Ceres is an automated cerebellum segmentation tool developed as part of the volBrain platform, designed to accurately quantify the volumes of cerebellar lobules and substructures using 3D T1-weighted MRI scans.

 Purpose To provide precise volumetric data on individual cerebellar lobules and hemispheres for use in:

Cognitive and motor research

Neurodegenerative disorders (e.g., multiple system atrophy, ataxias)

Developmental and psychiatric conditions

 Structures Segmented by Ceres Ceres segments the cerebellum into lobules I to X, including:

Anterior lobe: I–IV, V

Posterior lobe: VI, Crus I, Crus II, VIIB, VIIIA, VIIIB, IX

Flocculonodular lobe: X

It provides volumes for each hemisphere, the vermis, and can optionally estimate gray and white matter components.

⚙ Technical Features Input: 3D T1-weighted MRI (NIfTI or DICOM)

Output: Segmentation map + volumetric report (CSV and image format)

Based on a multi-atlas patch-based label fusion method

High anatomical accuracy, validated against expert manual labels

 Strengths One of the few tools focused specifically on detailed cerebellar anatomy

High reproducibility in healthy brains

Free and accessible via the volBrain web platform

⚠ Limitations Not designed for brains with space-occupying lesions, hydrocephalus, or postoperative changes

Volume estimates may be skewed in cases with:

Mass effect from distant lesions (like AVMs)

Poor scan quality

Misregistration due to abnormal anatomy

No functional correlation: purely structural output, not linked to symptoms or performance

 In the AVM Study Context The use of Ceres to measure cerebellar volume changes in patients with cortical AVMs (in precentral/postcentral gyri) is highly speculative. Any differences reported in cerebellar lobule volumes (e.g., VIIIA, VIIIB) lack mechanistic explanation, and without longitudinal data or functional outcomes, such findings risk being overinterpreted artifacts.