Digital Image Processing: Assignment set

Instructions

- Please note that you will be graded for both the effort taken in the implementation of your code as well as the knowledge gained in the process.
- **Any form of plagiarism will not be entertained, and will result in F grade in the course**.

1.Histogram Specification:

Modify the histogram of the image **givenhist.jpg** in such a way that the resulting histogram nearly approximates the histogram of the image **sphist.jpg**. Display the histogram of the image **givenhist.jpg** after this transformation.

2.Bilateral Filtering

You are given 3 images - **spnoisy.jpg**', **unifnoisy.jpg** and **spunifnoisy.jpg**. These are photographs corrupted with different types of noise. Try to reduce the effect of noise from each of them by applying a bilateral filter with mask size 5×5 with appropriate values of σ_d^2 and σ_r^2, set through experimentation.

3. Diffusion filtering and non-local means

You are provided with a noisy picture of Lenna. (**Lenna_noise.jpg**). In this task, you are expected to explore a set of edge preserving filters, to address the problem of image-denoising. For each filter, display both the input and de-noised image.

(a) **Anisotropic non-linear diffusion filter:** Implement the anisotropic diffusion filter for reducing the effect of noise. Consider adapting the value of the conduction coefficient, so as to stop the diffusion on the edges. Nevertheless, to get a visually pleasing result, it is suggested to iterate through the algorithm several times. You may consider either a 4 or 8 neighbor connectivity.

(b) **Isotropic linear diffusion filter:** How does your result in (a) compare with that of the Linear Diffusion filter (with fixed conduction coefficient applied across the entire image).

(c) **Non-local means filter:** Denoise the image using the non-local means filter. For faster implementation, restrict the search of similar patches in a window of size 5×5 pixels around the current patch. In addition, assume each patch to be of size 7×7. To get better results, it is expected that you compute the Gaussian weighted Sum of Squares distance between the patches. The bandwidth /scale of the Gaussian may set experimentally.

4. Corner Detection

Implement the Harris corner detector algorithm on the image **IITG.jpg**. Superimpose the corner points on to the relevant pixels in the image. It is suggested that you choose a suitable threshold to pick up the interest points, followed by a non-maximal suppression step.