

Assignment # 1 (A)

Course Title

Digital Image Processing

Due Date: 12/02/2022

Instructions:

1. Assignments are to be done individually. You must complete this assignment by yourself. You cannot work with anyone else in the class or with someone outside of the class.
 2. You can use any programming language of your choice, such as Python, MATLAB, or C++, etc.
 3. Plagiarism of any kind (copying from others and copying from the internet, etc.,) is not allowed.
 4. You can use OpenCV for basic tasks such as reading, and displaying images. You cannot use it when you are particularly asked to avoid using OpenCV.
 5. Your code must be properly commented.
 6. The data required for this assignment is also provided.
 7. Any assignment submitted even one second late will be considered **LATE** and **ZERO** will be provided.
 8. No marks will be assigned if any of the following deliverables are missing.
-

Deliverables:

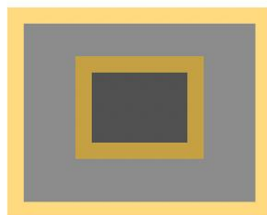
1. The source code of the program.
 2. A pdf or word report containing a brief explanation of the steps involved in the program (each question) and the results obtained for their respective input images.
-

Put both source code and report in one folder, ZIP it and submit it. Your folder must be named as below:

ROLLNO_NAME.ZIP

Question 1.

Consider the following color image in PNG format (four-channel image). Write a program that sets the transparency of the smallest and darkest rectangle shown in the middle of the image to ZERO. In the output image, the central rectangle will not appear while the rest will be the same. **You cannot use OpenCV for this task.**



Question 2.

Create a function `ConvertToGray(img)`. It takes an image as input. If the input image is color, then convert it into grayscale. Return the converted image. Use the following formula to convert a color image to grayscale. Display both grayscale and color images. **You cannot use OpenCV for this task.**

$$\text{imgGray} = 0.299R + 0.587G + 0.114B$$

Here R, G and B represent red, Green and blue channels respectively.

Question 3.

Create a function called `StackHorizontal(img1,img2)` that concatenates two images and returns the result. The function must check that both `img1` and `img2` have same size and channels. It should display error if size is not same. Display the obtained result. **You cannot use OpenCV for this task.**

Hint: Create a larger 2D array that can hold both images and then copy the pixels one by one from the source images.

Sample input and output:



Question 4.

Write a function called `FlipImg(img, flag)`. `img` is the input image while `flag` can be 0 or 1. If the `flag` is 0 flip the image horizontally and when `flag` is 1 then flip vertically. Default `flag` should be 0. Return the flipped image and display both the original and flipped images. **You cannot use OpenCV for this task.**

Question 5.

Consider the following two grayscale images. These have same dimensions. Write a function that `CommonImg(img1, img2)` that finds the common area between two image and displays the result. If no common area is found then it must display a black image otherwise, it will show the common area. **You cannot use OpenCV for this task.**

