Digital Image Processing: Lab Assignment 5

Wavelet Analysis [100points]

Issue date: - -2020 Due date: - -2020

Instructions

- **Each group must do single submission referring the names of all the members. Members must not submit same files separately. Submission must be under the folder name : entryno1_entryno2_entryno3.zip**

- Do not copy code from any other source (internet or friend). In case, any plagiarism detected, strictly zero mark will be assigned for that assignment.

- Show your results on sample images given in the assignment. Any other won't be considered for evaluation.

- Clearly state your name and Entry number on the lab report.

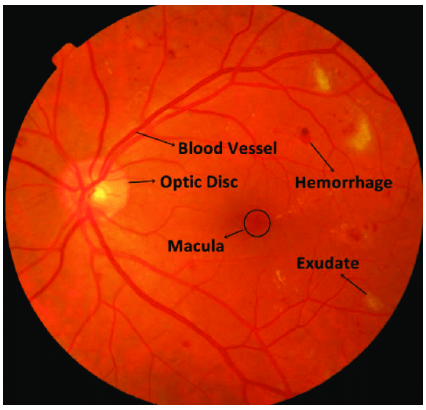
- Any additional materials used during the completion of the assignment must be cited. Failure to correctly reference sources will result in mark deduction(-10p/day).

- Submit a PDF file with proper. If the report is handed in more than three days after the deadline, the assignment will be marked zero marks. Up to five bonus points may be awarded to the student for very good lab assignments that comply with the criteria described below:

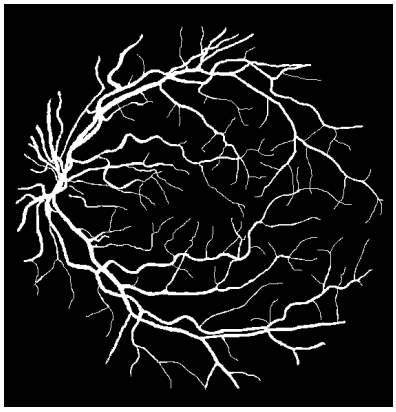
  +1p ← Report is clearly written and easy to follow.
  +1p ← Code is well documented.
  +1p ← Explanations and Observations are well written.
  +1p ← For overall exceptional reports, that confirm to all scientific writing standards.
  +1p ← Extra experiments performed on other set of images for better understanding.

Vessel Detection

Fundus images are 2-D capture of retinal layer. Analysis of these images help in diagnosis of various retinal diseases. The following figure is given for your reference. It shows normal retinal features like blood vessels, Optic Disc and macula along-with some abnormalities like Hemorrhages and exudates.



Corresponding retinal vessel map (Ground Truth)



Vessels are like curved edges. You are given a set of 20 colored fundus images. Write a program (MATLAB or PYTHON) to extract retinal blood vessels (binary) from these images (RGB) using :

1. Wavelets (Hint : Choose an appropriate directional analysing (mother) wavelet for wavelet analysis) [70 marks]
2. Sobel operator [10 marks]
3. Laplacian of Gaussian [10 marks]
4. Compare the results of above three operations by showing the extracted output vessel maps on any one fundus image from the given set. [10 marks]