

Brain Tumor Detection and Classification

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Introduction



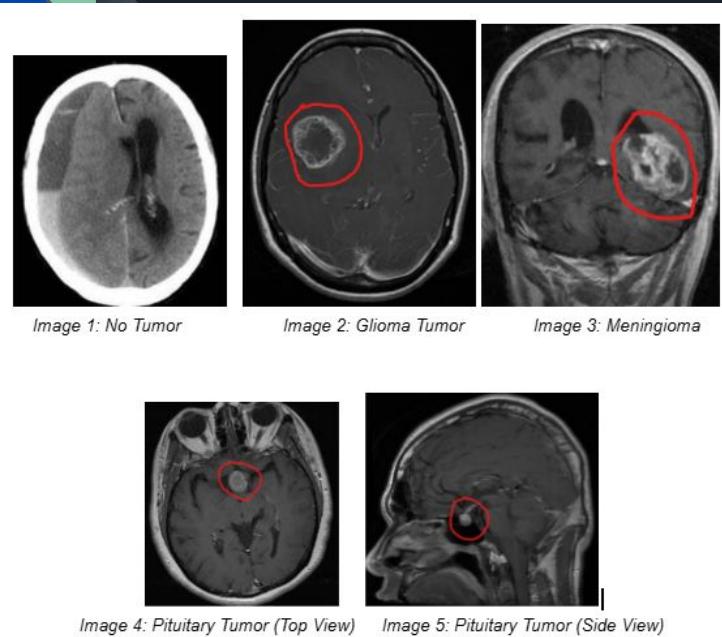
Brain Imaging

- Tumor Detection through MRIs

Presentation Format

- Data Preprocessing
- Model 1
- Model 2
- Discussion

Dataset/Preprocessing



Raw Data

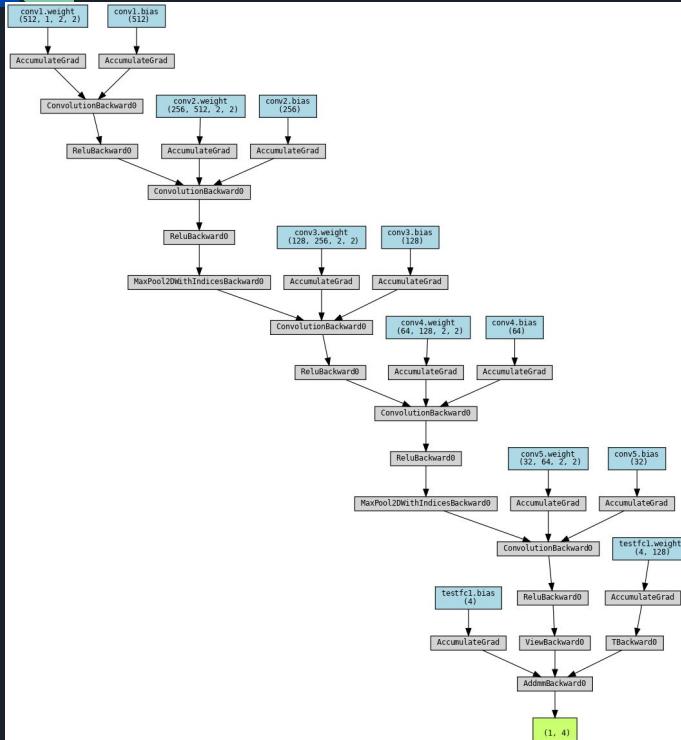
- 7,023 MRI images
- RGB
- Varying Sizes
- 4 classes
 - No Tumor
 - Glioma
 - Meningioma
 - Pituitary

Preprocessing

- Scale to 224x224
- Convert to Grayscale
- Normalize to [0,1] with Mean 0.5, Std Dev 0.5

<https://www.kaggle.com/datasets/masoudnickparvar/brain-tumor-mri-dataset>

Model 1



Structure:

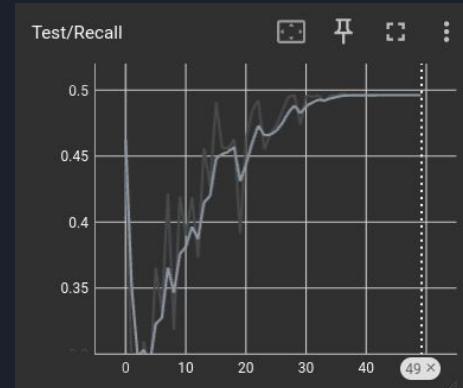
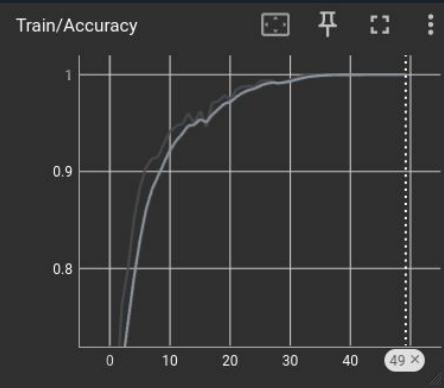
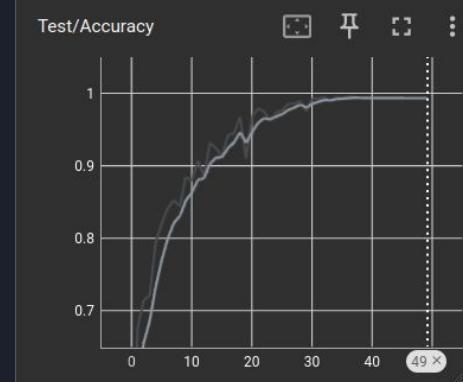
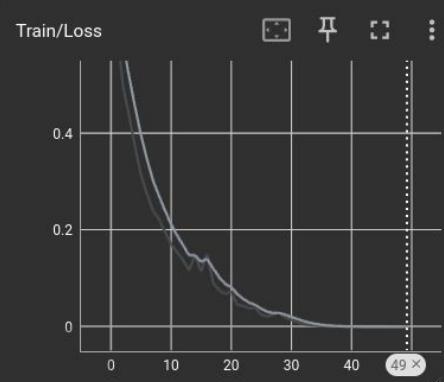
- Convolutional Layers: 5
- Pooling: Max Pooling
- Fully connected Layers: 1
- Activation Function: Relu
- Batch Size: 1
- Drop Out: Yes
- Learning Rate: 0.001
- Optimizer: Stochastic Gradient Descent
- Loss Function: Cross Entropy
- Kernel: Size=2, Stride=2, Padding=1

Attempts at Optimization

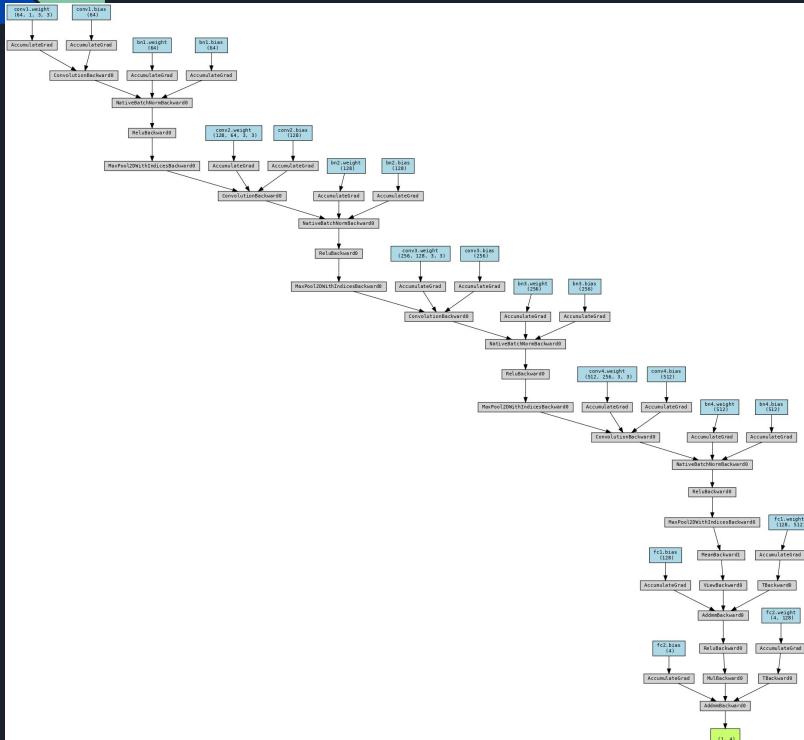
- Model Structure
- Optimizer, Loss Function, Kernel, Batch Size

Model 1 Results

- High Accuracy (99%)
- Low Recall (<50%)
- F1 score (49%)



Model 2



Structure:

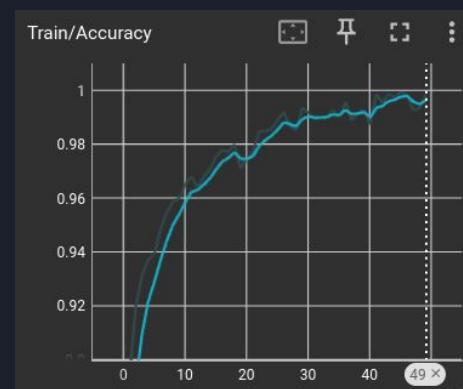
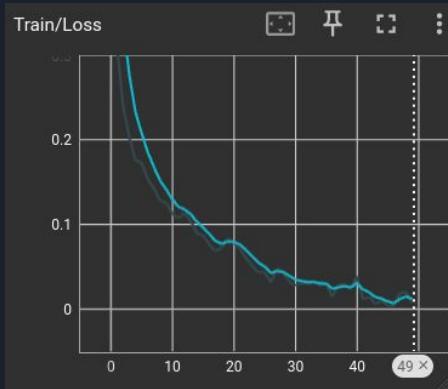
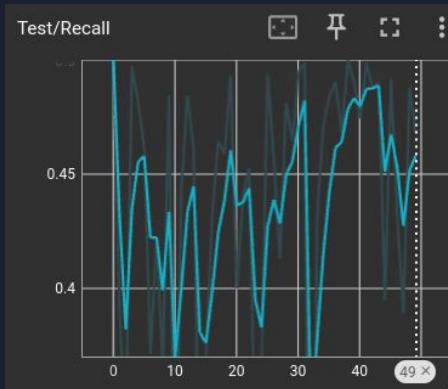
- Convolutional Layers: 4
- Pooling: Max Pooling
- Fully connected Layers: 2
- Activation Function: Relu
- Batch Size: 1
- Drop Out: Yes
- Learning Rate: 0.0001
- Optimizer: Stochastic Gradient Descent
- Loss Function: Cross Entropy
- Kernel: Size=3, Stride=1, Padding=1

Attempts at Optimization

- Model Structure
- Optimizer, Loss Function, Kernel, Batch Size

Model 2 Results

- High Accuracy (99%)
- Low Recall (<50%)
- Instability during Testing



Summary

- High accuracy
- Low Recall
 - Improve Image Classification (Side Profile, Top Profile)
 - Improve Image Preprocessing
- Future work
 - Larger/diverse dataset
 - Hyperparameter Optimization



Thank you!

