Segmentation software

- Automatic detection of hippocampal sclerosis in patients with epilepsy
- Multi-volume rendering using depth buffers for surgical planning in virtual reality
- Fusion of 3D photorealistic lateral-to-medial brain white matter dissection and diffusion tensor imaging for dynamic visualization of key fiber tracts
- BrainTumNet: multi-task deep learning framework for brain tumor segmentation and classification using adaptive masked transformers
- Early outcomes with virtual surgical planning software and patient-specific instrumentation in adult spinal deformity
- The meningo-orbital band from an endoscopic transorbital approach: an anatomical study
- Development of an Open-Source Algorithm for Automated Segmentation in Clinician-Led Paranasal Sinus Radiologic Research
- Skull Base Anatomy Presented in 360° Photogrammetry 3-Dimensional Models

Segmentation software is a type of computer software used in various fields, including medical imaging, computer vision, and geographic information systems (GIS). Its primary function is to divide or partition an image or dataset into distinct, meaningful regions or segments based on specific criteria or characteristics. Segmentation is a crucial step in image analysis and data processing, as it helps identify and separate objects or areas of interest within an image or dataset. Here are some key features and applications of segmentation software:

Key Features:

Image Processing: Segmentation software is often used in medical imaging to delineate structures or regions within images, such as organs, tumors, blood vessels, or anatomical features.

Computer Vision: In computer vision applications, segmentation is used to identify and track objects in videos or still images, enabling tasks like object recognition and autonomous navigation for robots and self-driving cars.

Geographic Information Systems (GIS): GIS segmentation software can be used to divide geographical maps or satellite images into distinct regions based on land use, vegetation types, urban areas, and more.

Machine Learning Integration: Many segmentation tools integrate with machine learning algorithms to improve accuracy and automate the process of identifying regions of interest.

Manual and Automatic Segmentation: Some software allows for manual delineation, where users can interactively draw boundaries around regions of interest. Automatic segmentation tools use predefined algorithms to perform segmentation without user input.

Applications:

Medical Imaging: Segmentation software is widely used in medical fields, such as radiology, to identify and analyze structures in X-rays, CT scans, MRIs, and other medical images. It helps in diagnosis, treatment planning, and monitoring disease progression.

Biomedical Research: Researchers use segmentation software to analyze cellular and tissue structures in microscopy images for various studies, including cancer research and neuroscience.

Computer Vision: In robotics and surveillance, segmentation software can track and recognize objects in video feeds, enhancing security and automation.

Geospatial Analysis: GIS segmentation tools are essential for urban planning, environmental monitoring, land-use classification, and disaster response.

Natural Language Processing (NLP): In NLP applications, text segmentation software is used to break down text into sentences, words, or phrases, facilitating language analysis and processing.

Image Editing: Graphic designers and photographers use segmentation software for tasks like background removal, object isolation, and creative image manipulation.

Examples of popular segmentation software tools include ITK-SNAP for medical imaging, OpenCV for computer vision, ENVI for remote sensing, and Adobe Photoshop for image editing.

The choice of segmentation software depends on the specific application and requirements, as different tools offer various features, accuracy levels, and compatibility with different data types.

Raidionics

3D Slicer

Segmentation software, such as GuideXT© and Suretune©, are commercially available for atlas-based identification of deep brain structures. However, no study has compared the concordance of the segmentation results between the two software.

Methods: We retrospectively compared the concordance of segmentation of GuideXT© and Suretune© software by comparing the position of the segmented key structures with clinically predicted targets obtained using the newly developed RebrAIn© software as a reference.

Results: We targeted the STN in 44 MRI from PD patients (88 hemispheres) and the Vim in 31 MRI from ET patients (62 hemispheres) who were elected for DBS. In 22 STN targeting (25%), the target positioning was not correlating between GuideXT© and Suretune©. Regarding the Vim, targets were located in the segmented Vim in 37%, the posterior subthalamic area (PSA) in 60%, and the STN in 3% of the cases using GuideXT©; the proportions were 34%, 60%, and 6%, respectively, using Suretune©. The mean distance from the centre of the RebrAIn© targeting to the segmented Vim by Suretune© was closer (0.64 mm) than with GuideXT© (0.96 mm; p = 0.0004).

Conclusion: While there is some level of concordance in the segmentation results of key structures for DBS treatment among software models, differences persist. Therefore, such software should still be considered as tools and should not replace clinician experience in DBS planning [1)]

1)

Constanthin PE, Zemzemi N, Cuny E, Engelhardt J. Comparison of two segmentation software tools for deep brain stimulation of the subthalamic and ventro-intermedius nuclei. Acta Neurochir (Wien). 2023 Oct 3. doi: 10.1007/s00701-023-05819-9. Epub ahead of print. PMID: 37787840.