# EXPERIMENT – 10

## Aim:

Perform colour-based segmentation on an Image.

Software used: MATLAB

## Theory:

Image segmentation is a method in which a digital image is broken down into various subgroups called Image segments which helps in reducing the complexity of the image to make further processing or analysis of the image simpler. Segmentation in easy words is assigning labels to pixels. All picture elements or pixels belonging to the same category have a common label assigned to them. For example: Let’s take a problem where the picture must be provided as input for object detection. Rather than processing the whole image, the detector can be inputted with a region selected by a segmentation algorithm. This will prevent the detector from processing the whole image thereby reducing inference time.

**Image Segmentation Techniques:**

1. Threshold Based Segmentation
2. Edge Based Segmentation
3. Region-Based Segmentation
4. Clustering Based Segmentation
5. Artificial Neural Network Based Segmentation

**Approaches in Image Segmentation**

1. **Similarity approach:** This approach is based on detecting similarity between image pixels to form a segment, based on a threshold. ML algorithms like clustering are based on this type of approach to segment an image.
2. **Discontinuity approach:** This approach relies on the discontinuity of pixel intensity values of the image. Line, Point, and Edge Detection techniques use this type of approach for obtaining intermediate segmentation results which can be later processed to obtain the final segmented image.

**Code:**

%Read Image

x = imread("MATLAB Drive/927310.jpg");

subplot(2,4,1);

imshow(x);

title("Original Image");

%Classify Colors in RBG Color Space Using K-Means Clustering

numColors = 3;

L = imsegkmeans(x,numColors);

B = labeloverlay(x,L);

subplot(2,4,2);

imshow(B);

title("Labeled Image RGB");

%Convert Image from RGB Color Space to L\*a\*b\* Color Space

lab\_he = rgb2lab(x);

%Classify Colors in a\*b\* Space Using K-Means Clustering

ab = lab\_he(:,:,2:3);

ab=im2single(ab);

pixel\_labels=imsegkmeans(ab,numColors,NumAttempts=3);

B2 = labeloverlay(x,pixel\_labels);

subplot(2,4,3);

imshow(B2);

title("Labeled Image a\*b\*");

%Create Images that Segment H&E Image by Color

mask1 = pixel\_labels == 1;

cluster1 = x.\*uint8(mask1);

subplot(2,4,4);

imshow(cluster1);

title("Objects in Cluster 1");

mask2 = pixel\_labels == 2;

cluster2 = x.\*uint8(mask2);

subplot(2,4,5);

imshow(cluster2)

title("Objects in Cluster 2");

mask3 = pixel\_labels == 3;

cluster3 = x.\*uint8(mask3);

subplot(2,4,6);

imshow(cluster3)

title("Objects in Cluster 3");

%Segment Nuclei

L=lab\_he(:,:,1);

L\_blue = L.\*double(mask3);

L\_blue = rescale(L\_blue);

idx\_light\_blue = imbinarize(nonzeros(L\_blue));

blue\_idx = find(mask3);

mask\_dark\_blue = mask3;

mask\_dark\_blue(blue\_idx(idx\_light\_blue)) = 0;

blue\_nuclei = x.\*uint8(mask\_dark\_blue);

subplot(2,4,7);

imshow(blue\_nuclei);

title("Blue Nuclei");

**Output:**

Graphical user interface, timeline

Description automatically generated