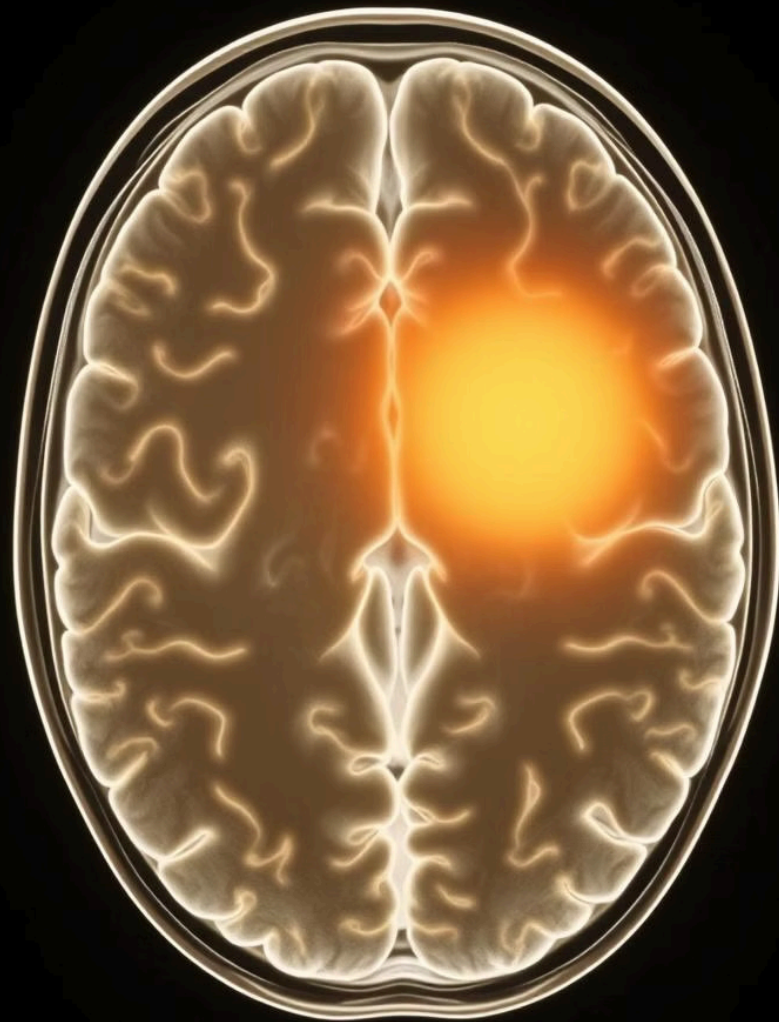# Brain Tumor Classification with Deep Learning

This presentation explores the use of deep learning for classifying brain tumors in MRI scans. We'll delve into the process of data preparation, model training, and evaluation, showcasing the potential of AI in medical diagnosis.
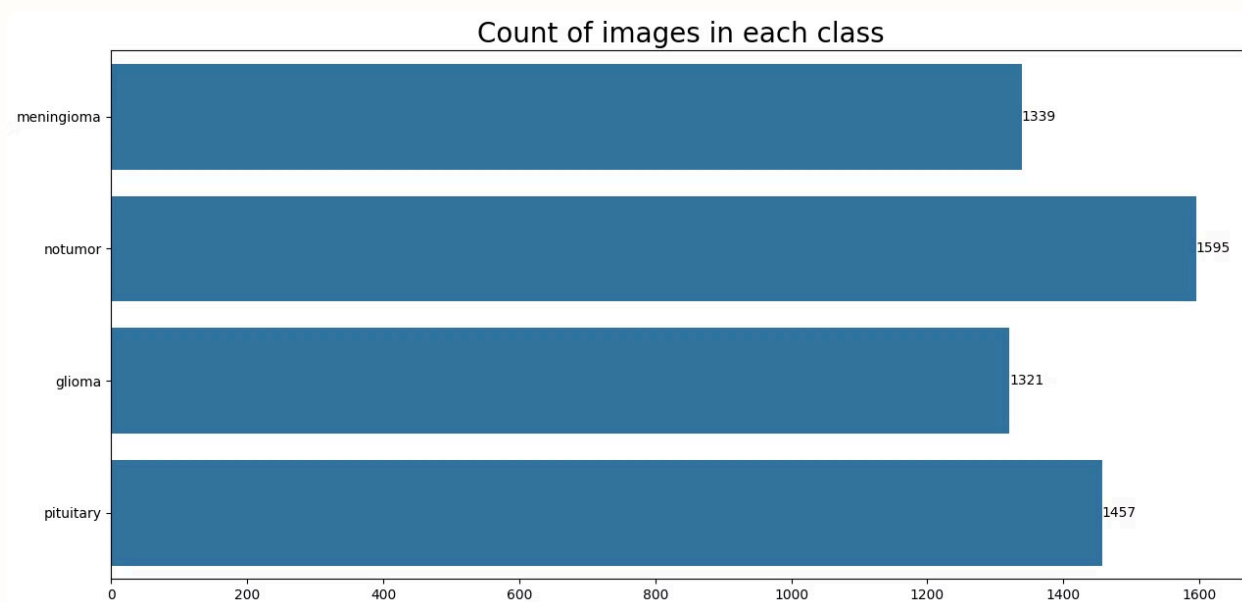
Data Preparation

Dataset Acquisition

The Brain Tumor MRI dataset was downloaded from Kaggle, containing images of different tumor types.

Data Exploration

The dataset was analyzed to understand the distribution of tumor types and ensure balanced representation.

Count of images in each class

meningioma — 1339
notumor — 1595
glioma — 1321
pituitary — 1457
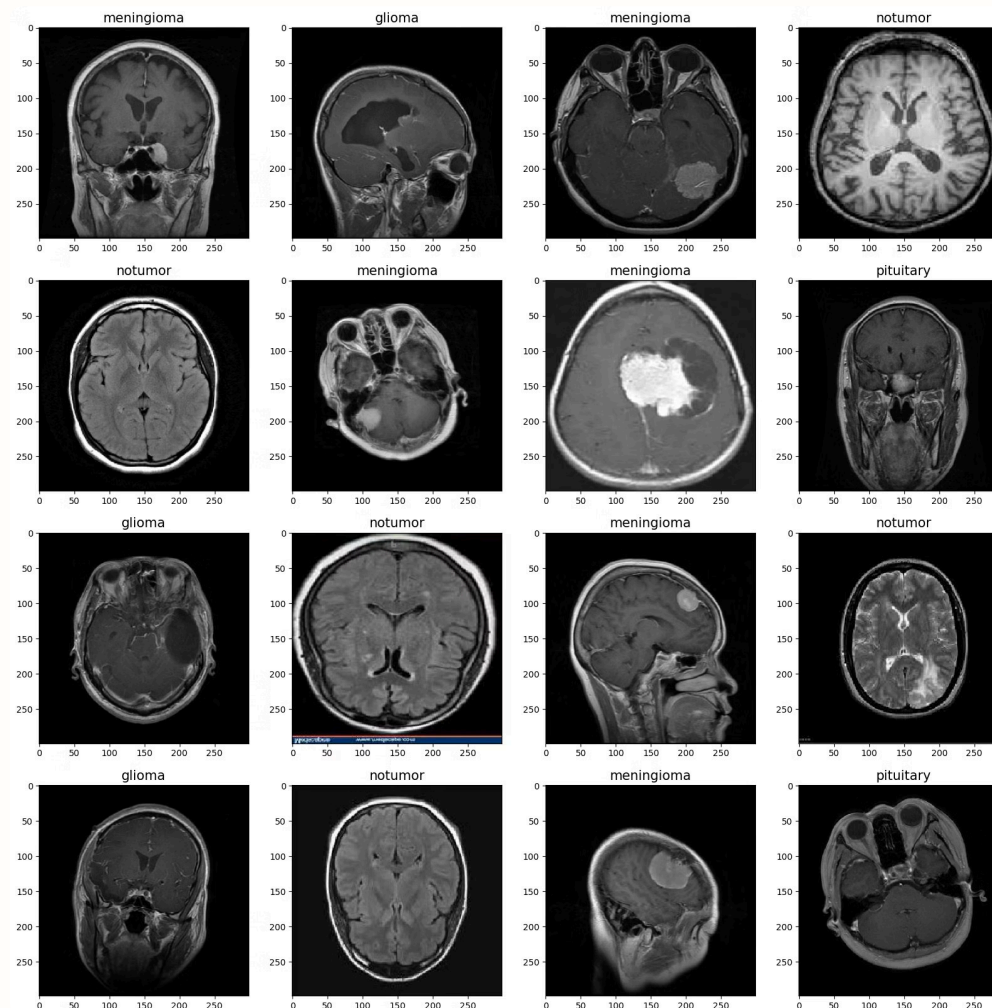
Data Preprocessing

1 Image Resizing

All images were resized to a consistent size for model input.
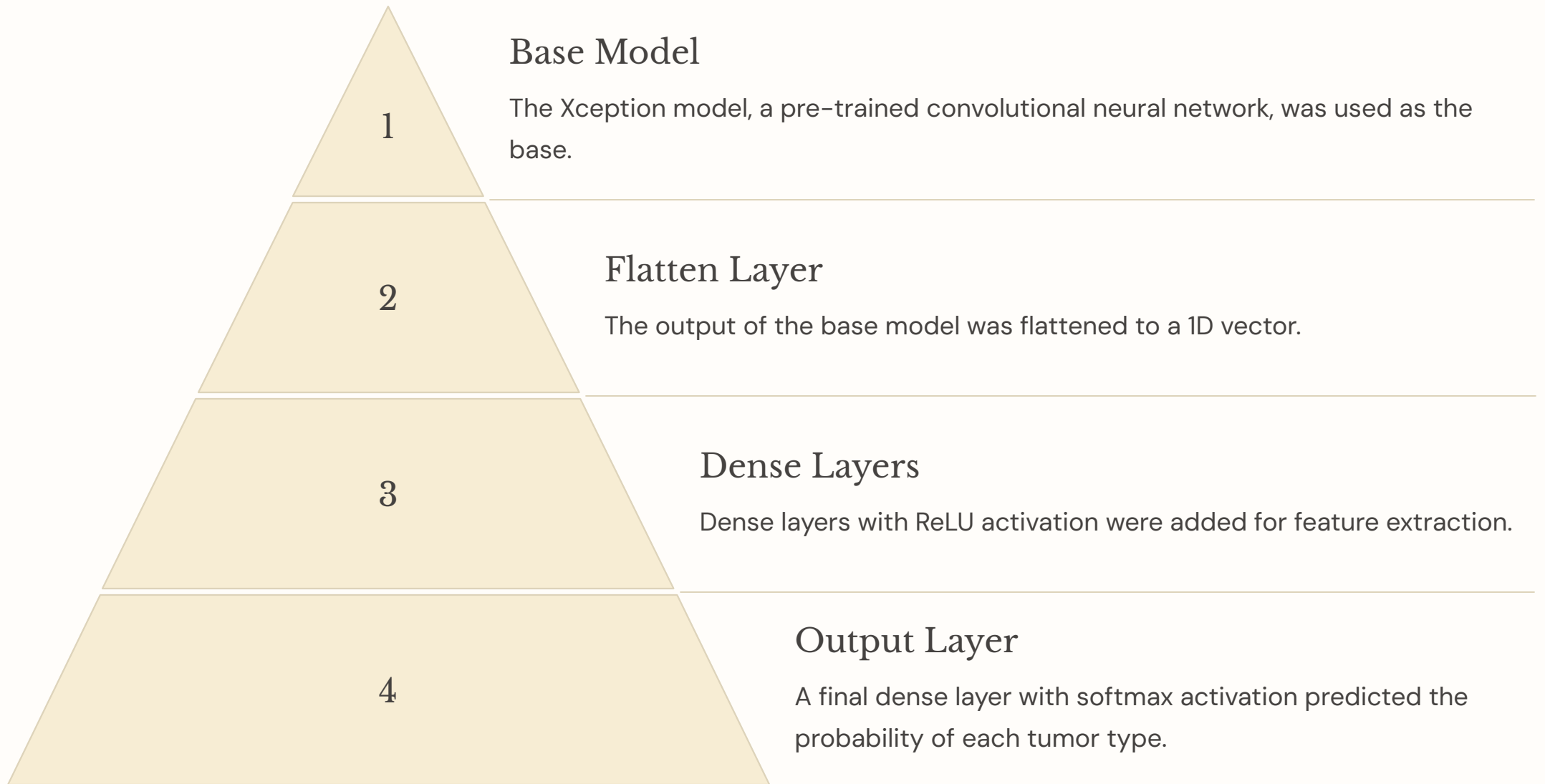
2 Normalization

Pixel values were normalized to a range of 0 to 1 for optimal model performance.

3 Data Augmentation

Augmentation techniques were applied to the training data to increase its diversity and prevent overfitting.

Model Architecture

Base Model

The Xception model, a pre-trained convolutional neural network, was used as the base.

Flatten Layer

The output of the base model was flattened to a 1D vector.

Dense Layers

Dense layers with ReLU activation were added for feature extraction.

Output Layer

A final dense layer with softmax activation predicted the probability of each tumor type.

Model Training

Compilation

The model was compiled with the Adamax optimizer and categorical cross-entropy loss function.

Validation

A separate validation set was used to monitor model performance and prevent overfitting.
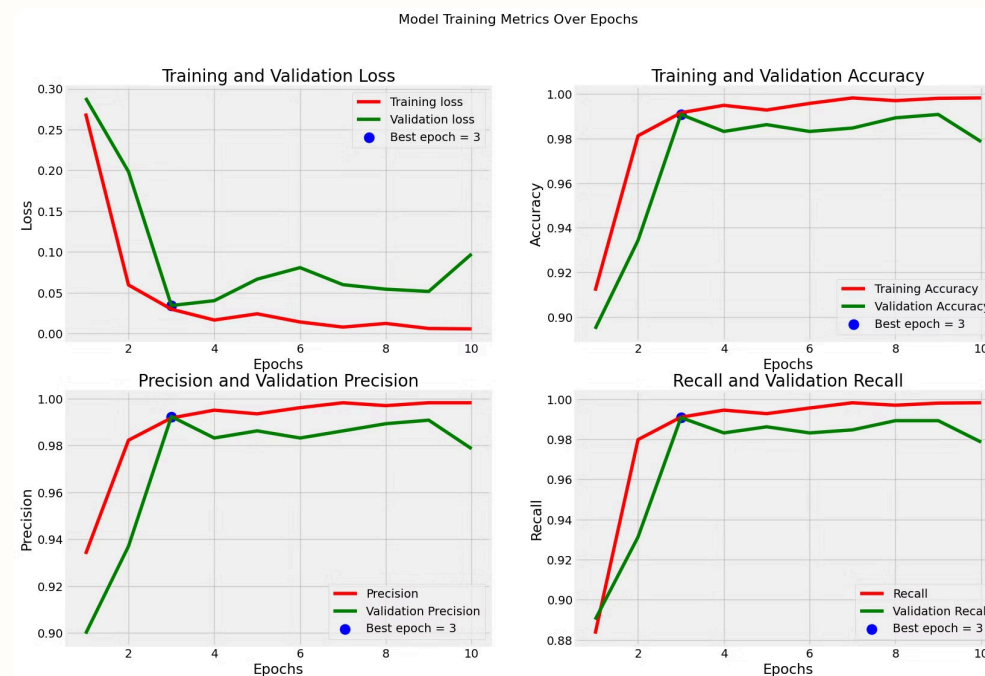
1 **2** **3**

Training

The model was trained for 10 epochs with a batch size of 32.

Model Training Metrics Over Epochs

Model Evaluation

1 ## Confusion Matrix

A confusion matrix visualized the model's ability to correctly classify different tumor types.
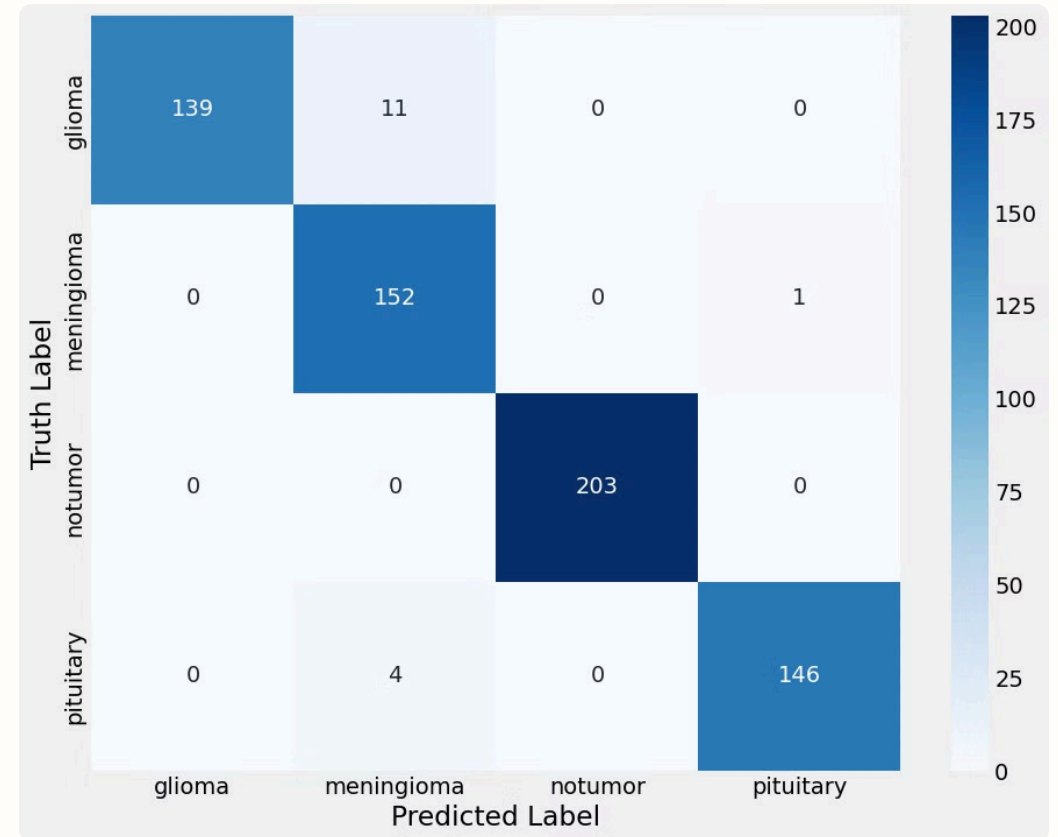
2 ## Accuracy

The proportion of correctly classified tumor types.

3 ## Precision

The ratio of true positive predictions to the total number of positive predictions.

4 ## Recall

The fraction of correctly classified positive cases among all positive cases.

Model Prediction

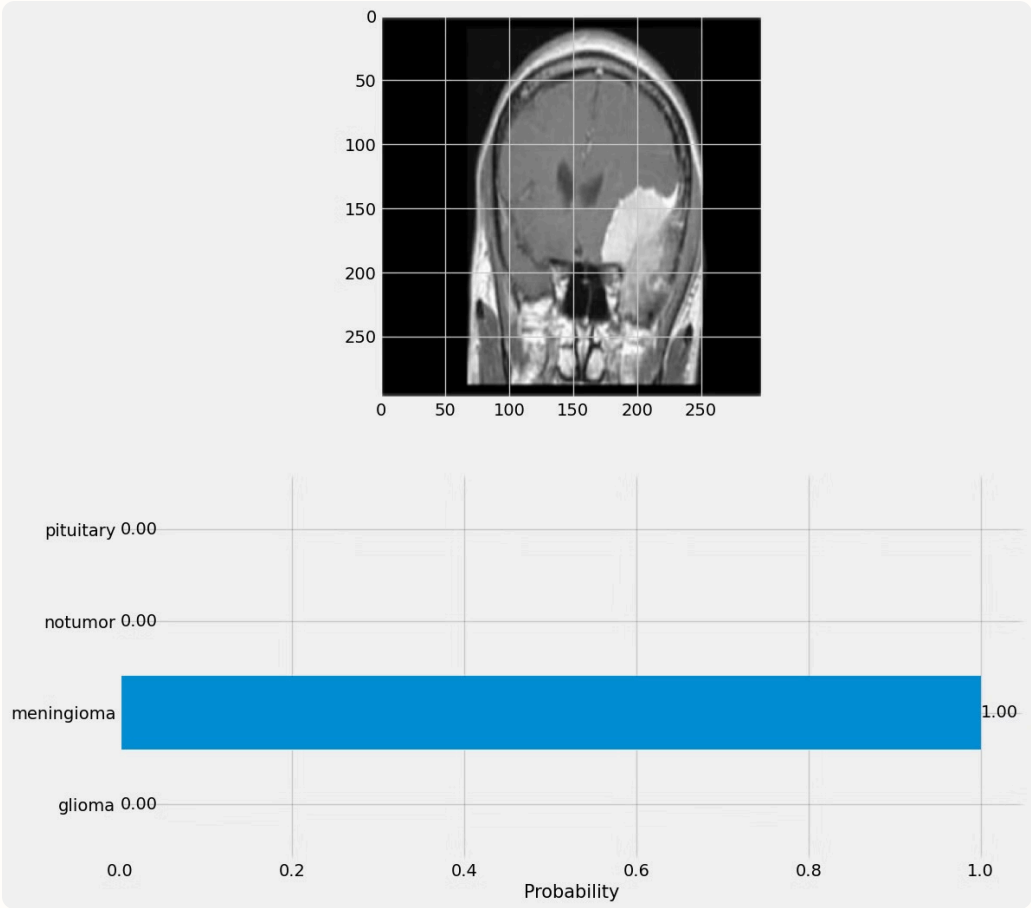## Input Image

The model takes an MRI scan as input.

Prediction

The model predicts the probability of each tumor type.

Output

The model outputs the predicted tumor type with the highest probability.

Conclusion

Key Takeaways

Deep learning can effectively classify brain tumors in MRI scans, demonstrating its potential in medical diagnosis.

Future Directions

Further research can explore the use of larger datasets, advanced architectures, and explainability techniques to enhance model performance and reliability.