DEPARTMENT OF COMPUTER SCIENCE

ICSI-533/433 Theory and Practice of Multimedia Computing – Fall 2019

Homework 3

Due date: November 16, 2019, 11:59 p.m.   **Total marks: 15**
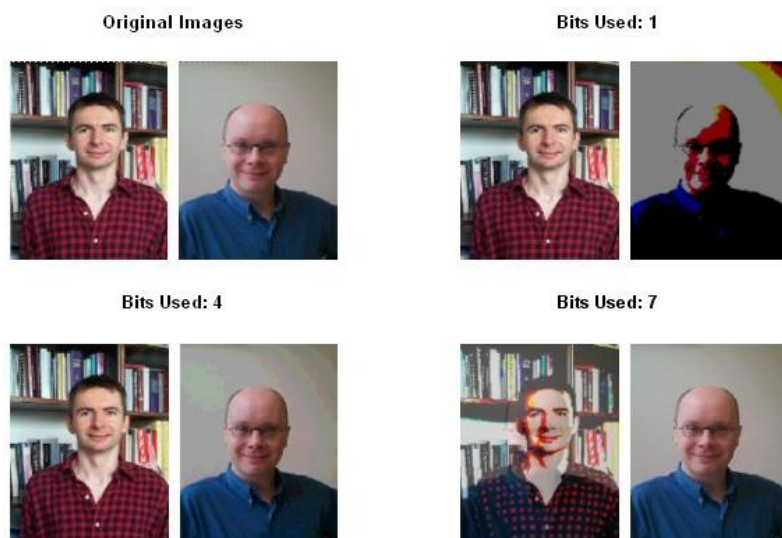
Objective

The purpose of this homework is to solidify the ideas of multimedia data hiding and video retrieval that were discussed in class.

Introduction

Consider the image hiding example given in the class (and shown in the figure below).

The java class **ImageHiding.java** (provided) contains code to hide one image (Secret Image S) in another (Host Image H).

Question 1

In the given program, the MSBs of Secret Image is embedded in the LSBs of the Host Image. You need to extend the application to perform the following operations:

1. Hide MSB of S in MSB of H.
2. Hide LSB of S in LSB of H.
3. Hide LSB of S in MSB of H.

Choose your own two images of same size (320×240) for this question. You also need to make appropriate changes to the GUI to give the user an option to select one of the four data hiding operations mentioned above. Implement the three operations and report your observations for all four data hiding operations.

[5 marks for ICSI 533, 7 marks for ICSI 433]

Question 2

Choose your own two images of same size, one representing the end of a shot, the other representing the beginning of another shot. You are required to program a dissolve edit transition between the two given images (or frames) by generating at least 5 intermediate frames using the formula on slide 23 of slide deck 5 – "Video Retrieval". Submit all the frames as JPEG images. Also, report your observations.

[5 marks for ICSI 533, 8 marks for ICSI 433]

Question 3

[This question is only for ICSI 533] Modify this code or write your own fresh code to hide a text document (.TXT file) into an image. The modified GUI must show the host image (choose one of two images used in Question 1) in the left panel and the text in the right panel (right panel is optional though). The hiding would be performed by replacing the n lower order bits of image with the ASCII values of the m number of characters from the text document. Obviously, the more the text you embed into the image, the lesser the quality of the image would be. The GUI must also show the value of n and m, where n can vary from 0 to 8 and m can be any value between 0 and the maximum number of characters that can be embedded in the image.

The text document (text.txt) is provided to you. This file contains 230,400 characters.

Devise your own strategy for this embedding and present your analysis and observations on how much of the text document you can embed into the image so that its quality is not perceptually degraded.

[5 marks]

Submission

You must submit the following via UAlbany Blackboard:
1) Source code files along with the instructions to run it.
2) Source code typed in a pdf of word file.
3) A pdf file containing answers to all the problems.
4) The two images that you have chosen for Question 1.
5) All the frames (in JPEG format) obtained in Question 2.
6) A video (of max 5 min) that shows the working of your programs.