



Color color, which colors?

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PROBLEM STATEMENT

Extracting Objects from Images Based on Color Similarity

Object detection traditionally relies on training neural networks on large labeled datasets, which may not always be feasible due to data scarcity. In this project, we aim to explore an alternative method for defining and extracting objects from images based on their color palettes.

METHODOLOGY

Image Segmentation with Color Clustering

This function utilizes the KMeans clustering algorithm from the scikit-learn library to segment images based on color similarity. It supports two color spaces for segmentation: RGB and HSV.



Color Space Conversion

For images chosen in the HSV color space, the function performs a conversion from BGR (OpenCV's default format) to HSV using the cv2.cvtColor function. This ensures a consistent representation for both color spaces before clustering.



METHODOLOGY

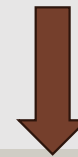
Clustering Similar Colors

Following the conversion to the chosen color space, the image is reshaped into a two-dimensional array of pixels. The KMeans clustering algorithm is then applied to group these pixels into a predefined number of clusters (`n_clusters`) based on their color similarity. Each pixel is assigned to the cluster centroid with the closest color characteristics in the chosen color space.



Conversion to RGB and Saving Results

If the chosen color space was HSV, the segmented image is converted back to RGB format using OpenCV's `cv2.cvtColor` function. The final segmented image is then saved to a specified directory with a filename that incorporates details about the color space (RGB or HSV) and the number of clusters (`n_clusters`) used for segmentation.

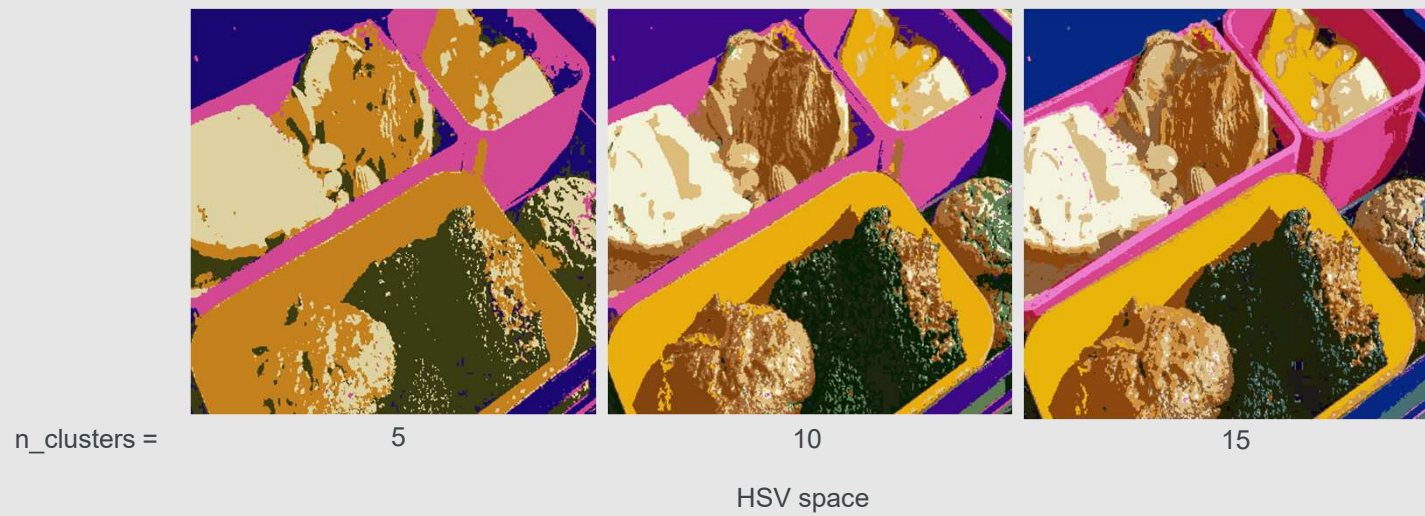


METHODOLOGY

Batch Processing

The script iterates through images in a designated dataset directory. It performs segmentation with varying numbers of clusters (typically 5, 10, and 15) for each image. This analysis is performed independently for both RGB and HSV color spaces to compare the results.

RESULTS



RESULTS



n_clusters =

5

10

15

RGB space

RESULTS



n_clusters =

5



10



15

RGB space

RESULTS



n_clusters =

5



10



15

RGB space

EXTRACTING THE PATCHES (FOR N_CLUSTERS=5)

Original Image Quantized Image



Patch 1



Patch 2



Patch 3



Patch 4



Patch 5



EXTRACTING THE PATCHES (FOR N_CLUSTERS=5)

Original Image Quantized Image



Patch 1



Patch 2



Patch 3



Patch 4



Patch 5



PRIMARY ISSUES

- ❖ Color Ambiguity
- ❖ Complex Backgrounds
- ❖ Lighting Variations



THANK YOU

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