Brain Tumor Detector

(MRI)

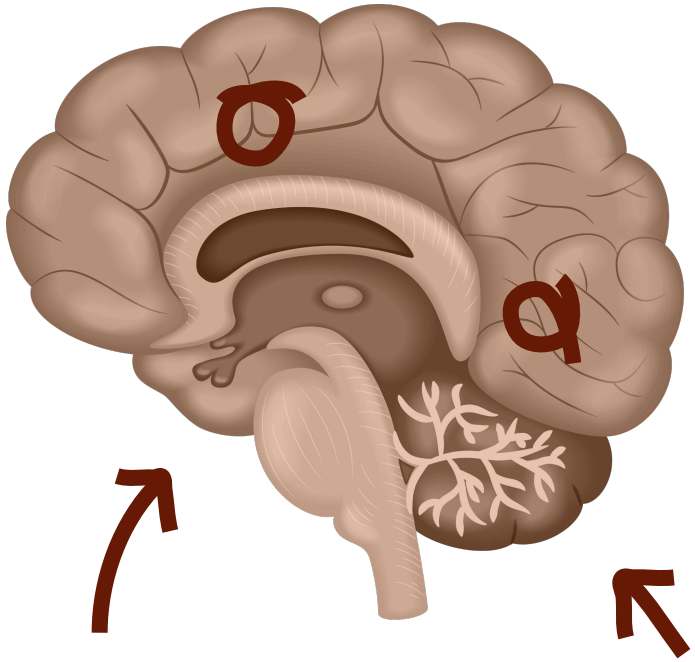
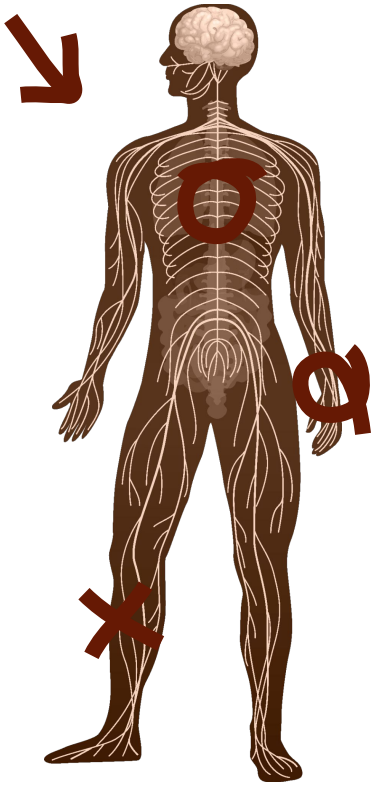


Table of contents

AN MRI !!



Project overview

This project develops an AI model to detect brain tumors from MRI scans using deep learning. We leverage a dataset of labeled MRI images to train a CNN classifier that distinguishes between HEALTHY and TUMOR cases. The goal is to assist radiologists by providing fast, accurate automated screening to improve early diagnosis and treatment planning.

01 Model Architecure

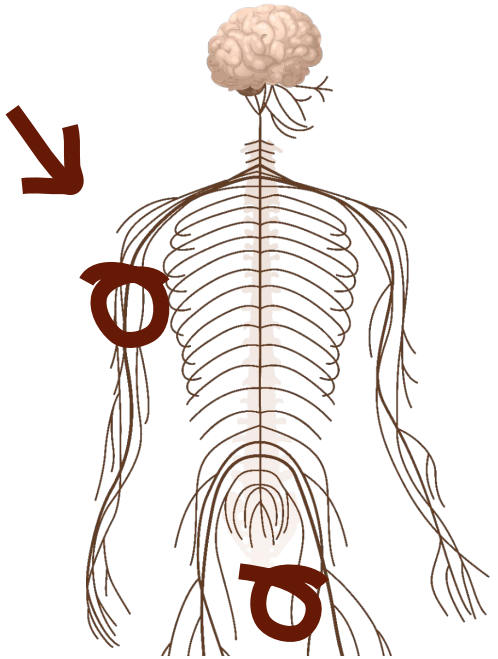
(Brain Tumor MRI Classification)

1. Custom CNN

   - Layers: 4 Conv Blocks → Flatten → FC (512) → Output (4)
   - Regularization: Dropout (25-50%) + BatchNorm
   - Grad-CAM: Layer 3 (128-ch) for attention maps

2. ResNet18 *(Transfer Learning)*

   - Fine-tuning: Unfrozen Layer4 + Custom FC head
   - Augmentations: Rotation, Flip, ColorJitter
   - Optimizer: AdamW + Cosine LR scheduler

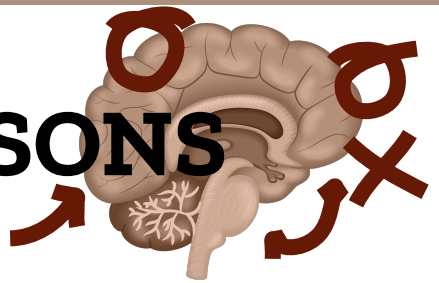


02 Results and Evaluation

Metric	CNN	ResNet
Accuracy	91%	96%
F-1 Score	0.90	0.96
Speed	Faster	Slower

Insight: ResNets pretrained features boost accuracy by 5 percent.

03 CHALLENGES & LESSONS



Challenges

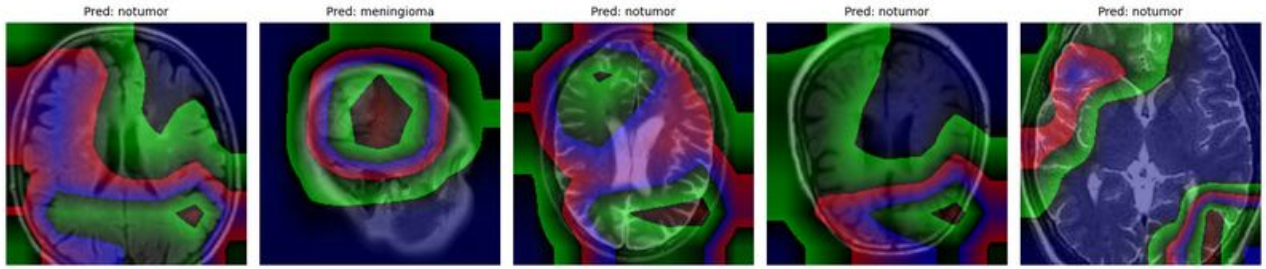
- Hit GPU limits → Used mixed-precision training
- Class imbalance → Weighted loss + augmentation
- Overfitting → Added dropout (60%)

Key Learnings

- CNNs: Depth ≠ accuracy (4-layer worked well)
- ResNet: Pretrained features boosted performance
- Grad-CAM: Revealed model focused on non-tumor areas

GRAD-CAM SAMPLES

RESNET MODEL



THANK YOU !