Image Processing & Analysis in Diagnostic Imaging
Assignment 2

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1 Image Segmentation

Implement an automated or semi-automated image segmentation approach to delineate left ventricle from the short-axis magnetic resonance image provided with this assignment. Please use MATLAB, Python, C or any other programming language to complete this assignment. However, please do not use any interactive software packages (*e.g.,* ImageJ or 3DSlicer) for the segmentation or validation. The following images are provided.

- **MRI.png:** The short-axis magnetic resonance image to be segmented.

- **InitialMask.png:** The initial mask to be used if you are implementing a semi-automated method. Please do not use any other initial mask or contours for completing this assignment.

- **GT.png**: The ground truth manual segmentation of the left ventricle.

For MATLAB-based semi-automated implementation, you can utilize the built-in `activecontour` function. Report the following evaluation metrics comparing the automated contour and manual ground truth: precision, recall, Dice score, and Hausdorff distance. Also, report the runtime of the implementation.

1.1 Grading (Total = 10 marks)

- Describe the segmentation method used: **4 marks**
  - Include theoretical or intuitive explanations
  - Show the automated contour on the MRI image
  - Show results for any intermediate steps

- Report the results for all evaluation metrics used for the validation: **4 marks**
  - Use equations to describe validation metrics

- Source code of the segmentation method and validation: **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 before Oct 31, 2017. A penalty of 10% (*i.e.,* 1 mark) per day will be applied for late submissions.