CS 1390-01: Introduction to Machine Learning

HW 5 (Given Nov. 23, 2020; Due Nov. 30, 2020)

Your answers must be entered in Google Classroom by midnight of the day it is due. If the question requires a textual response, you can create a PDF and upload that. The PDF might be generated from MS-WORD, LaTeX, the image of a handwritten response, or using any other mechanism. Numbers in the parentheses indicate points allocated to the question.

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1. An image can often be represented by much fewer colors wihout substantial degradation in the visual perception of the image. Consider for example the image at `https://en.wikipedia.org/wiki/File:Mona_Lisa,_by_Leonardo_da_Vinci,_from_C2RMF_retouched.jpg#file` in which each pixel is represented by 24 bits (8 bits for red, 8 bits for blue, and 8 bits for green).

   You can use the PILLOW (or any other) library to read in the image and asimage() to convert it into numpy arrays if you like. Your task is to represent each pixel using a fewer number of colors (say 256 total colors). Each of the 256 colors can be 24 bit colors but there are a total of 256 colors only. Each pixel can then be represented using only 8 bits. Such images are also called indexed images.

   Your goal is to find the 256 colors that can represent the image as faithfully as possible (based on what we have learnt so far in the class – do not use approaches that we have not covered).

   You should subbmit your code (the TA's can ask you to demonstrate the working), and the original as well as the reduced color image that you hve obtained. Better solutions will get higher points. **(100 points)**