

Cmpe537: Assignment 1 - Color Quantization

In this assignment we needed to implement our own k-means algorithm to use it on colour quantization. For this task, I wrote a quantize function.

In the assignment we were asked to write the function `quantize(image, k)` but I changed the method signature as we were given two options on how the colour centres were able to be chosen. Below, I will briefly explain my quantize function.

quantize(image, k_number, mode)

Input Parameters:

image: Image is a string that contains the name of the image file that we are asked to color quantize. This file should be in the same directory as the python source file and needs to contain the type of the file at the end of the file name. For example: "1.jpg"

k_number: k_number parameter is an integer with the value of number of colour centres we need to use when quantizing the image.

mode: As we are given two options to select the base colour centres in the assignment description, I added this parameter to allow the user to pick the mode that they want to choose the base colour centres. Mode is an integer value and it has to be either 1 or 2.

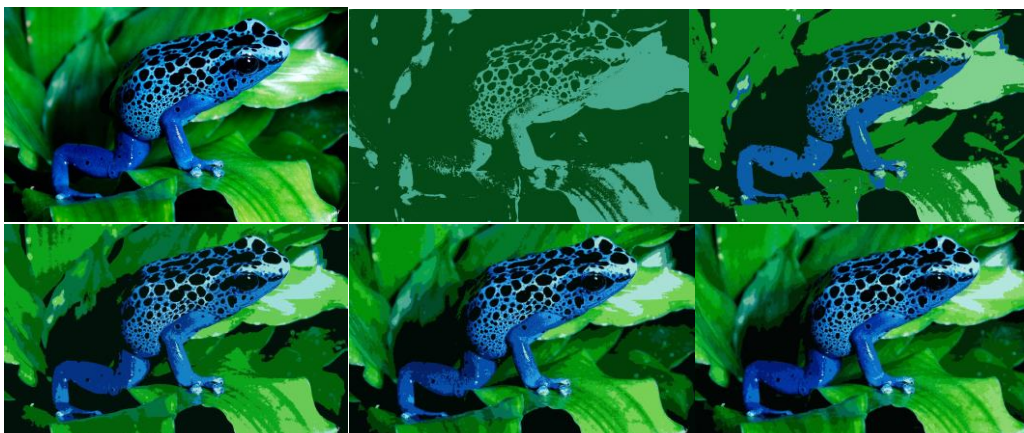
1. Choose initial colour centres manually, by clicking on the image: Using matplotlib librarys `pyplot.ginput` function, choose k points. Example code snippet to interactively select points from an image is provided at the end of this document.
2. Choose initial colour centres randomly. Pick colour centres randomly using numpys `numpy.random.uniform` function.

Output:

The output of the program is an image with the colour quantized version of the input image. The naming of the output image is `<k_number>quantized_image<image>`

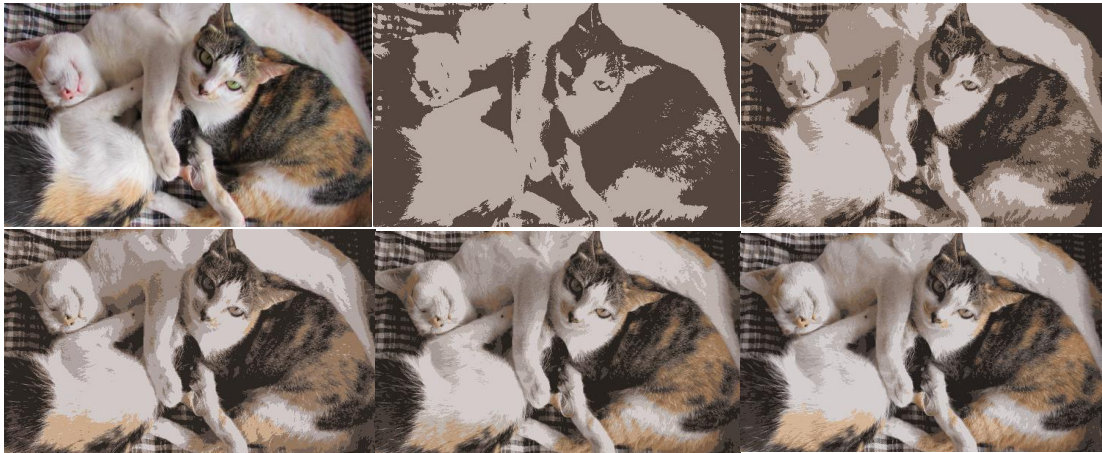
Results:

Image "1.jpg" With 2nd Image Selection Option (Random Colour Centres):



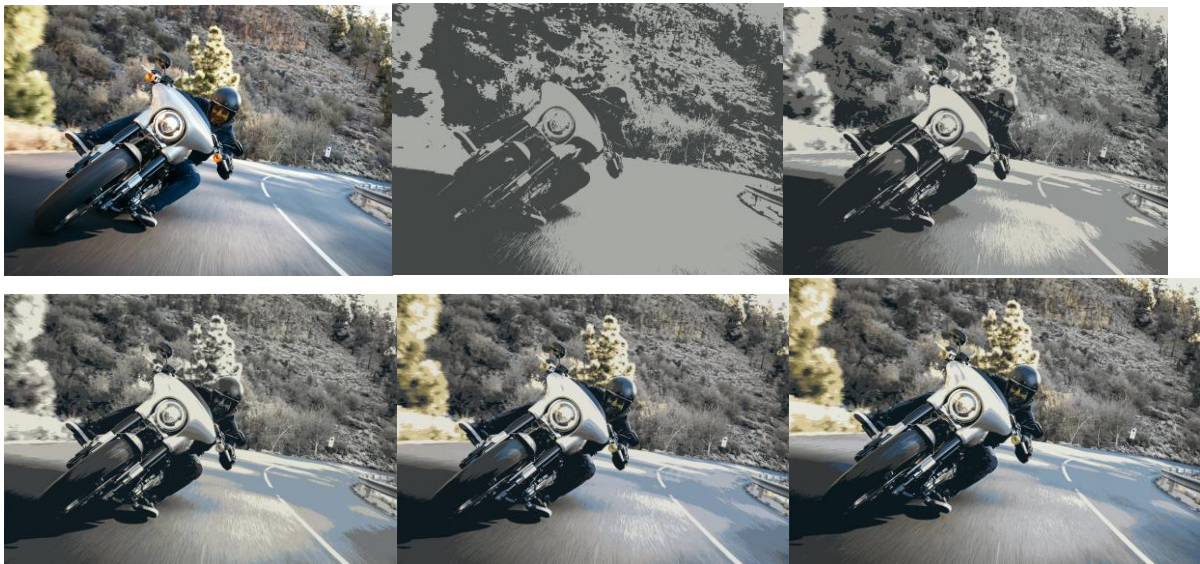
Here we see the given 1.jpg images non-quantized, 2-4-8-16-32 quantized version in this order.

Image "2.jpg" With 2nd Image Selection Option (Random Colour Centres):



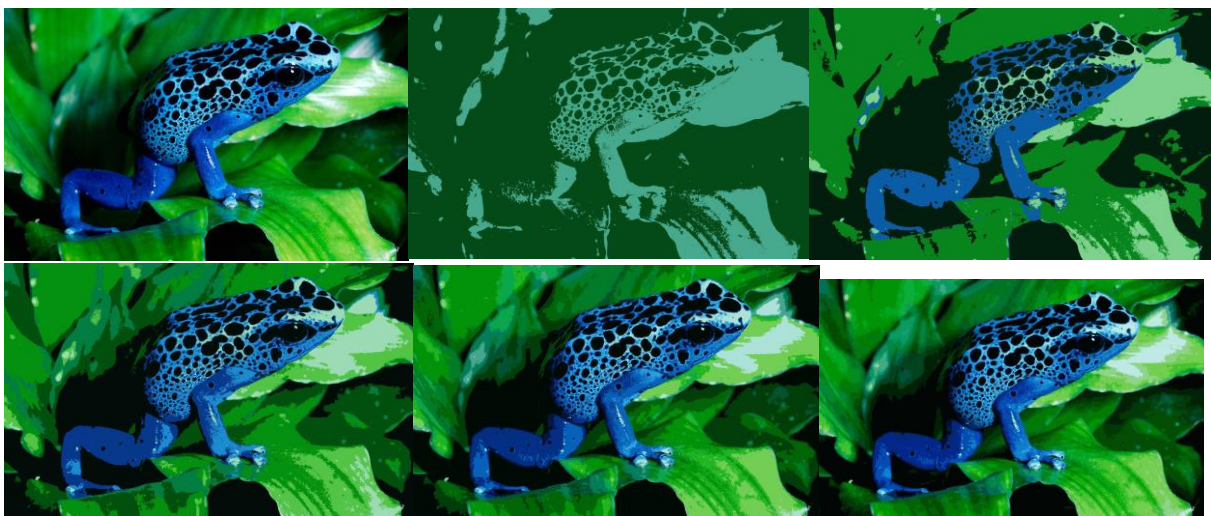
Here we see the given 2.jpg images non-quantized, 2-4-8-16-32 quantized version in this order.

Image “3.jpg” With 2nd Image Selection Option (Random Colour Centres):



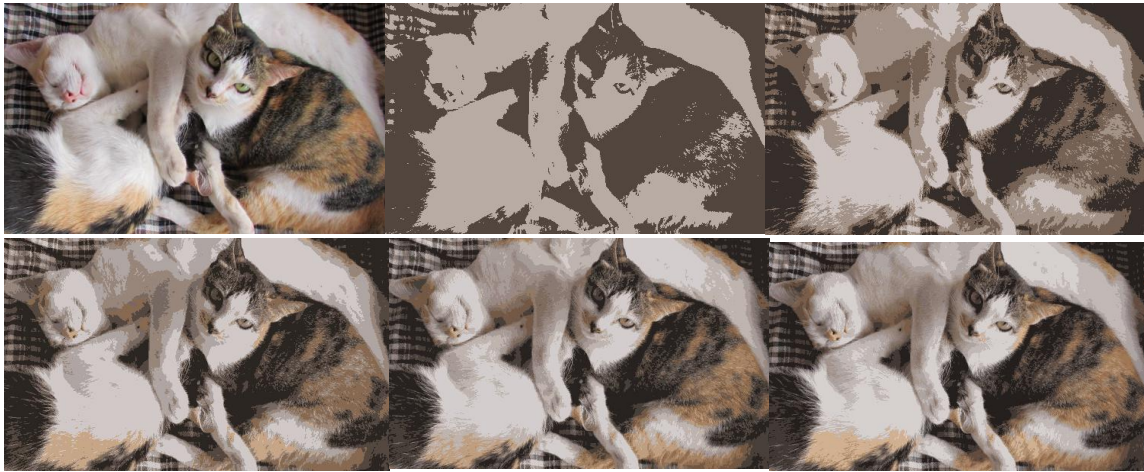
Here we see the given 3.jpg images non-quantized, 2-4-8-16-32 quantized version in this order.

Image “1.jpg” With 1st Image Selection Option (Manually Selected Colour Centres):



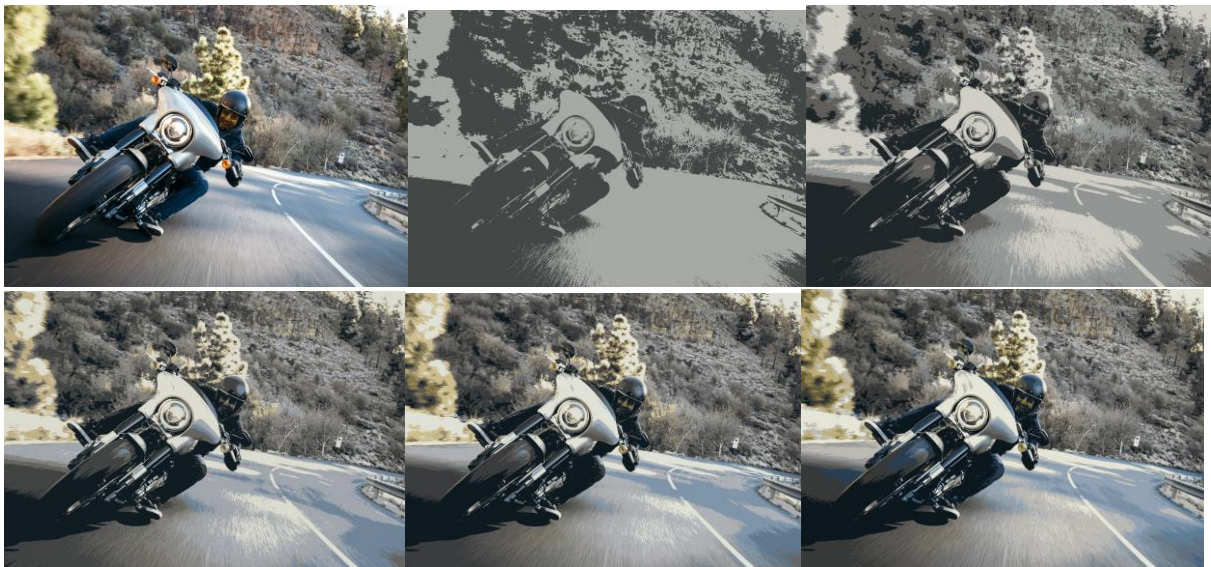
Here we see the given 1.jpg images non-quantized, 2-4-8-16-32 quantized version in this order.

Image “2.jpg” With 1st Image Selection Option (Manually Selected Colour Centres):



Here we see the given 2.jpg images non-quantized, 2-4-8-16-32 quantized version in this order.

Image “3.jpg” With 1st Image Selection Option (Manually Selected Colour Centres):



Here we see the given 3.jpg images non-quantized, 2-4-8-16-32 quantized version in this order.

Conclusions:

As we can see in the pictures, the more is the number of colours we use for quantizing, the closer is the resulting image is to the original image.