Practical Exam for SPI 2 Lecture - 2019

Purpose

Create a jupyter notebook in python that
- gets as input ANY image
- creates a mosaic of tiny images
- the mosaic should reproduce as closely as possible the information from the original image.

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1. (12 points) **General objective and goals of the implementation**

    (a) To build the mosaic, the original image needs to be decomposed in small squared patches. Each of these patches will be replaced by a tiny image from a database. The images bellow show two examples of the desired output given different input images. As you may see the general structure of the "pearlerraing girl" and the "starry sky" are preserved, implying that both the contours and the colors the original and the replacing patches are similar. The specific information of each patch is only visible when zooming into the mosaic.

    Input   Desired output
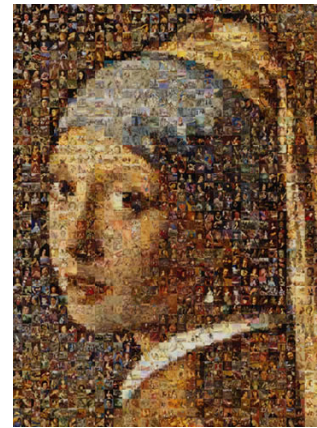
Hints :
— To create the database of tiny images you may use the CIFAR 10 or CIFAR 100 databases : `https://www.cs.toronto.edu/~kriz/cifar.html`.
— There are many ways in which the similarity between the patches can be measured, for instance : - global mean color intensities - type of frequency information present (high frequency, low frequency) - presence or not of edges You can also look at similarity measurements such as the Sum of Squared Differences or the Normalized Cross-correlation.
— There are also many ways in which the patches can be adapted to look closer to the original patch, for instance : - adjusting the contrast - global intensity transformations - filtered versions of the original patches However, when zooming it the information of the original patch should be clearly perceptible.
— An adequate size of the input patches may depend on the resolution of the original image. The program should accept input images of any size.
— The implementation should allow me to easily change the input image in order to try the code with a set of test images.

2. (8 points) **Report**

    (a) As important to the code implementation is the 2-4 page report that you should give in, explaining in detail your implementation.

    (b) In particular, one of the objectives of the report is to relate the implementation to the concepts seen during the lecture.

    (c) There are many ways in which this project can be achieved, so **your solution should be unique**.

    (d) If you use any piece of code from a website or toolbox please add an explicit reference to the original source. Avoid to reference external code will lead to a Fail grade.

    (e) It is ok to use functions from external libraries that do PARTS of the work. You need then to explain in the report the goal of the function as well as the key idea of the method behind it.