

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, MPEG

Browse files

 0023.dcm 127.5KB

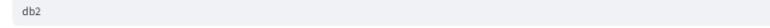
Use random image (ignore upload if checked)

MRA & processing parameters

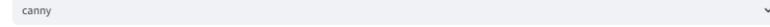
MRA levels

 3

Wavelet (PyWavelets)

 db2

Edge detector

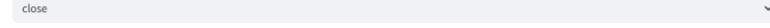
 canny

Canny Thresholds

Canny low  100

Canny high  200

Morphology

 close

Morph kernel

 5

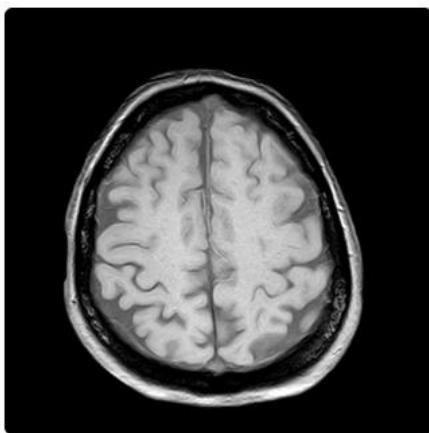
Prefer SIFT (falls back to ORB)

Video mode (only used for videos / multiframe DICOM)

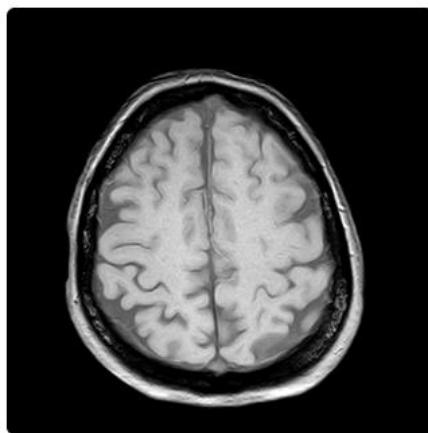
Frame mode

intra diff

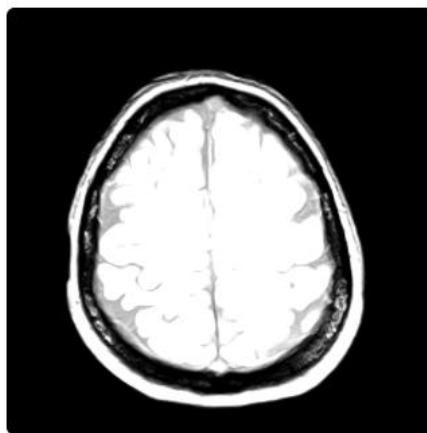
Results



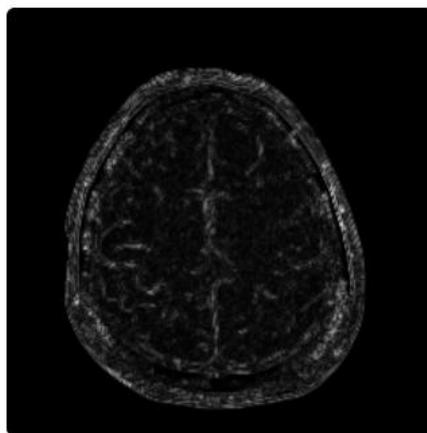
Original

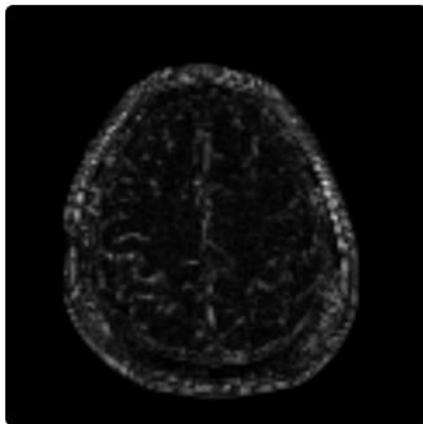


Grayscale

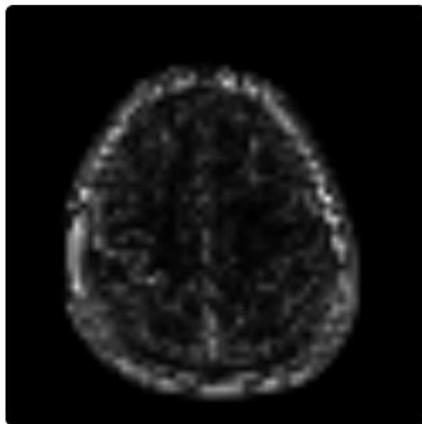


MRA Approx L1

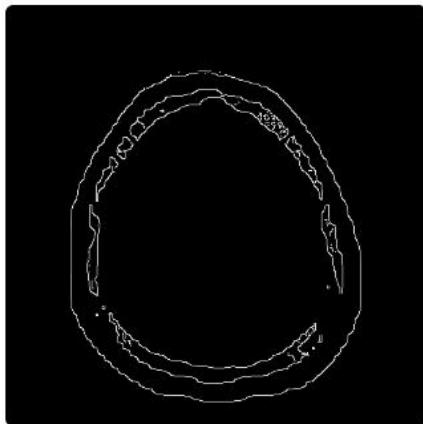




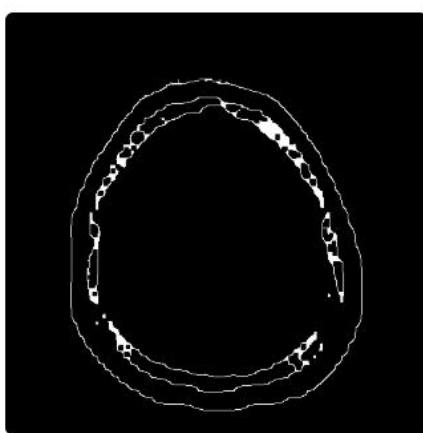
MRA Detail L2



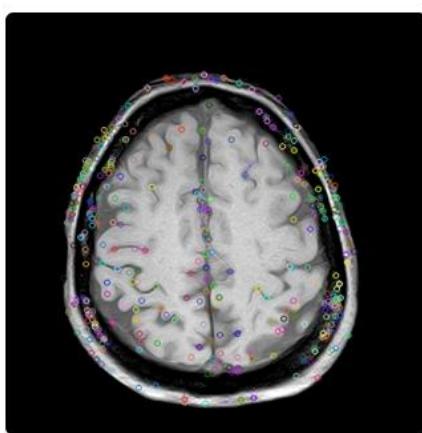
MRA Detail L3



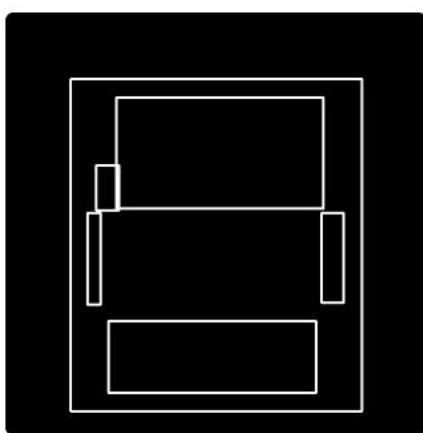
Edges



Morphology



Feature Keypoints



ROIs {from edges}

Edge detector - Sobel

Inputs

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0003.dcm 145.8KB



Use random image (ignore upload if checked)

MRA & processing parameters

MRA levels



Wavelet (PyWavelets)

db2

Edge detector

sobel



Morphology

close



Morph kernel



Prefer SIFT (falls back to ORB)

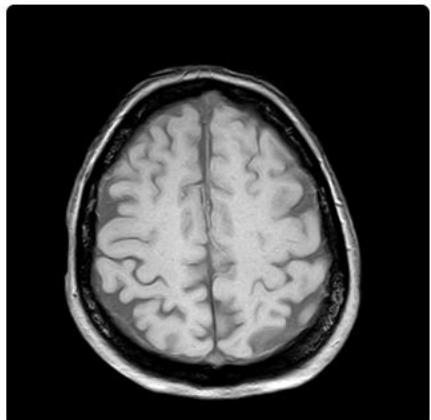
Video mode (only used for videos / multiframe DICOM)

Frame mode

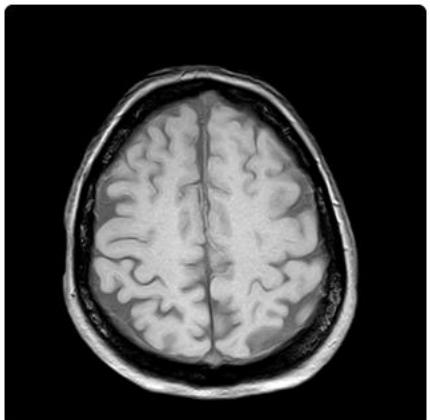
intra diff

Run

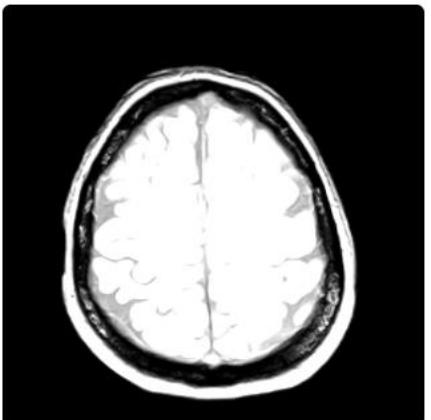
Results



Original



Grayscale



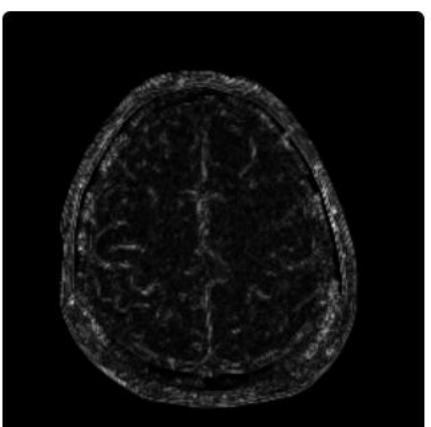
MRA Approx L1



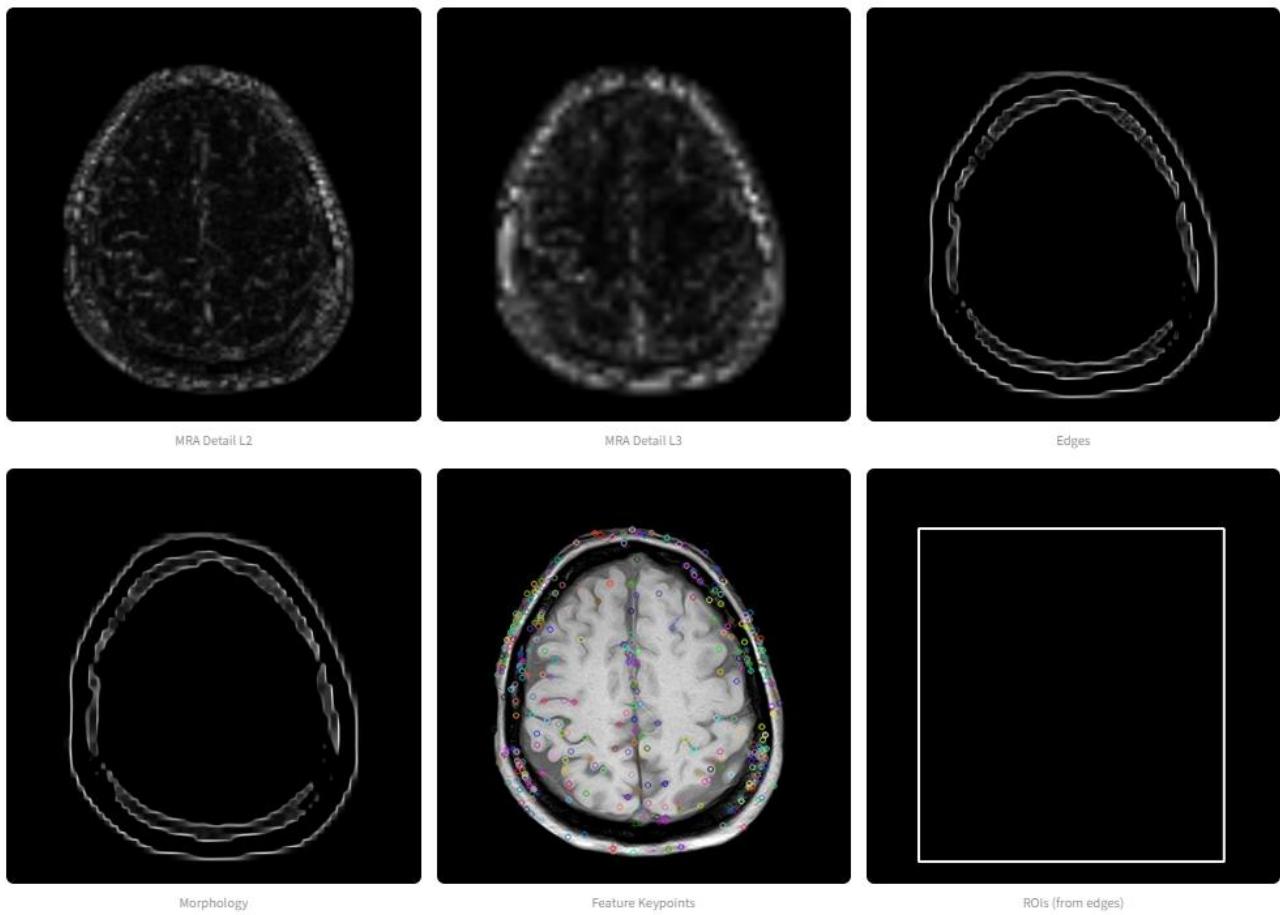
MRA Approx L2



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



Wavelet (PyWavelets)

db2

Edge detector

laplacian



Morphology

close



Morph kernel



Prefer SIFT (falls back to ORB)

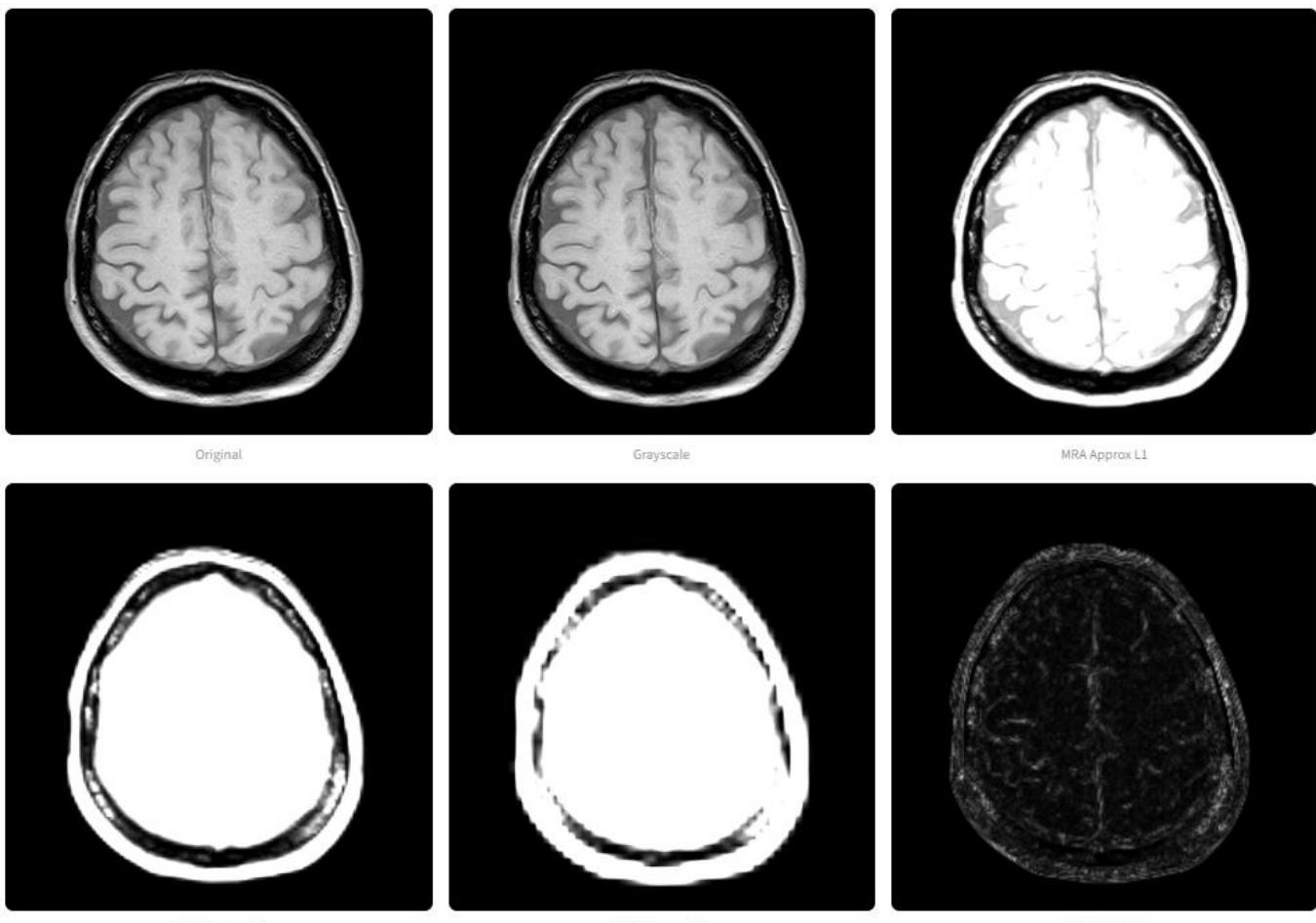
Video mode (only used for videos / multiframe DICOM)

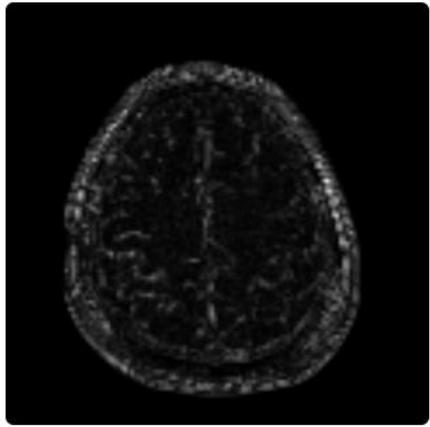
Frame mode

intra diff

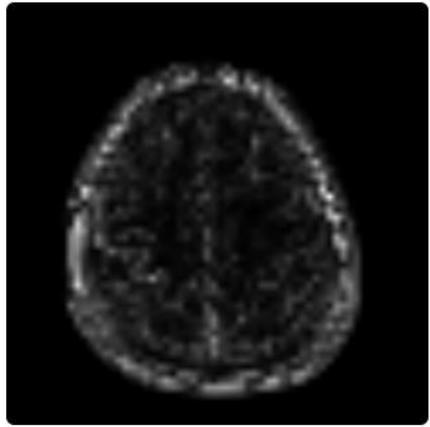
Run

Results

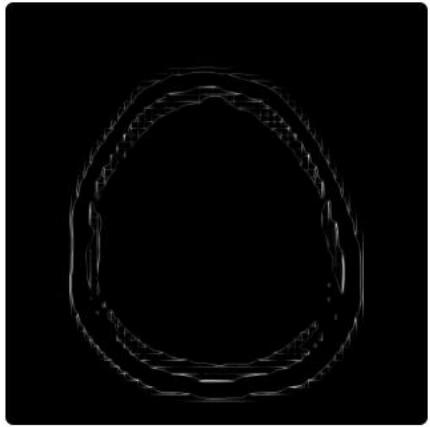




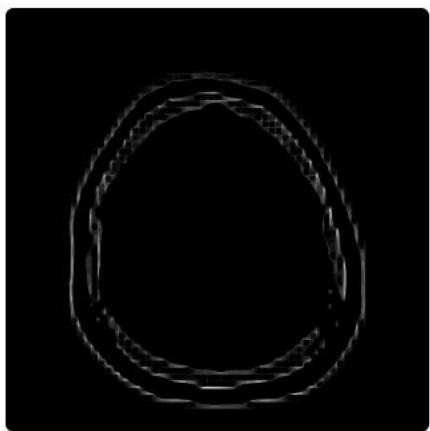
MRA Detail L2



MRA Detail L3



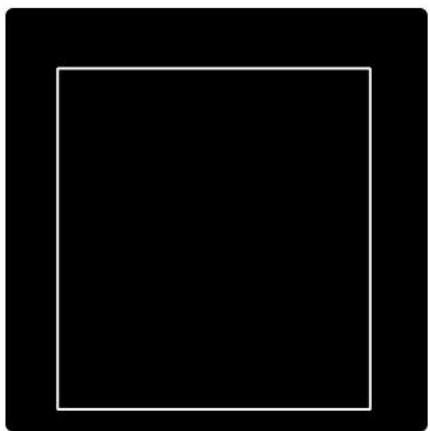
Edges



Morphology



Feature Keypoints



ROIs (from edges)

Inputs

Upload an image, DICOM, or a video



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Brain MRA 3d rotation.mp4 194.0KB



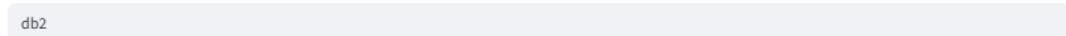
Use random image (ignore upload if checked)

MRA & processing parameters

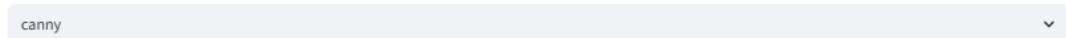
MRA levels



Wavelet (PyWavelets)



Edge detector



Canny Thresholds

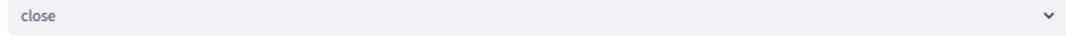
Canny low



Canny high



Morphology



Morph kernel



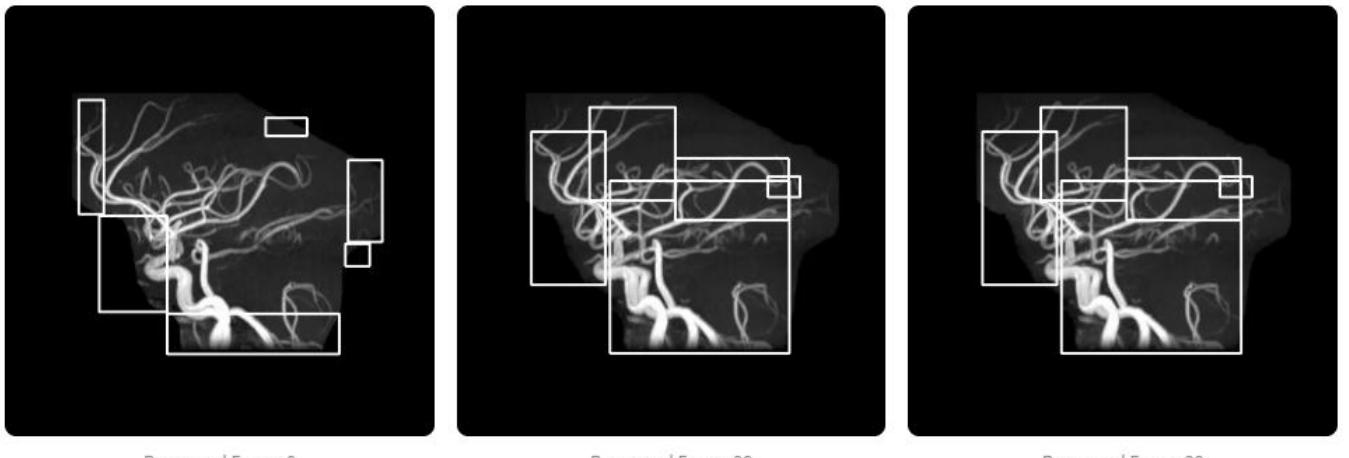
Prefer SIFT (falls back to ORB)

Video mode (only used for videos / multiframe DICOM)

Frame mode

intra diff

Results



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.