CSE438:Digital Image Processing
[Fall23]

Lab Final

Submitted for
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Department of Computer Science and Engineering
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Submitted by
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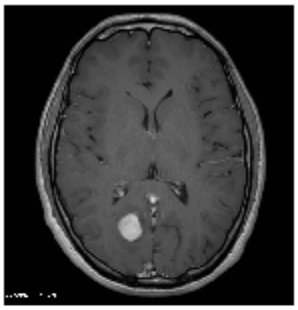
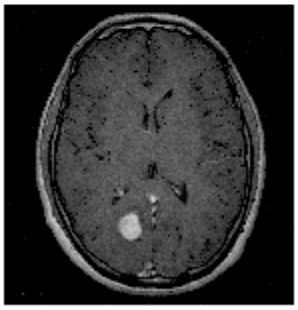
Question 1

Input Orginal

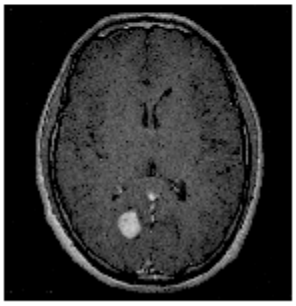


Gaussian noise

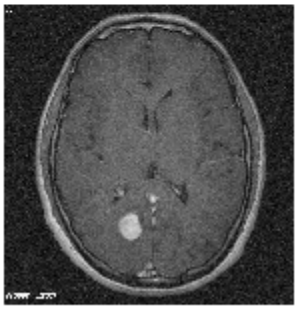
Geometric Mean filter



Harmonic Mean Filter

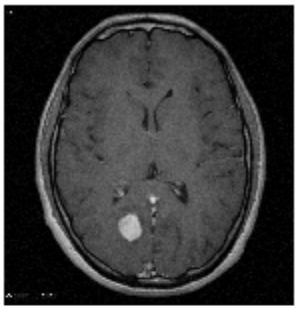


Contraharmonic mean filter



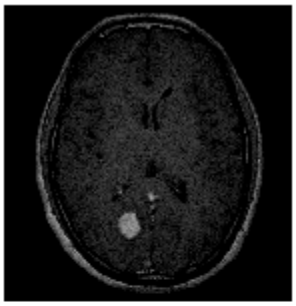
Question 2

Median Filter

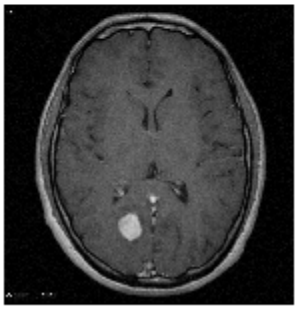


Maximum Filter

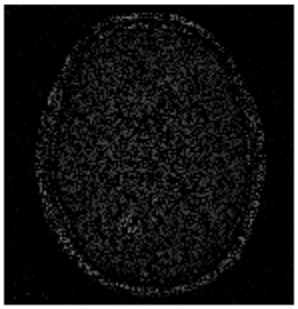
Minimum Filter



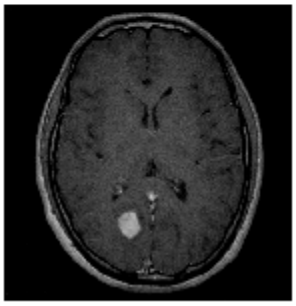
Midpoint Filter



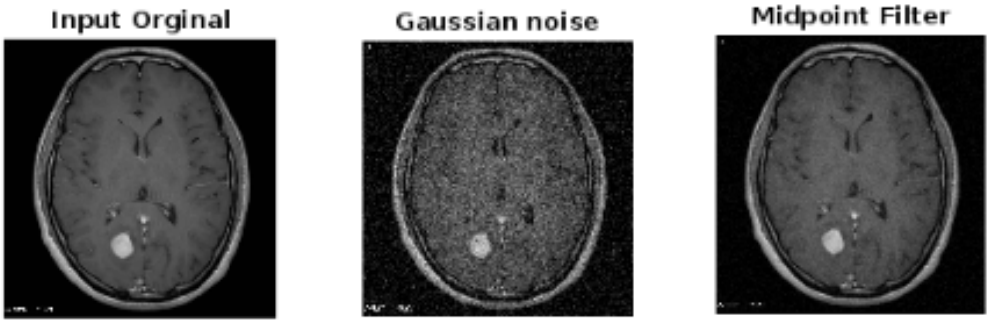
Alpha-Trimmed Filter



Trimmed Filter

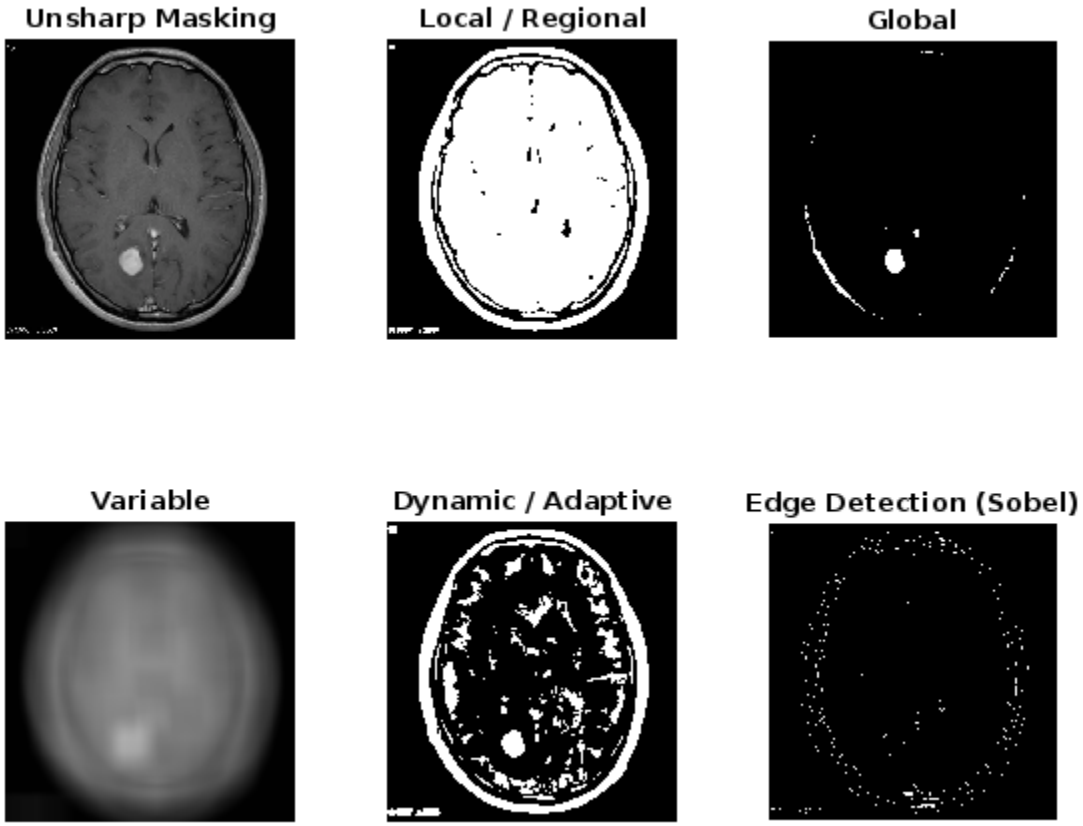


Question 3



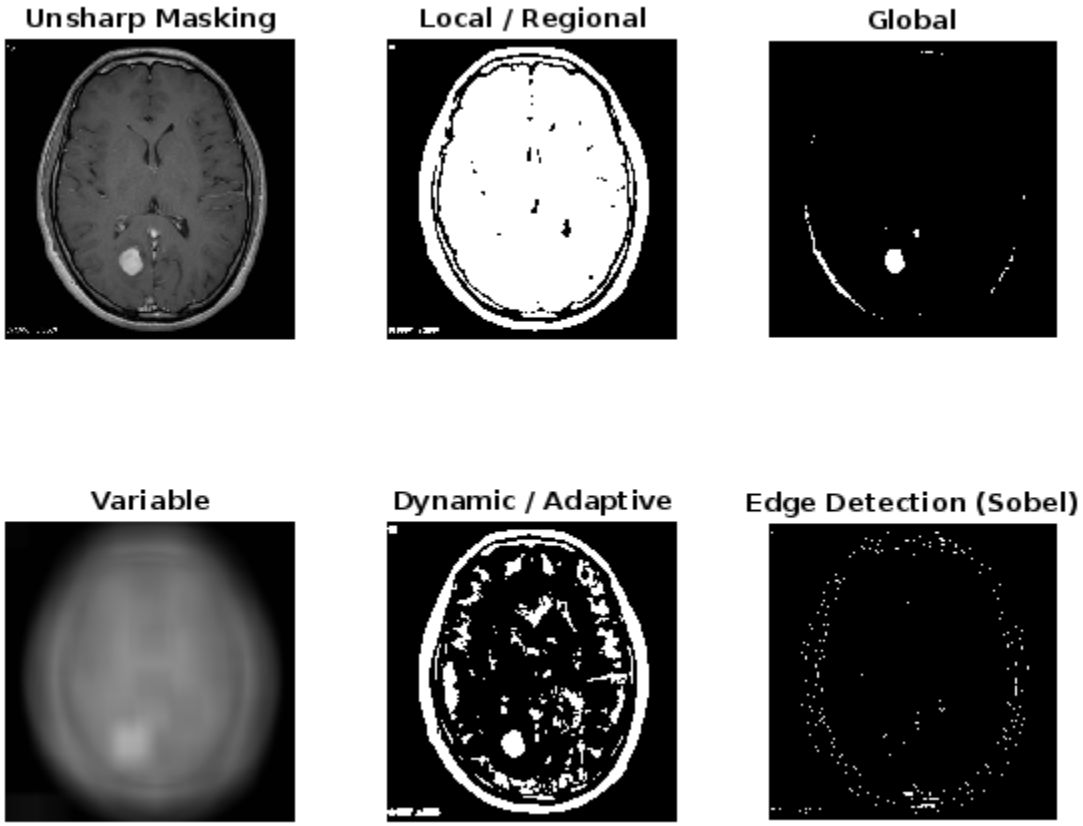
By observing and comparing each of the outputs from question 1 and 2, the Midpoint filter restores the image closer to its original state than other filters in my scenario. It is because, midpoint filter selects the midpoint, which is the average of the minimum and maximum values. It is very effective in removing Gaussian noise and uniform noise. For those reasons, Midpoint filters restore the images perfectly.

Question 4



Here in the images, we can see that the global thresholding and dynamic/ adaptive thresholding can identify the tumor (round shape) perfectly. Especially the adaptive thresholding can highlight all the edges including the tumor. So, in my case, the adaptive has worked better than other segmentation processes including global thresholding. Because global thresholding only highlighted the round shape, it could miss the tumor in another scenario.

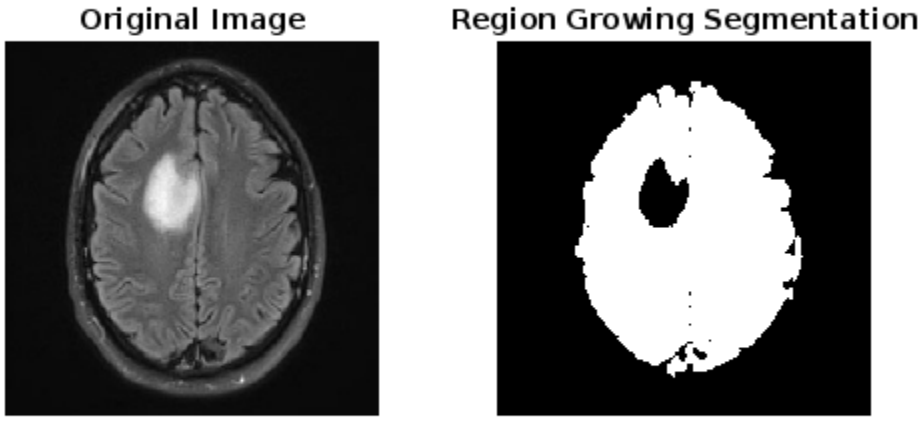
Question 5



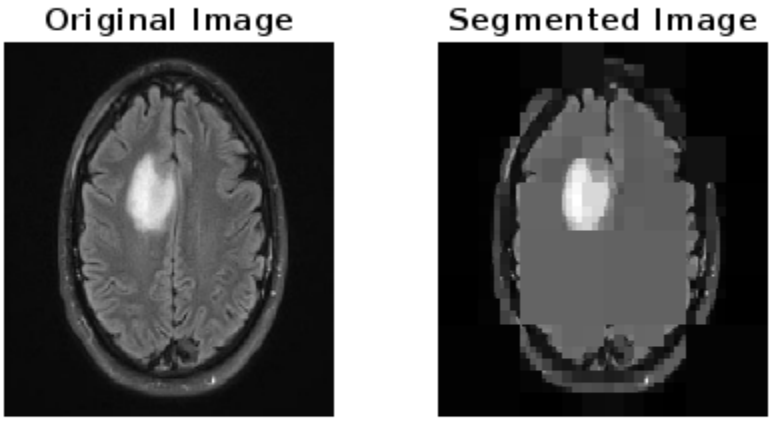
Similarity and discontinuity techniques are two main types of image segmentation approaches. Similarity techniques are based on grouping pixels with similar properties or characteristics, such as color or texture, into regions. On the other hand, discontinuity techniques are based on detecting edges or boundaries between different regions of an image. In the case of tumor detection, similarity techniques can be useful when the tumor has different characteristics or properties than the surrounding tissue. For example, if the tumor is darker or brighter than the surrounding tissue, thresholding techniques can be used to segment the tumor based on differences in intensity values. However, if the tumor is similar in intensity to the surrounding tissue, these techniques may not be effective. Discontinuity techniques, such as edge detection, can be useful in detecting the boundary between the tumor and the surrounding tissue. By identifying the edges or boundaries, it is possible to segment the tumor from the surrounding tissue. However, these techniques may not be effective if the boundary between the tumor and surrounding tissue is not well-defined or if there is noise in the image. In general, both similarity and discontinuity techniques can be useful in image segmentation, and the choice of technique will depend on the specific characteristics of the image and the object of interest. A combination

of different techniques may also be used for more accurate segmentation. But, in my case, the Similarity technique (adaptive thresholding) has worked better.

Question 6 (i)

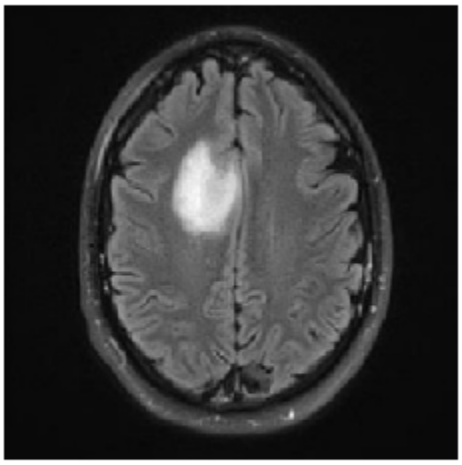


Question 6 (ii)

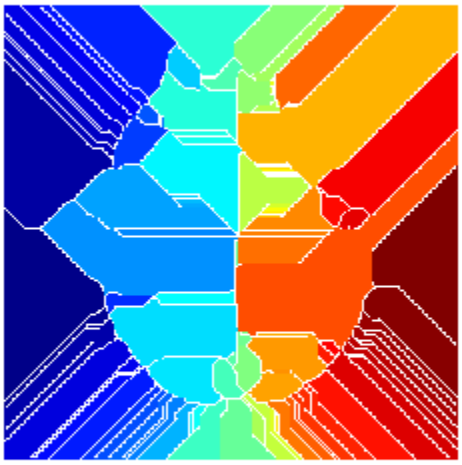


Question 7

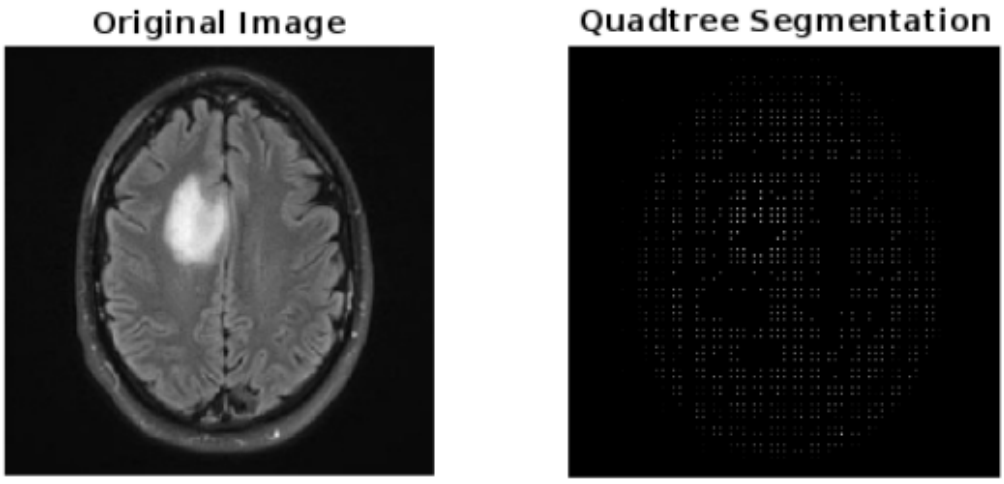
Original Image



Segmented Tumor

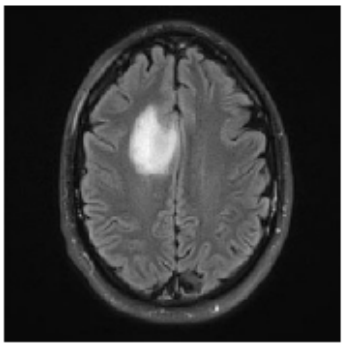


Question 8



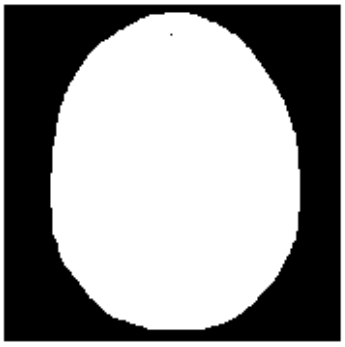
Question 9

Original Image



Binary Mask

Morphological Dilation



Morphological Erosion

Question 10