

Programming Assignment 2

Vector Quantization
(Last update: February 14, 2017)

The purpose of this exercise is to implement Vector Quantization on an image. There are two applications of VQ in this assignment. You may choose either one, or optionally do both. Create a clear detailed report of your findings. Use Matlab, Python, or C/C++.

Option 1: Write a program to implement vector quantization on a gray-scale image using a “vector” that consists of a 4x4 block of pixels. Design your codebook using all the blocks in the image as training data, using the Generalized Lloyd algorithm. Then quantize the image using your codebook. Explore the impact of different codebook sizes, for example, $L = 128$ and $L = 256$.

Next, train your codebook on a collection of 10 images, and quantize your original image using the new codebook. Compare your results on the new codebook to your previous results, and explain any differences.

Option 2: Write a program to implement color quantization on a color image. In this case, the “vector” now consists of the 3 color components, for example, R, G, B. Design your codebook using all the color pixels in the image as training data. Design a color palette (i.e., a codebook) of size L , using the Generalized Lloyd algorithm. Quantize the image using your codebook. Explore the impact of difference codebook sizes, for example, $L = 128$ and $L = 64$.

For each option, design your quantizer on two different images. How do the designs differ? Show results of your 2 designs on 4 different images.

Questions or comments concerning this assignment should be directed to Prof. Amy Reibman,
reibman@purdue.edu