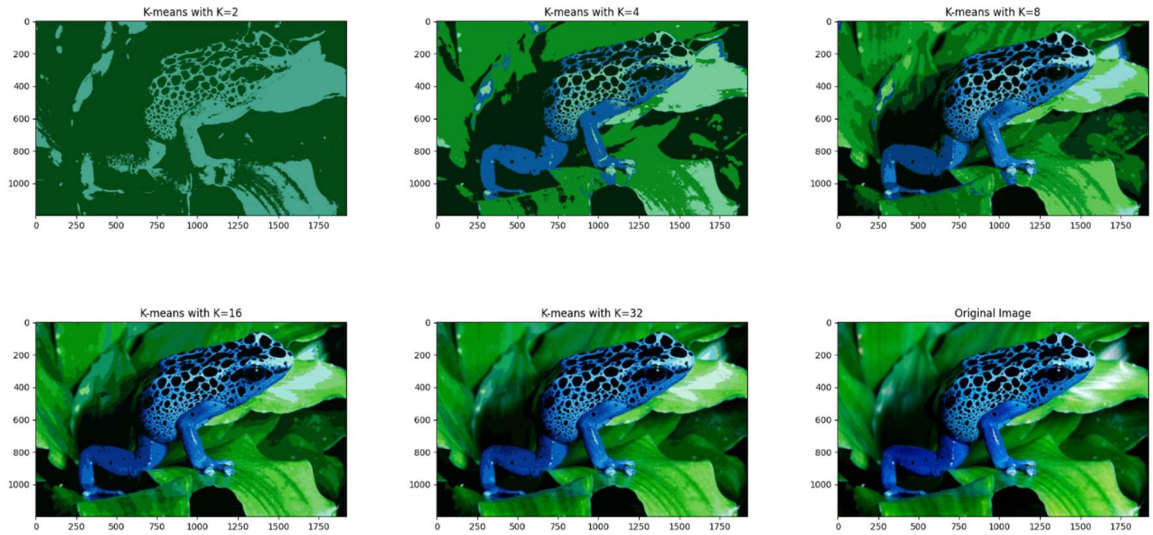
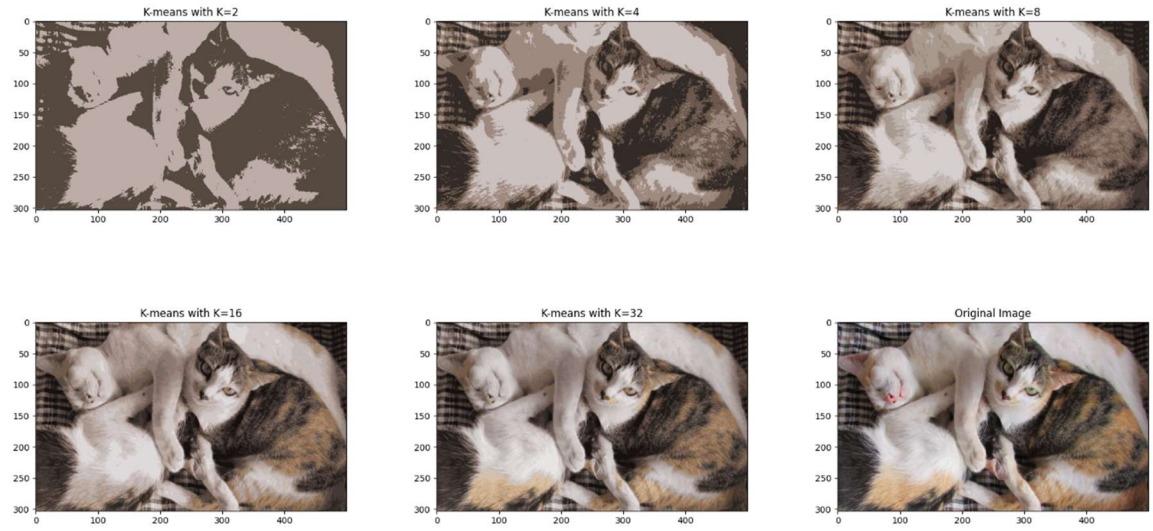
Assignment 1: Color Quantization and Connected Component Analysis

Part 1: Color Quantization:

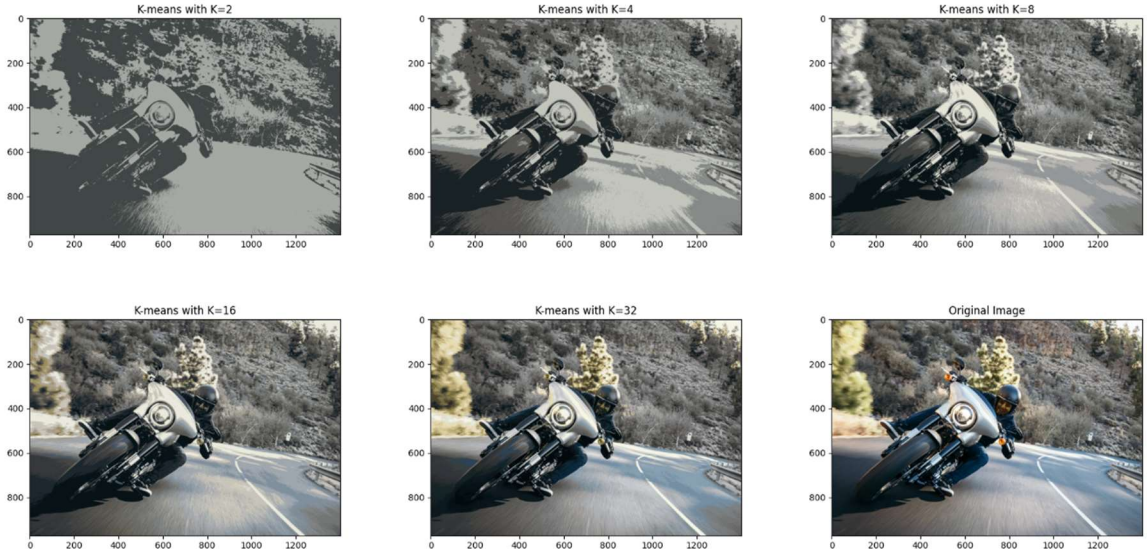
1



2



3



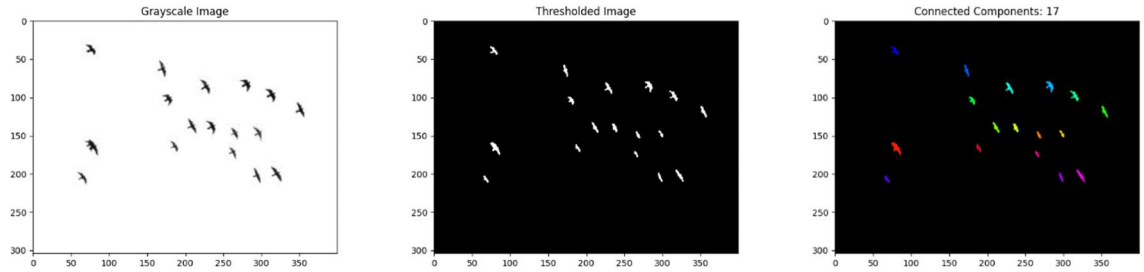
K-means quantization is applied using Euclidian distance on CIE-LAB color space.

Seed points are selected randomly, and the process is stopped at tenth iteration, so the results may differ slightly.

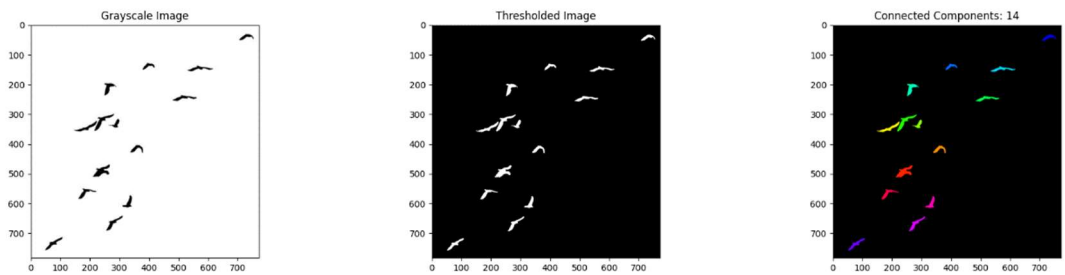
We can perceptually conclude that the results are as desired. But one downside of using K-means is that details are lost in special regions. Because the colors are converged uniformly to gradually changing areas. For example, the light reflection is visually poor, and there are way too much shades of green in the image with blue frog. The same applies to the face of the motorcyclist, and the shades of gray.

Part 2: Connected Component Analysis:

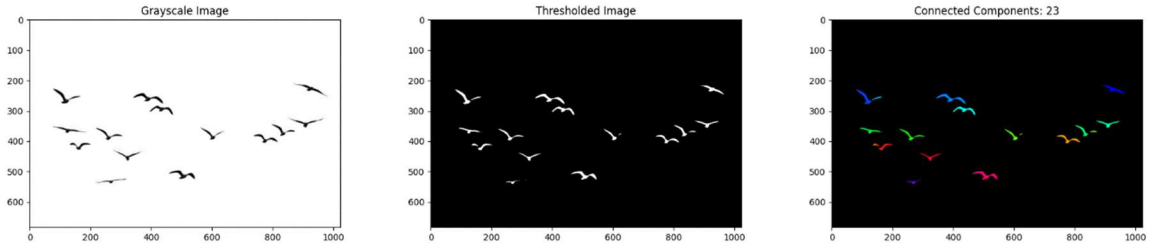
birds1



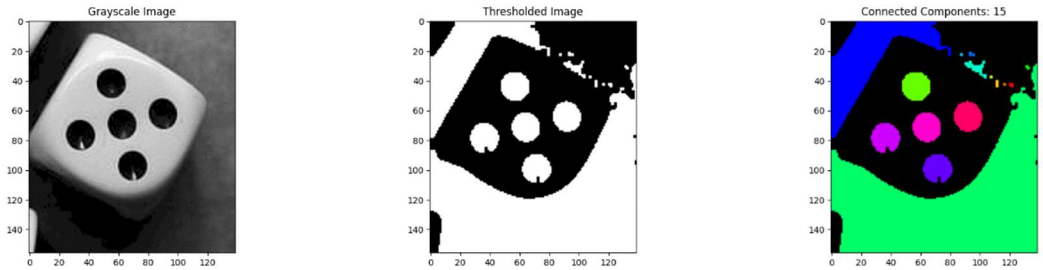
birds2



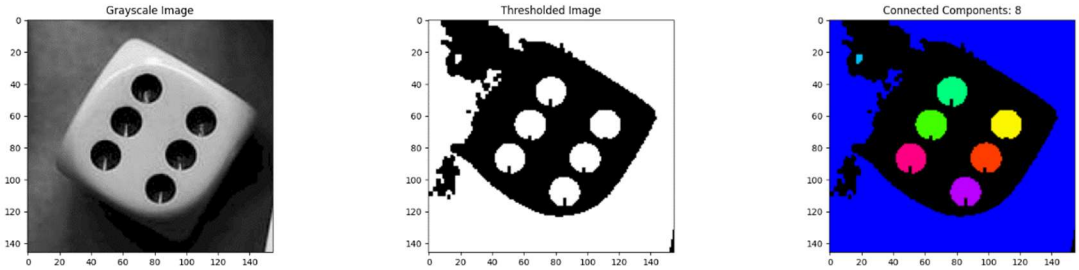
birds3



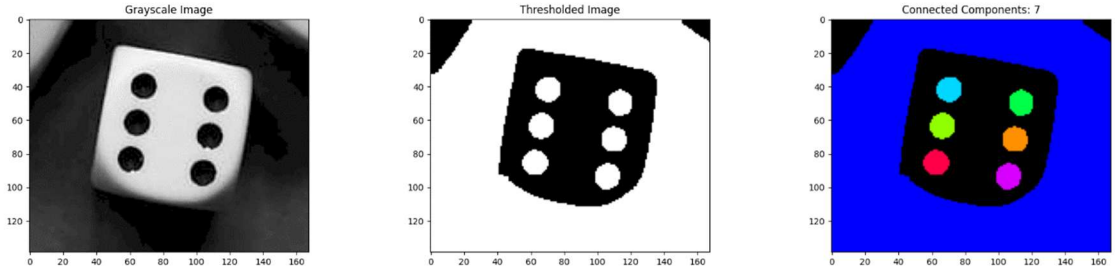
dice5



dice6



dice6_2



Region growing algorithm is applied to extract each connected component from the binary mask.

If the binary mask is obtained well, then the results are pretty successful.

The program prints the area and the first point of each component. You can also see the small components that should not be separate in binary images.

One can find the desired number of connected components by applying a threshold to the area of components. This will eliminate too small distortions and too large planar areas.