

✓ Aim :

Use k means clustering to segment colored objects of any image ,use GenAi tools to write the code change the number of clusters k and observe the effect on segmented image

```
1 import cv2
2 import numpy as np
3 import matplotlib.pyplot as plt

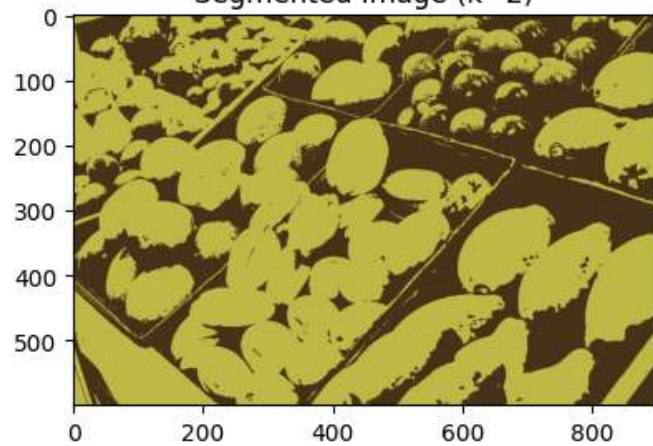
4
5
6
7
8
9
10 def segment_image(image_path, k=3):
11
12     img = cv2.imread(image_path)
13
14     img_rgb = cv2.cvtColor(img, cv2.COLOR_BGR2RGB)
15
16     pixels = img_rgb.reshape((-1, 3))
17     pixels = np.float32(pixels)
18
19     criteria = (cv2.TERM_CRITERIA_EPS + cv2.TERM_CRITERIA_MAX_ITER, 100, 0.2)
20
21     _, labels, centers = cv2.kmeans(pixels, k, None, criteria, 10, cv2.
22     KMEANS_RANDOM_CENTERS)
23
24     centers = np.uint8(centers)
25
26     segmented_image = centers[labels.flatten()]
27     segmented_image = segmented_image.reshape(img_rgb.shape)
28
29     return segmented_image, labels, centers
30
31
32 image_path = '/content/fruit-market.jpg'
33
34 k_values = [2, 3, 5, 10]
35 for k in k_values:
36     segmented_image, _, _ = segment_image(image_path, k=k)
37
38     plt.figure(figsize=(10, 5))
39
40     plt.subplot(1, 2, 1)
41     plt.imshow(cv2.cvtColor(cv2.imread(image_path), cv2.COLOR_BGR2RGB))
42     plt.title(f'Original Image')
43
44     plt.subplot(1, 2, 2)
45     plt.imshow(segmented_image)
46     plt.title(f'Segmented Image (k={k})')
47
48     plt.show()
```



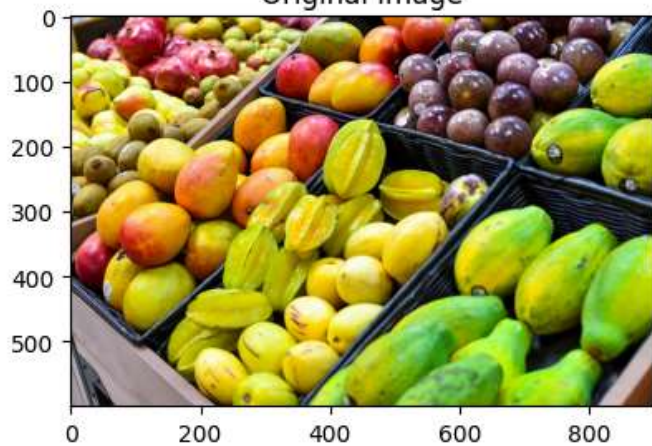
Original Image



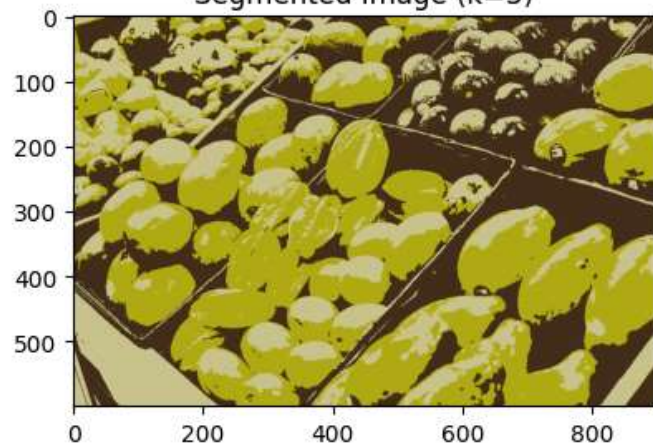
Segmented Image (k=2)



Original Image



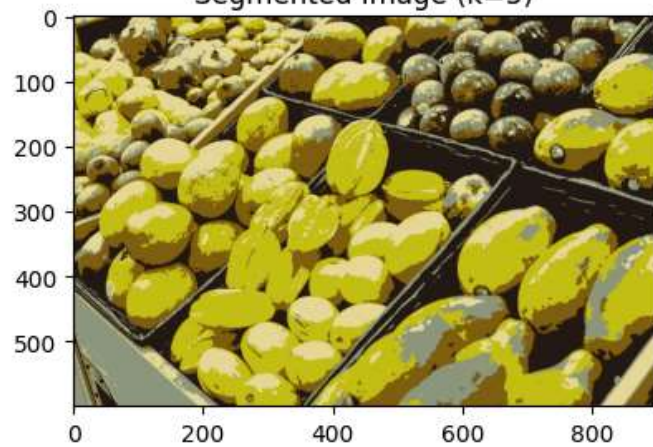
Segmented Image (k=3)



Original Image



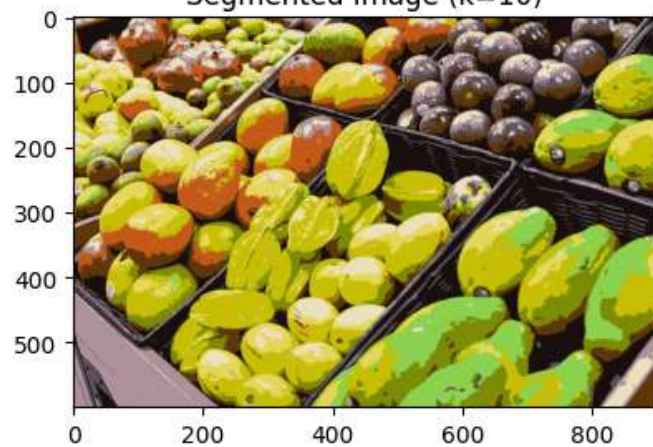
Segmented Image (k=5)



Original Image



Segmented Image (k=10)



Conclusion:

The K-means clustering algorithm effectively segmented the fruit market image by grouping similar colors into distinct clusters, as demonstrated by the comparison between the original colorful images and their segmented counterparts. The segmentation successfully identified major color groups corresponding to different fruit types (like yellow bananas, purple grapes, and green apples), with the varying k values (2, 3, 5, and 10) showing different levels of color detail preservation - lower k values produced more simplified representations while higher k values retained more color nuance in the segmented output. This technique proves useful for applications like automated fruit sorting, quality control, or image analysis in agricultural settings.