EE 604 Digital Image Processing

Assignment 2: Photo Editor (worth 20%)

We edit photos in our mobile phone or laptop on a daily basis. In this assignment, you will build a simple photo editing software yourself. It must have a graphical user interface (GUI). See Fig. 1 for a basic example, of course, you can make it more detailed if you wish. You will design and implement only 2 out of the 4 editing functionalities mentioned below.

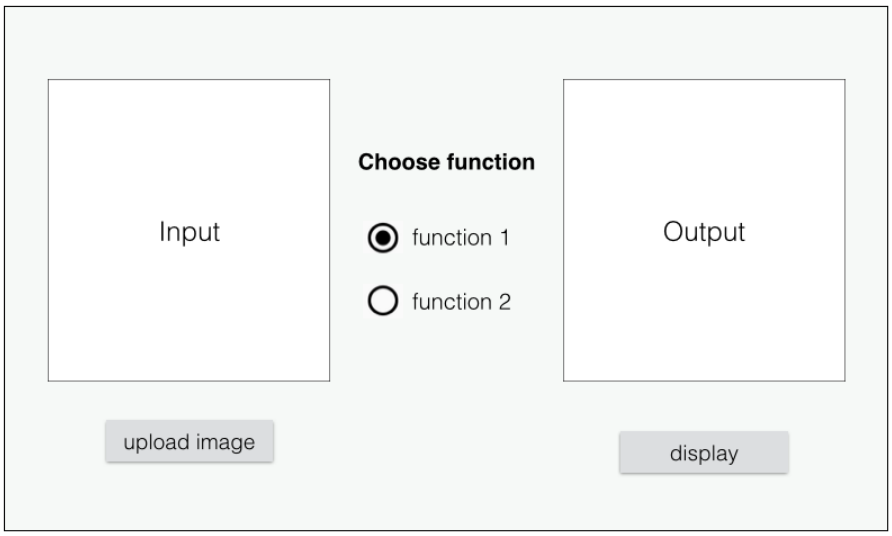

Figure 1: GUI sample

Implement any 2 functionalities:

1. **Autoenhance:** Design your own image enhancement pipeline which can remove small amount of noise, enhance illumination, contrast, and can also sharpen an image. For the denoising part, use bilateral filtering or NL means or denoising autoencoder. Ideally, your system should be able to clean all common types of noise. This functionality should not take any user input apart from the image. See an example.

2. **Red eye correction:** Assume that you are given a frontal facial image. Remove the red-eye effect often caused by flash photography by following these steps: performing eye detection, finding the red part in the eye, and fixing it. See example.

3. **Selective blur:** Ask the user to click on a foreground object. Segment the object out, and then apply motion blur in the rest of the image. In the output image the foreground should look crisp and sharp while the background looks blurred. See example.

4. **Object removal:** Ask the user to select an object (or a part of it) in the input image. Remove this selected region by filling it out the with background texture and color (if working with color image). For better effect, choose a small (again not too small) object to remove. This is called image inpainting. You are free to choose and implement any inpainting algorithm (e.g. Criminisi et al. CVPR 2003). See example.

Follow the instructions carefully:

- Consider only natural images as input (grayscale images are fine, except for red-eye correction). One important evaluation criteria is how pleasant the output image looks to humans.
- Any code you obtain from internet should be properly acknowledged. Any part of the code (hopefully not the entire code) you borrow from your friend should also be acknowledged. Plagiarism will lead to 0 marks in the assignment with possible other consequences.
- Techniques taken from books/papers should be properly cited. Wikipedia is not an acceptable technical reference.
- You should be able to give a demo and answer questions related to your implementation. Demo date will be announced later.
- We will release a set of test images a few hours before the demo. The performance of your photo editor will be evaluated based on those images only.
- A (PDF) report should be prepared with brief descriptions of the methods, screenshot of your GUI in action, and sample results on the test images. The deadline for report submission is **Nov 10 midnight**.