

DIP Homework 1

Jayden Fassett

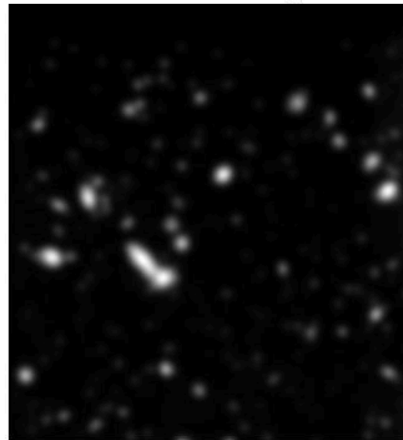
This assignment was done in a jupyter notebook using the scikit-image library. All code is in the attached jupyter file and is commented for convenience.

Question 1

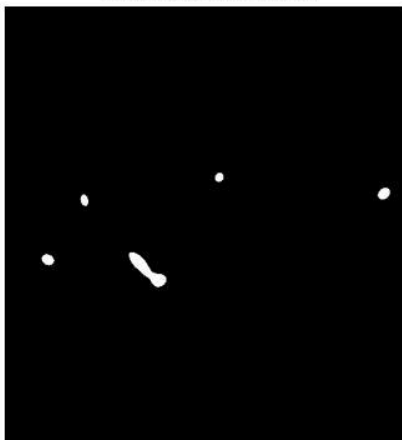
Original



Gaussian Blurring



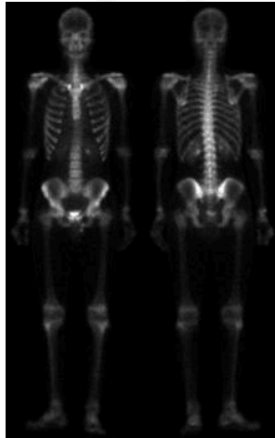
Thresholded $t = 150$



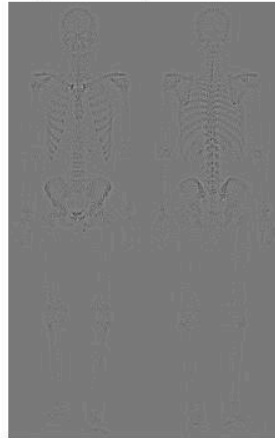
The Gaussian Blur was done with a sk-image function, and the threshold was applied with np.where().

Question 2

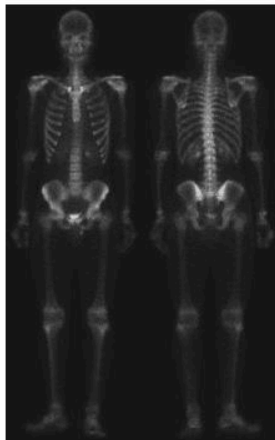
Original Image



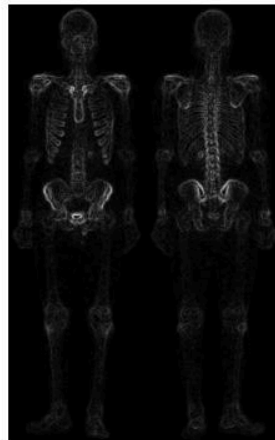
Laplacian Representation



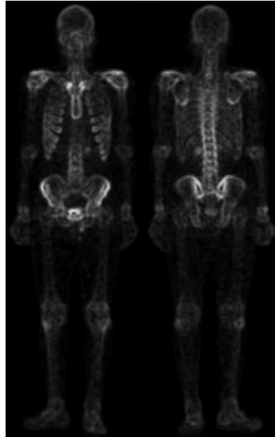
Sharpened



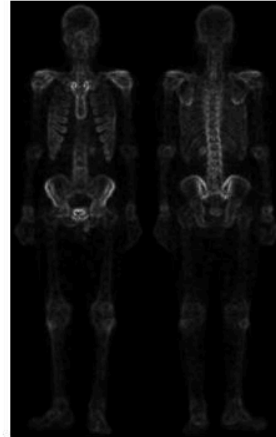
Sobel Filtered



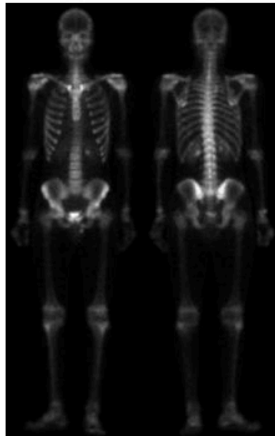
Smoothed w/ 5x5 kernel



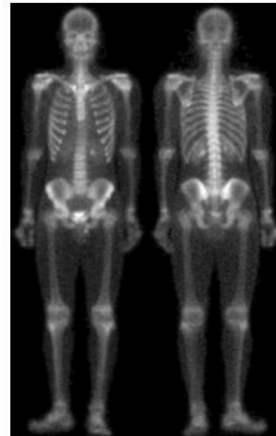
Masked



Sharpened



Brightened w/ gamma = 0.5



The laplacian was applied with the `convolve2d` function. There is an in-built laplacian function but I preferred to write the kernel myself. I sharpened the image by subtracting the laplacian. After that I used the `skimage sobel` filter.

For the next section I created a 5x5 kernel and applied it with `convolve2d`. This averaged the image. I then masked the image by multiplying the normalized laplacian by the averaged image. After that I gamma corrected the image with $\gamma = 0.5$

Question 3

Original Image



Butterworth w/ $D_0 = 140$



Butterworth w/ $D_0 = 120$



For the last section I wrote functions to convert to and from the frequency domain. After doing this I used a butterworth filter written in cell 1. I then multiplied the filter w/ the original image and converted them back to spatial domain images