993), (1, 7)]
```



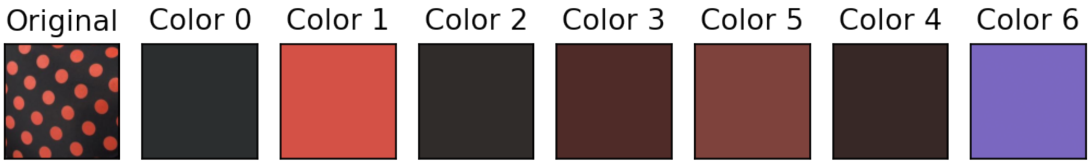
```
Count of Labels =  [(0, 797), (1, 203)]
```



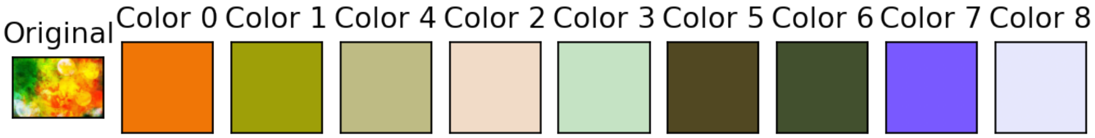
```
Count of Labels =  [(0, 541), (1, 459)]
```



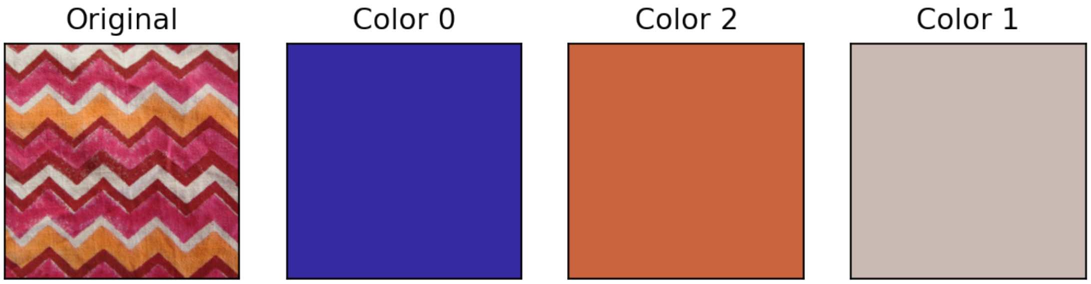
```
Count of Labels =  [(0, 603), (1, 233), (2, 62), (3, 38), (5, 34), (4, 27), (6,
3)]
```



```
Count of Labels =  [(0, 602), (1, 296), (4, 37), (2, 24), (3, 16), (5, 16), (6,
6), (7, 2), (8, 1)]
```



```
Count of Labels =  [(0, 511), (2, 273), (1, 216)]
```


Original
Color 0
Color 2
Color 1