Brain Tumor MRI Image Classification

Project Title

Brain Tumor MRI Image Classification using Deep Learning

Problem Statement

To automate the classification of brain tumors from MRI images using convolutional neural networks and transfer learning techniques.

Dataset

- 4 classes: Glioma, Meningioma, Pituitary, No Tumor
- Train/Valid/Test split with real MRI scans

Models Trained

Custom CNN:

- Accuracy: 52%
- Weak generalization, failed on meningioma and no_tumor

MobileNetV2:

- Accuracy: 80%
- Strong performance on all classes
- Transfer learning improved results significantly

Evaluation Metrics

- Accuracy
- Precision
- Recall
- F1-score
- Confusion Matrix

Best Model Performance (MobileNetV2)

- Glioma F1: 0.84
- Meningioma F1: 0.55
- No Tumor F1: 0.86
- Pituitary F1: 0.87
- Overall Accuracy: 80%

Deployment

- Built a Streamlit app
- Allows image upload and predicts tumor type with confidence score

Conclusion

- MobileNetV2 provided significantly better performance over Custom CNN
- High accuracy, good generalization
- Suitable for real-time demo via Streamlit