TERM PROJECT IMT4305

Due: 08.12.2016

PROJECT TITLE

Developing a tool for implementing image analysis operations in the frequency domain.

Objective:

This project aims at building a tool for implementing operations such as:

1) Keeping a small database of images e.g. 10 – 15 images.
2) Having selected an image as input, being able to apply the following operations on the input image:
   a) Apply Fourier transform on the image (either a good quality image or a noisy one)
   b) Display the real and imaginary parts and the magnitude of the image in the frequency domain
   c) Use inverse Fourier transform in order to reconstruct the original image from its Fourier Transform and display it on the screen.
   d) If there is noise in the original image, interpret where in the frequency domain image, the noise component/part appears.
   e) Compare the input original image and the reconstructed image to find out how similar the two are and interpret your comparison results.
   f) Some of the images in your image dataset should be noisy images. Be able to filter noise from the images. The filters you are asked to consider for are the ones covered as frequency domain filters during the lectures.
   g) Display any filtered image vs. the original image in the spatial domain. The filtering should be done in the frequency domain. To be able to display it in the spatial domain, use inverse Fourier transform.
   h) Compute the similarity for the two images, the filtered vs. the original image and interpret your comparison results.

Expected outcome:

The expected outcome is mainly a tool that is developed by each project group where the above stated functionalities can be selected for use/demonstration of the tool. We are not interested in fancy interfaces for the tool, however, the tool should provide some flexibility in terms of selecting any image from the dataset or being able to select one from outside the database. It should also provide a list of functionalities that is available in the tool. You may further have your own design choices, e.g. how the interface ultimately looks like,

where the images are positioned on the screen, filtered vs. original image, or having additional functionalities than the listed ones above, as well as any other design choices you make.

Project delivery:

a) Write a short report that describes your database, your interfaces e.g, the list of functionalities you provide, and any specific approach for implementing the functionalities e.g. your approach to comparing any two images. Maximum report size is no more than 10 pages.

b) Deliver your report and code on fronter on 8th December, midnight. Include a readme file as necessary. Each group will make a short presentation of their code on latest 9th December, 2016.

Project groups:

You may work in groups of 2 or 3 for the project.