

Wavelets

Edge detector – Canny

Inputs

Upload an image, DICOM, or a video

 Drag and drop file here
Limit 200MB per file • PNG, JPG, JPEG, BMP, DCM, MP4, AVI, MOV, MKV, MPEG4

Browse files

 0023.dcm 127.5KB ×

☐ Use random image (ignore upload if checked)

MRA & processing parameters

MRA levels 3

Wavelet (PyWavelets)
db2

Edge detector
canny

Canny Thresholds

Canny low 100

Canny high 200

Morphology
close

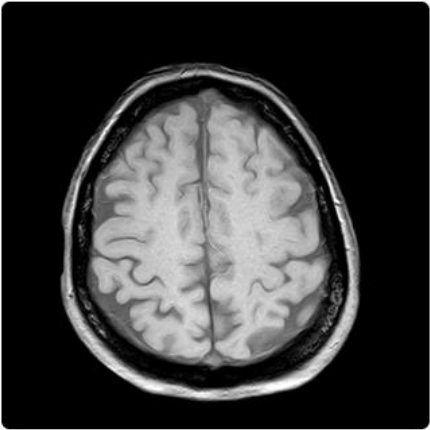
Morph kernel 5

☒ Prefer SIFT (falls back to ORB)

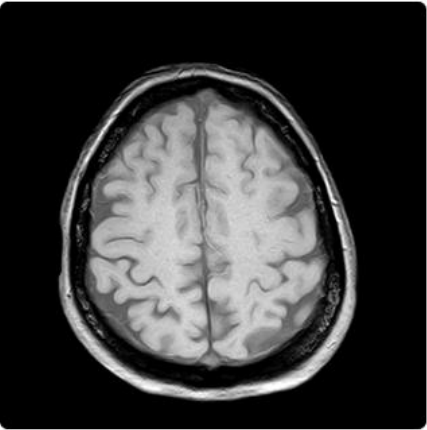
Video mode (only used for videos / multiframe DICOM)

Frame mode
☒ intra ☐ diff

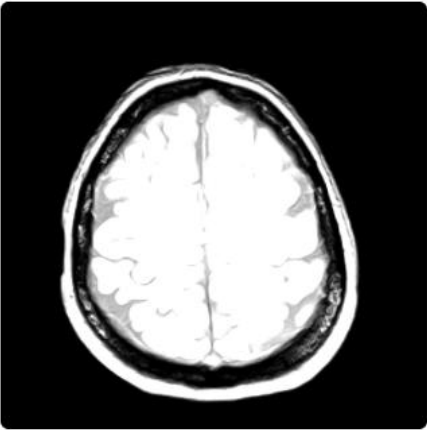
Results



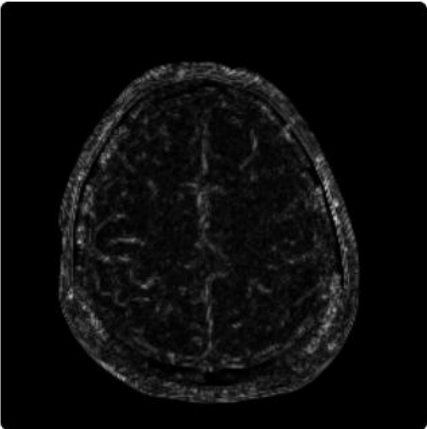
Original

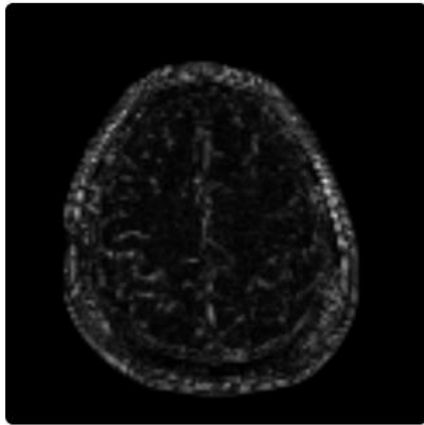


Grayscale

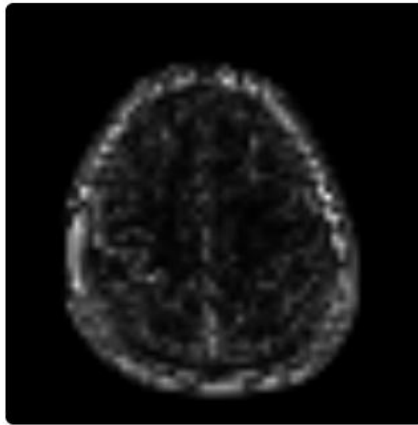


MRA Approx L1

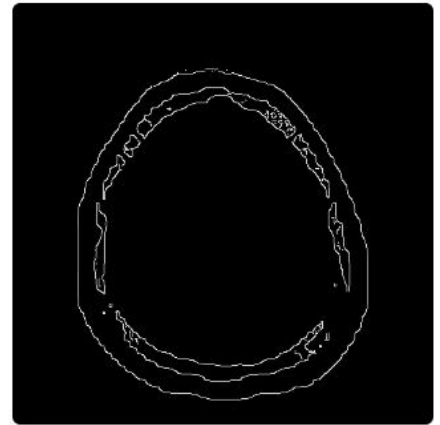




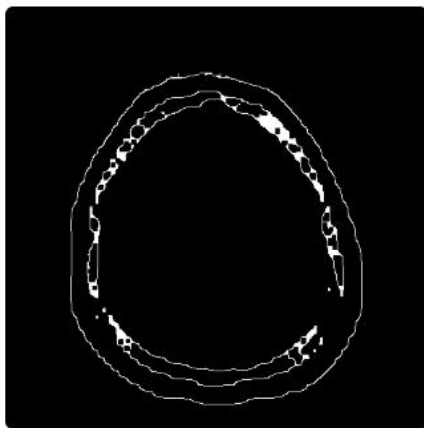
MRA Detail L2



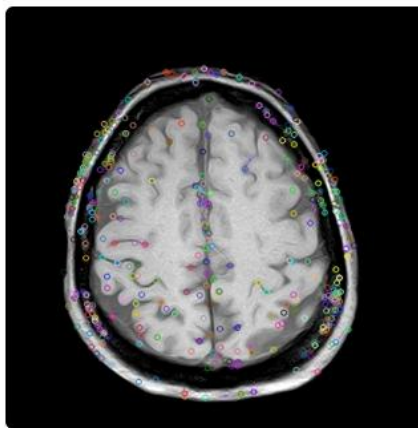
MRA Detail L3



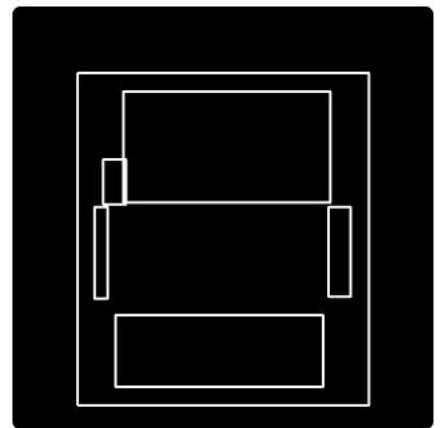
Edges



Morphology



Feature Keypoints



ROIs (from edges)

Edge detector - Sobel

Inputs

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Browse files

0003.dcm 145.8KB

X

☐ Use random image (ignore upload if checked)

MRA & processing parameters

MRA levels

3

Wavelet (PyWavelets)

db2

Edge detector

sobel

▼

Morphology

close

▼

Morph kernel

5

☒ Prefer SIFT (falls back to ORB)

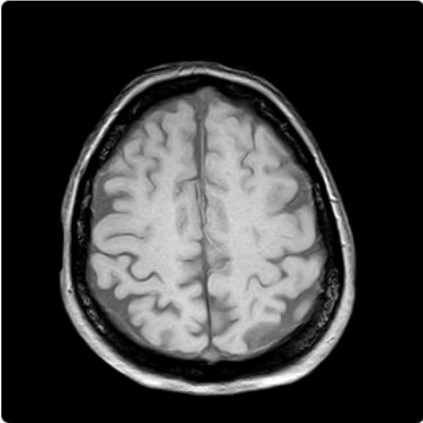
Video mode (only used for videos / multiframe DICOM)

Frame mode

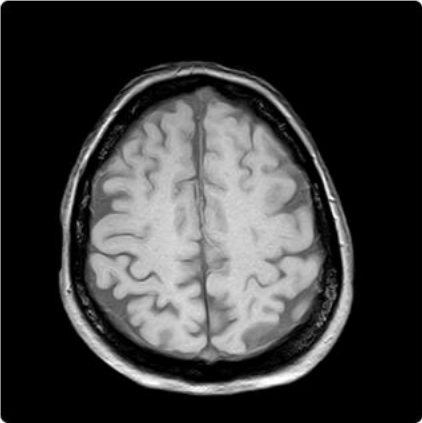
☒ intra ☐ diff

Run

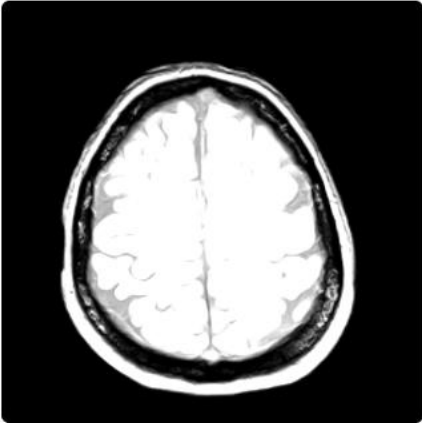
Results



Original



Grayscale



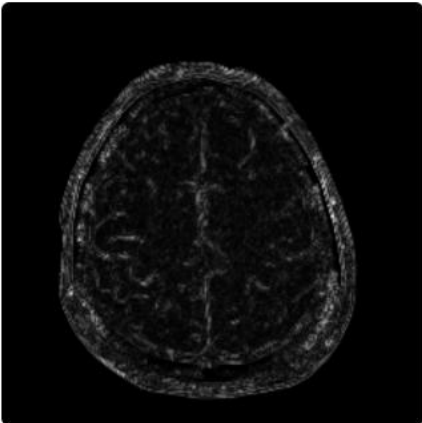
MRA Approx L1



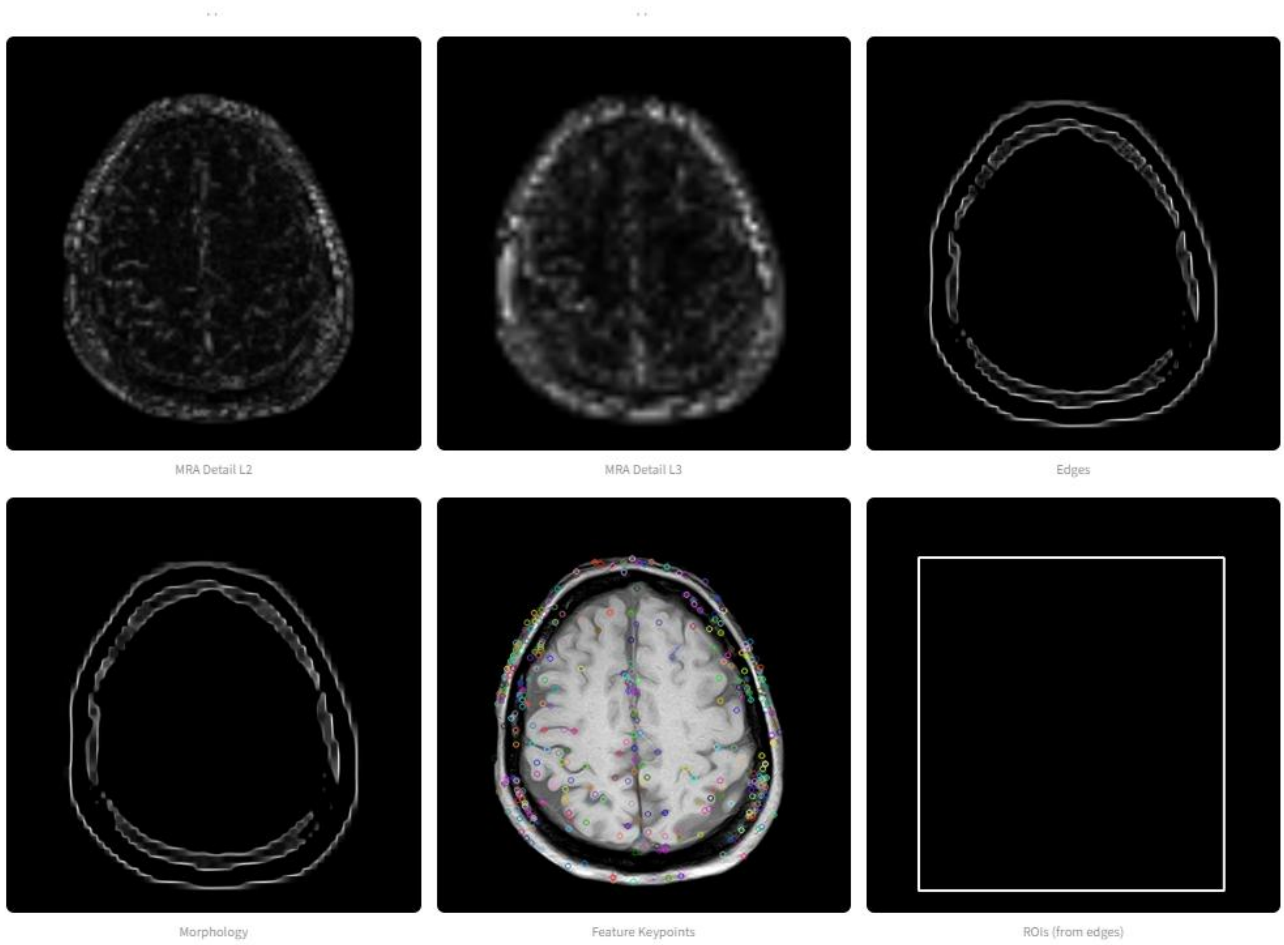
MRA Approx L2



MRA Approx L3




MRA Detail L1



Edge detector - laplacian

Inputs


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Browse files



0023.dcm 115.1KB

✕

☐ Use random image (ignore upload if checked)

MRA & processing parameters

MRA levels

3

Wavelet (PyWavelets)

db2

Edge detector

laplacian

▼

Morphology

close

▼

Morph kernel

5

☒ Prefer SIFT (falls back to ORB)

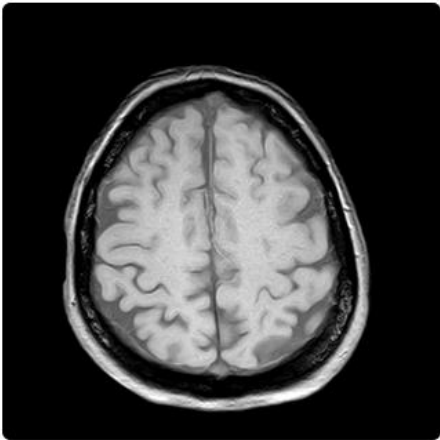
Video mode (only used for videos / multiframe DICOM)

Frame mode

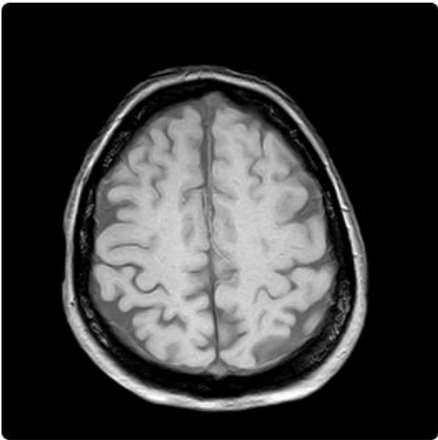
☒ intra ☐ diff

Run

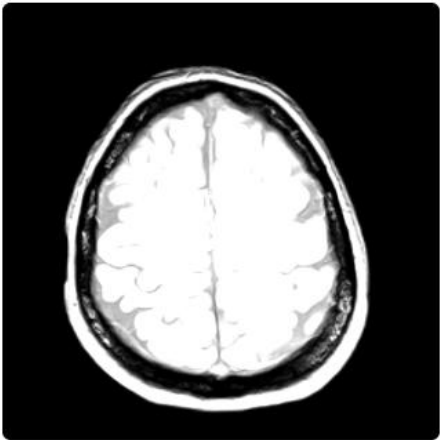
Results



Original



Grayscale



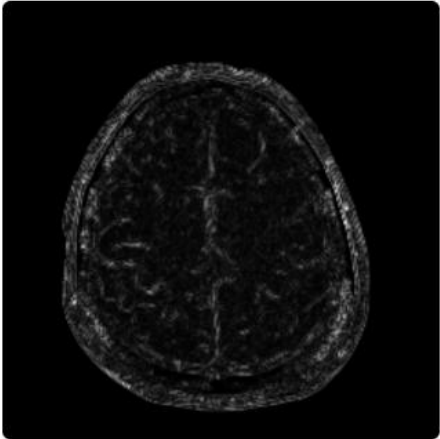
MRA Approx L1



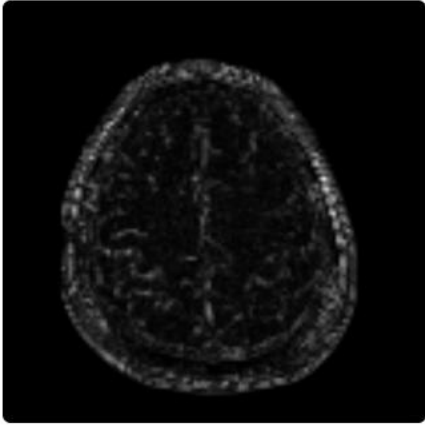
MRA Approx L2



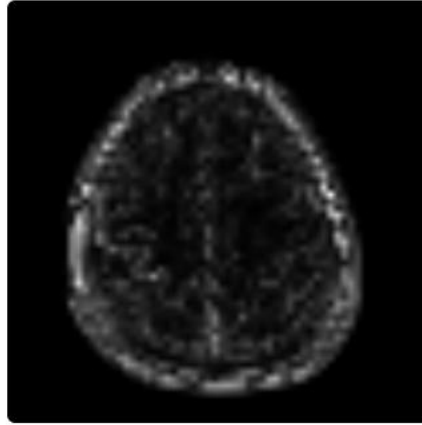
MRA Approx L3



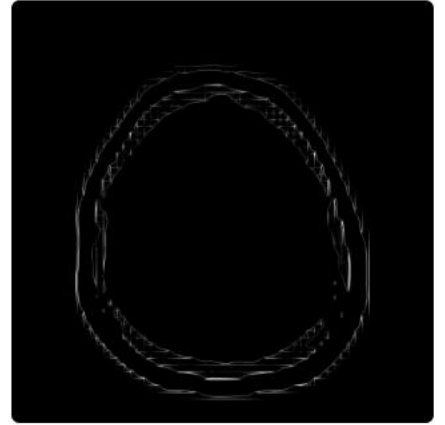
MRA Detail L1



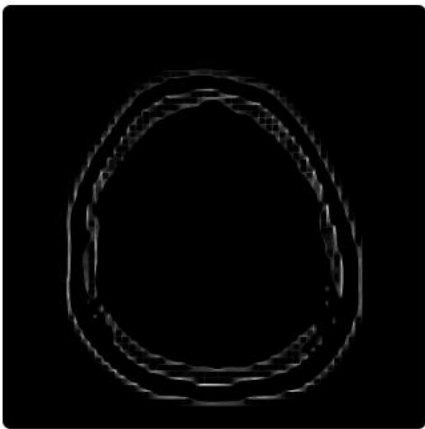
MRA Detail L2



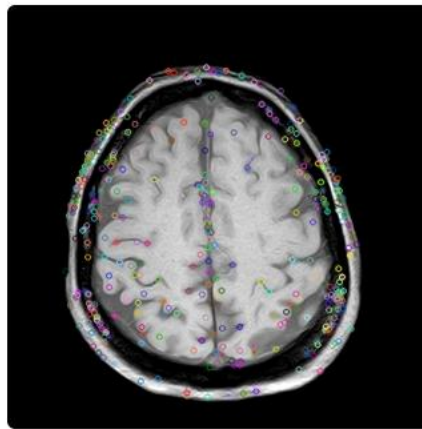
MRA Detail L3



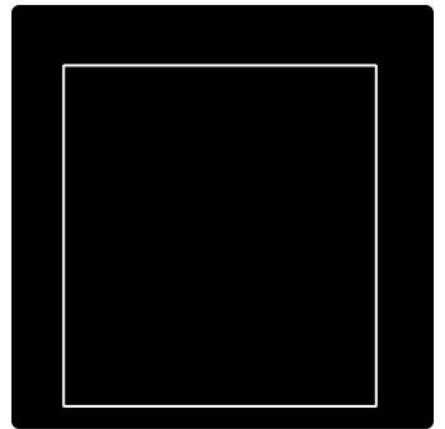
Edges



Morphology



Feature Keypoints



ROIs (from edges)

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Browse files



Brain MRA 3d rotation.mp4 194.0KB



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MRA & processing parameters

MRA levels

3

Wavelet (PyWavelets)

db2

Edge detector

canny



Canny Thresholds

Canny low

100

Canny high

200

Morphology

close



Morph kernel

5

☒ Prefer SIFT (falls back to ORB)

Video mode (only used for videos / multiframe DICOM)

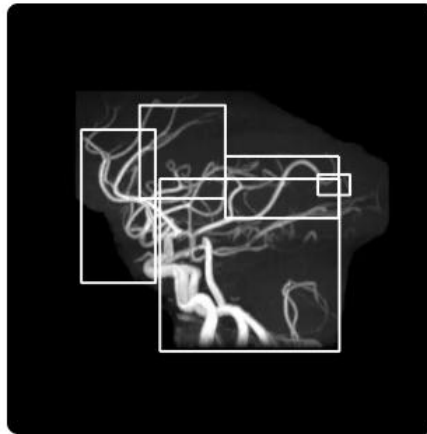
Frame mode

☐ intra ☒ diff

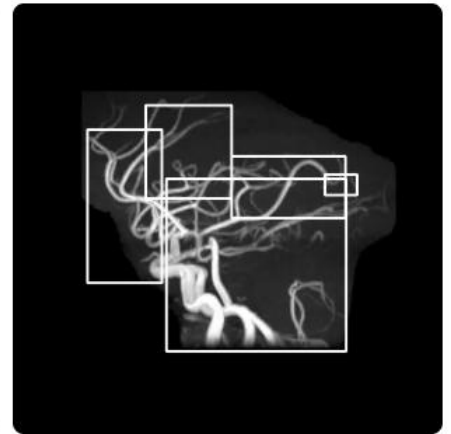
Results



Processed Frame 0



Processed Frame 29



Processed Frame 29

I tested all three edge detectors (Canny, Sobel, and Laplacian) using the **same DICOM file** so the results are easy to compare.

For the video part, I used a public 3D brain rotation video from YouTube (<https://www.youtube.com/shorts/Lui8PI9G58o>), since real MRI videos aren't available to me. This shows how my app handles both **single-frame medical images** and **multi-frame video processing** in a consistent way.

Why MRA is useful?

- **Separates scales:** MRA splits an image into coarse structure (big shapes) and fine details (texture/edges). That lets us work at the scale that matters.
- **Noise robustness:** Running edges/features on a coarser approximation reduces small noise while keeping important boundaries.
- **Localizes features in space *and* scale:** Wavelet bands tell us *where* a feature is and *how big* it is, which helps ROI selection and feature matching.
- **Computational efficiency:** Processing a lower-resolution approximation is faster, which is great for videos.
- **Better downstream results:** Edge detectors, morphology, and SIFT/ORB often perform more cleanly on the smoothed (coarse) level, producing fewer false positives.
- **Video flexibility:** With MRA + frame differencing, we can emphasize motion (diff mode) or structure (intra mode) depending on the task.