An Investigation on Brain Tumor Segmentation with MRI Images Using Body Axis Planes

T Naveen, M Naveen Kumar, K Pranitha, S Reddylikitha, G Sai Prathyusha

Undergraduate Student

Department of Electronics and Communication Engineering

Siddartha Institute of Science and Technology

Puttur, Andhra Pradesh 517583

Abstract: The purpose of this paper is dissection of brain tumor cells, focusing on Region of Interest using Magnetic Resonance Imaging. Medical images obtained from the cancer imaging archive were in the tumor cells indicated with the metadata of patients. Raw image in DICOM format visualized into the body planes of Sagittal view, Coronal view and axial view interpreted with Region of Tumor's area. Imaging algorithms in the body axis plane, associating it to corresponding ortho-view is used for segmenting the tumor area. Here two segmentation algorithms incorporated with labeled images in axial plane. Contour segmentation of object performs segmenting the tumor area across the axial slices with free hand process using seed parts. In the second type of segmentation tumor located on the brain white matter and those of overlap intensity grey matter are segmented by volume visualization with rendering objects.

I. INTRODUCTION

Medical imaging, also known as radiology, is the field of medicine in which medical professionals recreate various images of parts of the body for diagnosis (or) treatment purposes. Medical imaging procedures include non-invasive test that allow doctors to diagnosis injuries and diseases. MRI: (Magnetic Resonance Imaging) is a medical imaging technique that uses a magnetic field and computer-generated radio waves to create detailed images of the organs and tissues in your body. Image segmentation is a method in which digital image is broken down into various subgroups called image segments. It helps in reducing the complexity of image to make further processing of the image simpler.

1.1 Human Anatomy with Imaging Axis:-

In human anatomy, the anatomical planes are defined in reference to the anatomical model being in the upright, or standing, orientation. A transverse plane also known as axial or horizontal plane is parallel to the ground; it separates the superior from the inferior, or the head from the feet. The transverse planes identified in Terminological Anatomic are the trans pyloric, the sub costal plane, the trans umbilical or umbilical plane, the supra orbital plane, the inter tubercular plane, and the inter spinous plane. A coronal plane also known as frontal plane is perpendicular to the ground; it separates the anterior from the posterior, the front from the back, the ventral from the dorsal. A sagittal plane also known as anteroposterior plane is perpendicular to the ground, separating left from right. The median or midsagittal plane is the sagittal plane that is exactly in the middle of the body; it passes through midline structures such as the navel and the spine. All other sagittal planes also known as parasagittal planes are parallel to it.

The objectives of the paper are as follows. Computer assisted measurement techniques in visualizing the accuracy of finding tumor area. Finding the spatial variations of segmentation approaches.

The paper is organized as follows section 2 deals with existing system. Section 3 deals with proposed works. Section 4 deals with results. Finally section 5 concludes the overall work.

II. EXISTING WORKS

The existing works focuses on any one among the views axial, sagittal and coronal views. The major focus has been using dies for improving the contrast within the image. Intelligence Quotient(IQ) features within an MRI image has been done [2] using morphometric features using Mevis laboratory. The morphometric features

mainly include volumetric, size, shape and surface analysis. Image co-registration of two imaging modules namely positron emission tomography/computed tomography have been done manually suggested by nuclear medicine physician [3]. Challenges involved in segmenting brain MRI in [5] states the initial step is image registration it is followed by bias correction and final step is alleviating non brain cell tissues. In [6], discussions states that specifying the initial contour points would produce accuracy in segmentation outcomes. Natural language has been used for suppressing the noise that exhibits while patient doctor interaction in [7]. However, deep learning are not used for interpreting the image statistics. Contrast function and morphological operation has been performed in thermal and non-thermal images in [8] specifies the various methods of extracting the features.

III. PROPOSED METHODOLOGY

GLSL

Step 1: Image is been downloaded from the database called cancer imaging archive with the metadata [1].

Step 2: Image is being loaded inside the image loader.

Step 3: Min max scan is to scans the input image and updates minimum and maximum values of input image.

Step 4: Scale function is , it scales the input image to another interval if needed.

Step 5: The scaled image is been subjected to histogram and the properties of the image in matrix level is given in info module. LUTTOM images creates lookup table fit the images which can be customized (or) on a editable basis.

Step 6: SoExamineViewer renders and allows interaction and navigation of this image. Spatial manipulation of the image is done and connected to the SoCustomeExamineViewer.

3.2 Contour Segmentation

Image is been downloaded from the database called cancer imaging archive with the metadata [1]. Image is been loaded inside the image loader.

The image load is transferred to the VolumeRendering toolbox which specifies the maximum and minimum intensities of 3D projection.

The VolumeRendering is connected to the CustomExamineViewer.

The contour required for the image is drawn via the ML library SoCSO3DRender.

The interaction drawing and editing operations are performed via SoView2DEditor incorporates with the free hand processor.

3.3 Algorithm:-

The image is obtained from the data base in DICOMM format.

The image is loaded in the image load tool box. Then preprocessing the image is done by min max scan. In min max scan determine the minimum and maximum values and the adequate data type of an input image. The range is between 0 to 255 scale.

Scale data from input to output with all possible data type conversions.

The scaled image is further being masked with the histogram function. Lookup table operations are performed. The segmentation of object is performed in following green color tool boxes using shader programming.
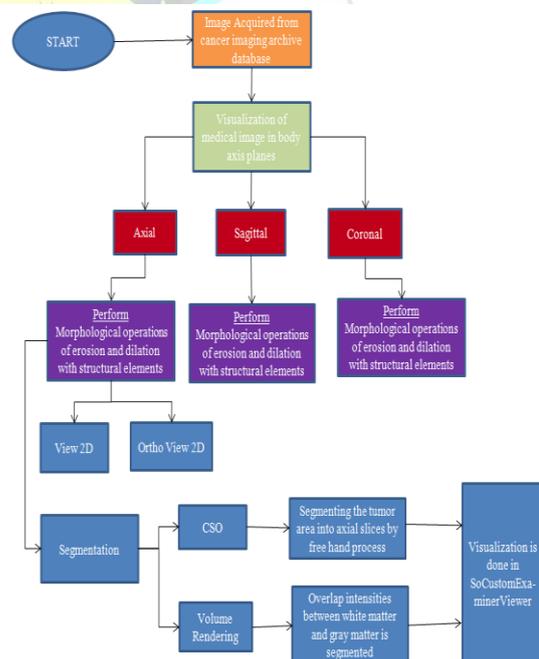

Figure 1. Flowchart of proposed work:-

IV. RESULTS

Medical images are processed with MevisLAB [4]. The contour segmentation layout diagram and its output is

shown in figure 2. The volume rendering layout diagram and its results are shown in figure 3.
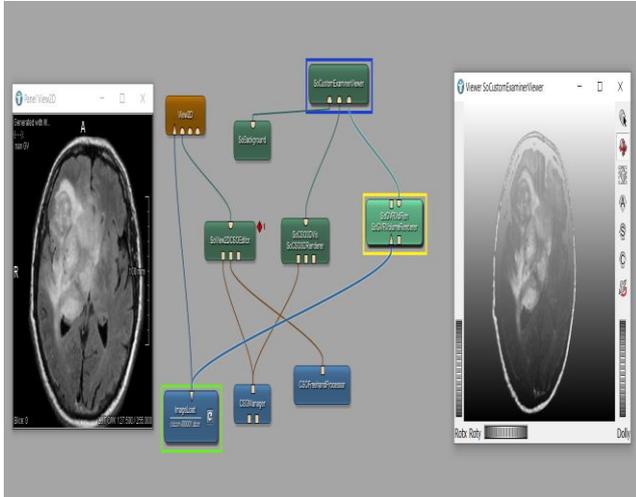
Figure 2 The DICOM image is performed under contour segmentation
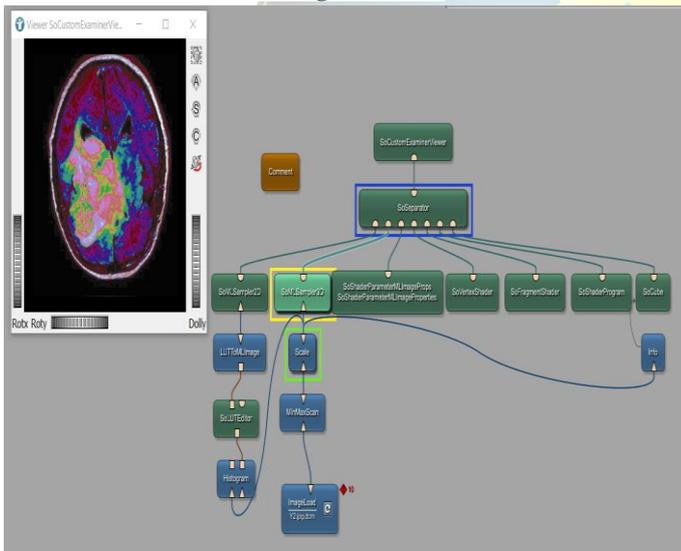
Figure 3. The DICOM image is performed under volume rendering segmentation.

V. CONCLUSION

In this paper two segmentation algorithms were incorporated. Contour segmentation of objects with volume Rendering in axial view is performed from the labeled dataset. Examining the tumor area manually via free hand processor provides the axial slices variability from non tumors areas. Finally volume visualization has been done by using a lookup table from the MeVis image processing library tool box and seen object modules. Further

REFERENCES

1. https://www.cancerimagingarchive.net/nbia-search/?CollectionCriteria=Brain-Tumor-Progression (07 Dec 2019).

2. Thilakavathy, P., & Diwan, B. (2021). Semi-Automatic Framework for Estimating Intelligence Quotient (IQ) Using MRI. Annals of the Romanian Society for Cell Biology, 2087-2101.

3. Pandey, A. K., Sharma, A., Kumar, S., Negi, A., Singh, S., Kumar, S., & Kumar, R. (2022). Design and evaluation of MeVislab networks for co-registration and cropping of positron emission tomography/computed tomography scans. Indian Journal of Nuclear Medicine, 37(1), 37.

4. https://www.mevislab.de

5. Despotović, I., Goossens, B., & Philips, W. (2015). MRI segmentation of the human brain: challenges, methods, and applications. Computational and mathematical methods in medicine, 2015.

6. Islam, M., & Kashem, M. (2021). Parametric active contour model-based tumor area segmentation from brain mri images using minimum initial points. Iran Journal of Computer Science, 4(2), 125-132.

7. Menon, N. G., Shrivastava, A., Bhavana, N. D., & Simon, J. (2021, November). Deep Learning based Transcribing and Summarizing Clinical Conversations. In 2021 Fifth International Conference on I-SMAC (IoT in Social, Mobile, Analytics and Cloud)(I-SMAC) (pp. 358-365). IEEE.

8. Kumar, U. S., Simon, J., Vengaloor, R. P., & Elaveini, M. A. (2021, May). Image Processing Techniques in Thermal and Non-thermal Images. In International Conference on Image Processing and Capsule Networks (pp. 533-544). Springer, Cham.