Image Processing & Analysis in Diagnostic Imaging
Assignment 1

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1   Image Enhancement

Image Enhancement Implement an image enhancement technique (discussed in class) using a MAT-LAB/Python/C. Test the method only on two medical image datasets.

Datasets Provided:

- Dataset 1: Musculoskeletal ultrasound image of an infant hip (Image name: dataset1_img_hip.png, Mask name: dataset1_mask_hip.png)

- Dataset 2: A 2D image slice from 3D echocardiography scan (Image name: dataset2_img_heart.png, Mask name: dataset2_mask_heart.png)

Optionally you can test the image enhancement on your own datasets. Please do not submit test results on more than two datasets. A sample MATLAB code is provided to read image and mask files.

1.1   Grading (Total = 10 marks)

- Describe the image enhancement method used ($\approx$100 Words): **2 marks**

    - What was the purpose of enhancement – Visualization /Preprocessing?

    - Which dataset(s) was used? Mention the regions of interest in the image?

- Explain the image enhancement method ($\approx$ 150 Words): **2 marks**

    - Describe the method (you may use schematic diagrams)

    - Please provide the mathematical formulation explaining the method

- Results of the image enhancement: ($\approx$150 Words): **4 marks**

  - Show images before and after enhancement

  - Provide quantitative results in a table using the following metrics: 1) SNR; 2) contrast (any one of them). You need to compute the values based only for the region defined by the mask.

  - Mention the advantages and limitations of the technique

  - Discuss any possible improvements that can be done.

- Source code for the program: **2 marks**

1.2 Submission

You are required to submit the following files for this assignment:

1. A report containing the information mentioned above

2. The source code of the program

3. A README file containing details on how to run the code and other information such as Python/MATLAB/C++ module version used for writing the code.

  Place your files in a single directory. Zip and submit the file via email to punithak@ualberta.ca on or before Oct 11, 2018.