

# Patient-Owned MRI Intelligence Engine

Clinical-grade MRI analysis pipeline for lesion detection, anatomical localization, and patient-oriented interpretation.

Open, modular, and research-aligned architecture.

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# Clinical Problem

Patients with neurological conditions undergo repeated MRI examinations over many years.

Interpretation is often limited to radiology reports that do not contextualize lesion changes for patients.

Longitudinal lesion burden and regional involvement are difficult to track outside specialized systems.

# Clinical Need

Improved patient understanding of MRI findings.

Consistent longitudinal comparison across imaging sessions.

Structured, explainable outputs that complement clinical workflows.

# Proposed Solution

A patient-centered MRI intelligence pipeline focused on clarity and interpretability.

Converts raw imaging data into structured anatomical and functional summaries.

Designed as a decision-support and educational tool, not a diagnostic system.

# System Outputs

Binary lesion presence assessment.

Anatomical region overlap using validated brain atlases.

Region-associated functional and symptom domains.

Standardized patient-facing report (PDF).

# Data Ingestion and Preprocessing

Support for DICOM and NIfTI formats.

Bias field correction and skull stripping.

Spatial normalization to MNI152 reference space.

Intensity normalization for cross-session consistency.

# Lesion Detection

Deep learning-based segmentation using U-Net / nnUNet architectures.

Voxel-level lesion probability estimation.

Output masks suitable for quantitative and qualitative analysis.

# Anatomical Mapping

Intersection of lesion masks with established neuroanatomical atlases.

White matter, cortical, and subcortical region support.

Quantification of lesion burden by region.



# Symptom Domain Mapping

Region-to-function associations derived from neuroscience literature.

Generation of likely symptom domains based on affected regions.

Intended for patient education and discussion support.

# Clinical and Research Use Cases

Patient education and engagement.

Longitudinal monitoring of lesion evolution.

Research prototyping and reproducible analysis pipelines.

# Current Status

Functional open-source codebase.

DICOM ingestion and preprocessing implemented.

Lesion detection and atlas mapping integrated.

Documentation and example workflows available.

# Differentiation

Patient-oriented output design.

Explainable, modular pipeline.

Open-source transparency.

Designed for extension rather than black-box inference.

# Founder Background

Former CTO with experience building health-related data systems.

Background in software engineering and applied analytics.

Focus on practical, deployable systems.

# Regulatory and Ethical Positioning

Non-diagnostic, informational tool.

Patient-controlled data handling.

Designed to complement clinical interpretation.

# Next Steps

Clinical collaborator feedback.

Pilot studies focused on usability and comprehension.

Expansion to additional neurological conditions.