Vol2Brain is an automated brain MRI segmentation pipeline designed to analyze structural images and calculate volumetric data for over 130 distinct brain structures, including cortical, subcortical, cerebellar, and ventricular regions.

It is part of the volBrain platform, developed by the GIRDLab (University of Castilla-La Mancha, Spain) and Neurospin (CEA, France).

⚙ Key Features Input: High-resolution 3D T1-weighted MRI scan (NIfTI or DICOM).

Output: Detailed volumetric report (absolute and normalized volumes).

Uses multiple processing steps:

Skull-stripping

Spatial normalization

Tissue classification

Atlas-based segmentation

Generates labeled brain maps and summary tables.

 Strengths Fast and user-friendly (web-based interface or command-line options).

Validated in healthy controls and neurodegenerative diseases (e.g., Alzheimer’s, multiple sclerosis).

Useful for population studies and tracking brain atrophy.

⚠ Limitations Not optimized for lesioned brains:

Inaccurate segmentation in cases with tumors, arteriovenous malformations (AVMs), hemorrhages, or large anatomical distortions.

No clinical interpretation: Only provides volumes; no insight into symptoms or function.

High risk of false positives if used in studies with small sample sizes and multiple comparisons without correction.

Dependent on image quality and acquisition protocol.

 In the context of the AVM study While Vol2Brain provides elegant and detailed volumetric data, its use in patients with structural brain lesions (like AVMs) may yield unreliable segmentations, especially when volumes are compared across dozens of regions without proper clinical correlation or statistical adjustment. This limits the scientific value of the findings.