1 Description

Dataset name	Brain Tumor MRI Dataset
Link	Kaggle
License	CC0: Public Domain
Medical discipline	Neurology
Medical procedure	Magnetic Resonance Imaging (MRI)
Multi-class problem	✓
Multi-label problem	✗

This dataset is a combination of the following three datasets:

- figshare
- SARTAJ dataset
- Br35H

It contains 7,022 images of human brain MRI images which are classified into four classes:

- Glioma
- Meningioma
- Pituitary
- No tumor

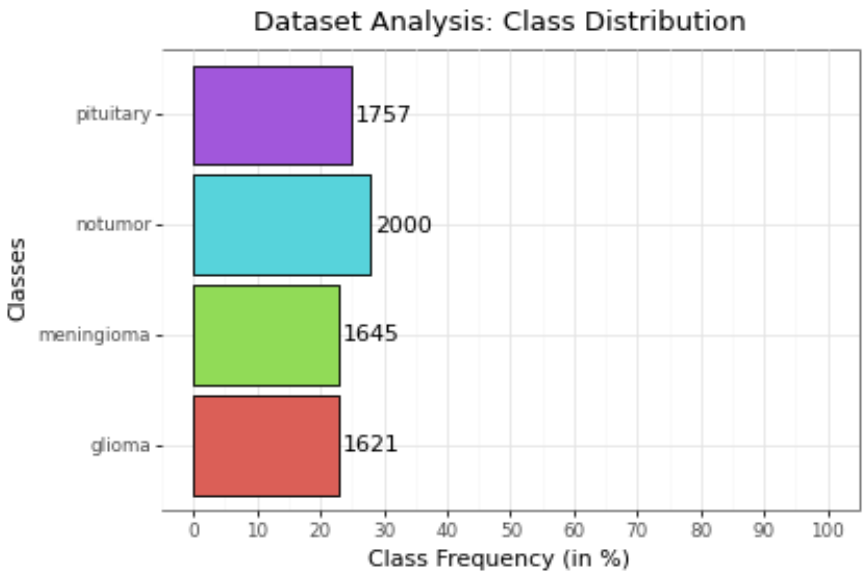


Figure 1: Class distribution: Brain Tumor MRI Dataset

2 Pre-processing

No pre-processing was done.

3 Training

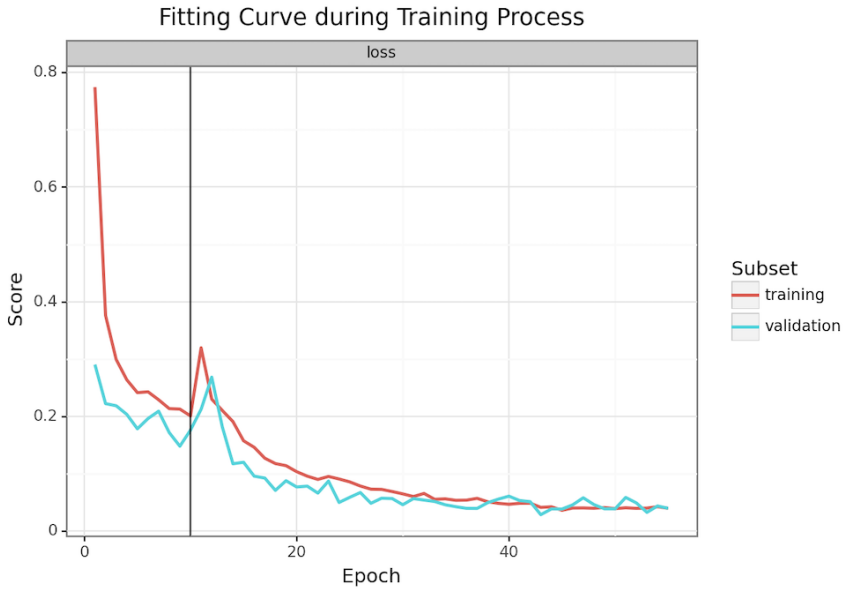


Figure 2: Training: Brain Tumor MRI Dataset

Training and validation loss decrease smoothly, despite the expected peak after the unfreezing of the model's weights.

4 Results

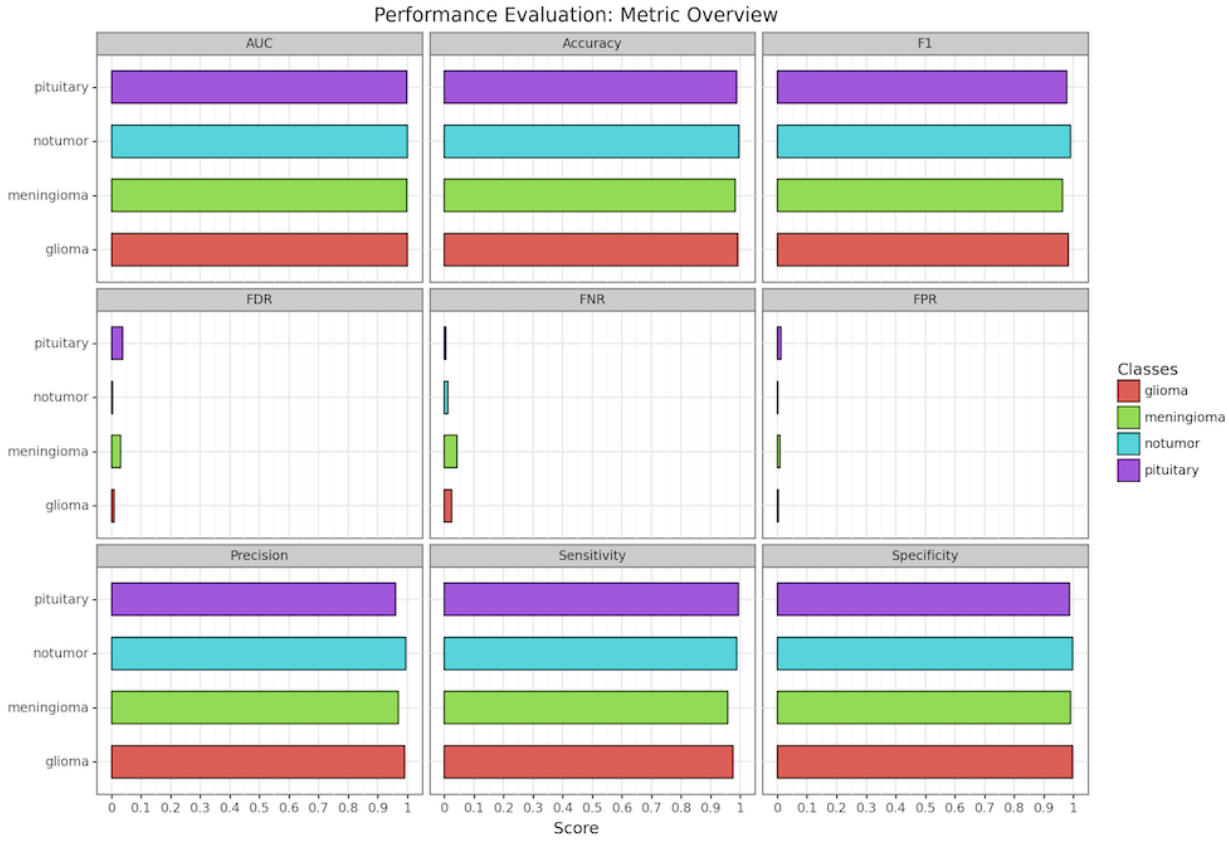


Figure 3: Metric overview: Brain Tumor MRI Dataset

The metrics in figure 3 and the ROC curves in figure 4 underline the exceptional performance on this specific classification task.

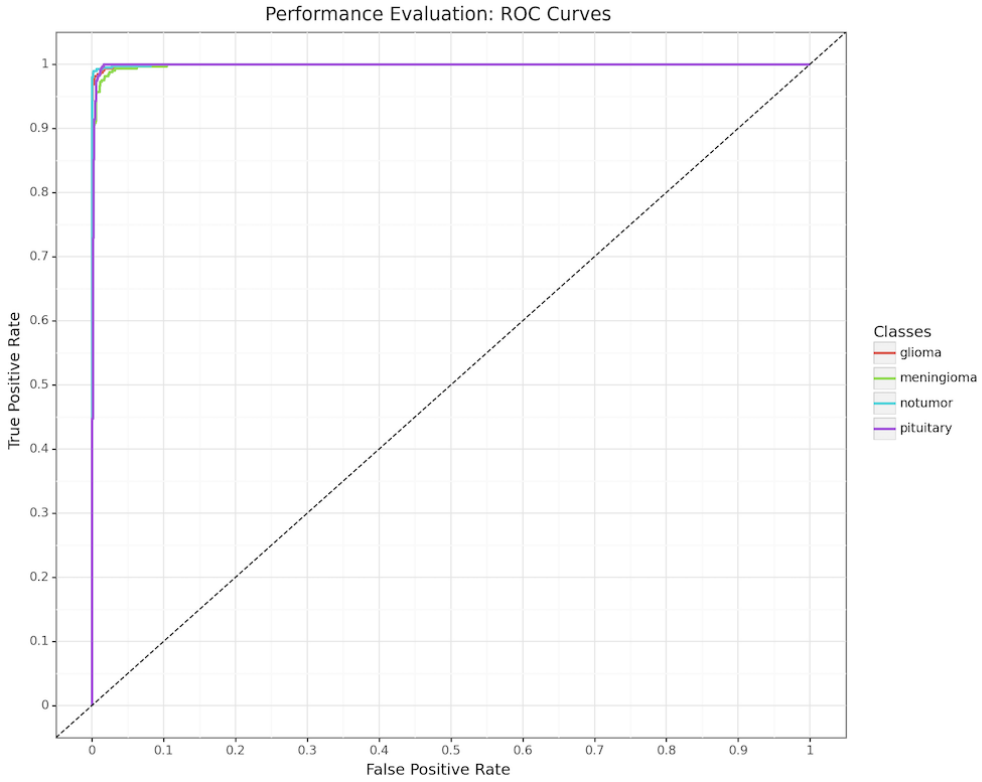


Figure 4: ROC curve: Brain Tumor MRI Dataset

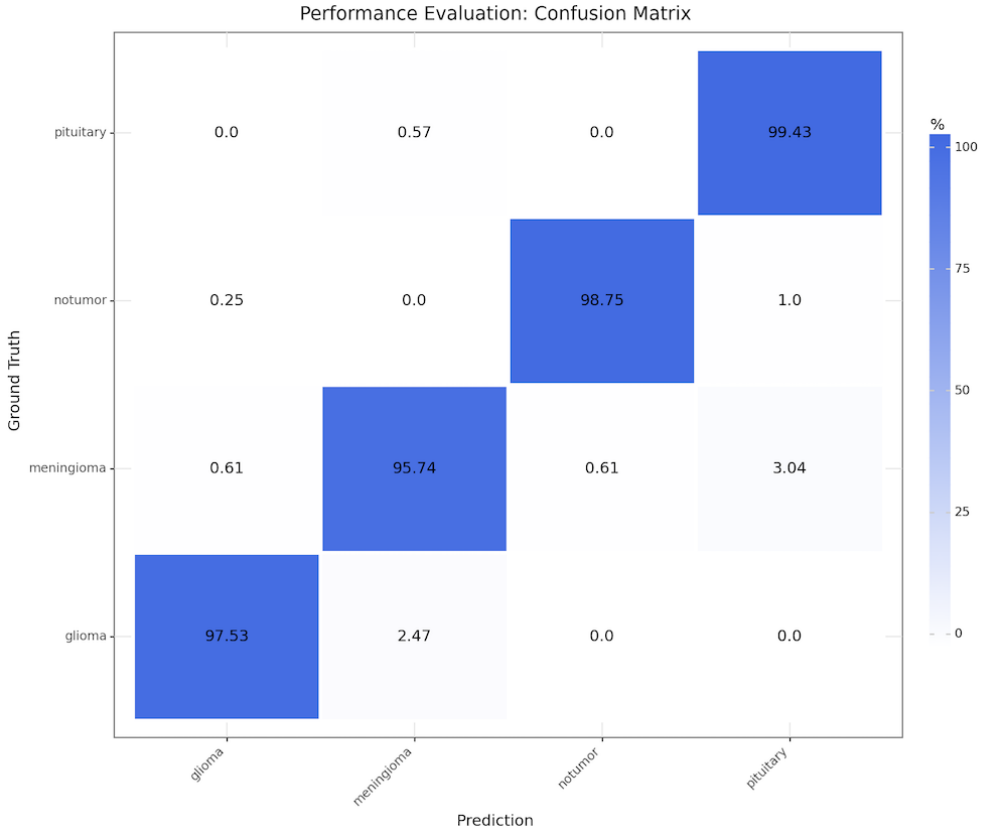


Figure 5: Confusion matrix: Brain Tumor MRI Dataset

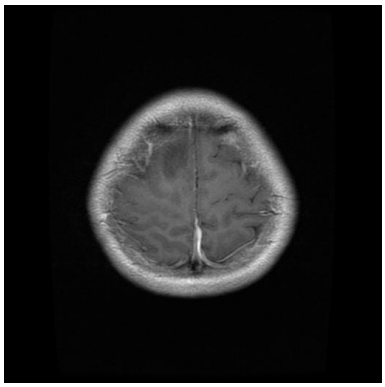
5 XAI

All samples visualized in this section are correctly classified. Grad-CAM images for classes meningioma, no tumor and pituitary seem reliable. The Grad-CAM mark-up for the glioma class however, image **Tr-gl_1305.jpg**, does not seem to make sense. The major part of the portion marked as relevant lies outside of the brain tissue. To further investigate that, more glioma class Grad-CAM images should be considered.

Image: Tr-gl_1305

Class: Glioma

Classified as: Glioma (94.6 %)



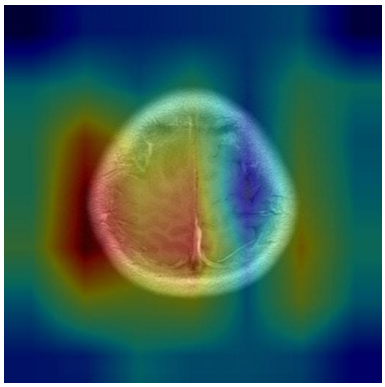
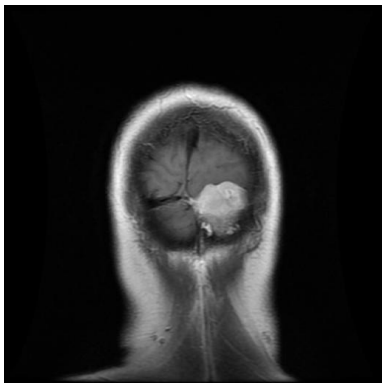


Image: Tr-me_1003

Class: Meningioma

Classified as: Meningioma (99.1 %)



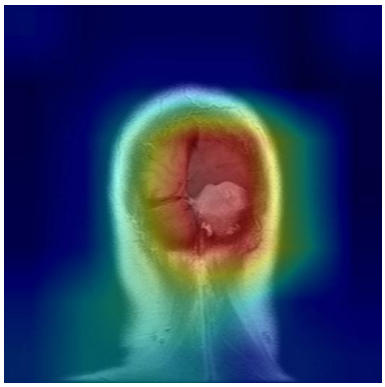
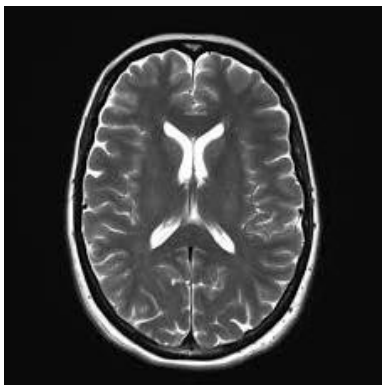


Image: Tr-no_1564

Class: No tumor

Classified as: No tumor (99.6 %)



6 Summary

The classification performance for the dataset is exceptional, which is not surprising considering it's a very balanced dataset and contains many samples. Besides the glioma sample **Tr-gl_1305**, Grad-CAM images seem to make sense.

Image: Tr-pi_0825

Class: Pituitary

Classified as: Pituitary (100.0 %)