Brain Tumor Classifier

Agenda

1. Overview
2. The Approach
3. Findings
4. Next Steps
5. Conclusion

Overview

- Brain tumors are rare, but can be fatal. Proper diagnosis as early as possible is needed to improve a patient's prognosis.

- EMG Consulting has been retained to predict tumor type based on imaging taken during an MRI.

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EMG CONSULTING
DATA. ANALYSIS. INSIGHTS.

Getting a brain tumor diagnosis right is crucial.

GBM has claimed another from us. ▮▮▮▮▮ is 19 and fought with grace, and faced it all with positivity and determination. He went into hospice on Wendy and passed on Friday. My heart hurts.

He was misdiagnosed twice, once at the ▮▮▮▮▮▮▮ where they told him that it was a dead spot on his brain that had probably always been there and a nonissue.

Nearly 5 to 10 % of people with a brain tumor receive an inaccurate diagnosis.
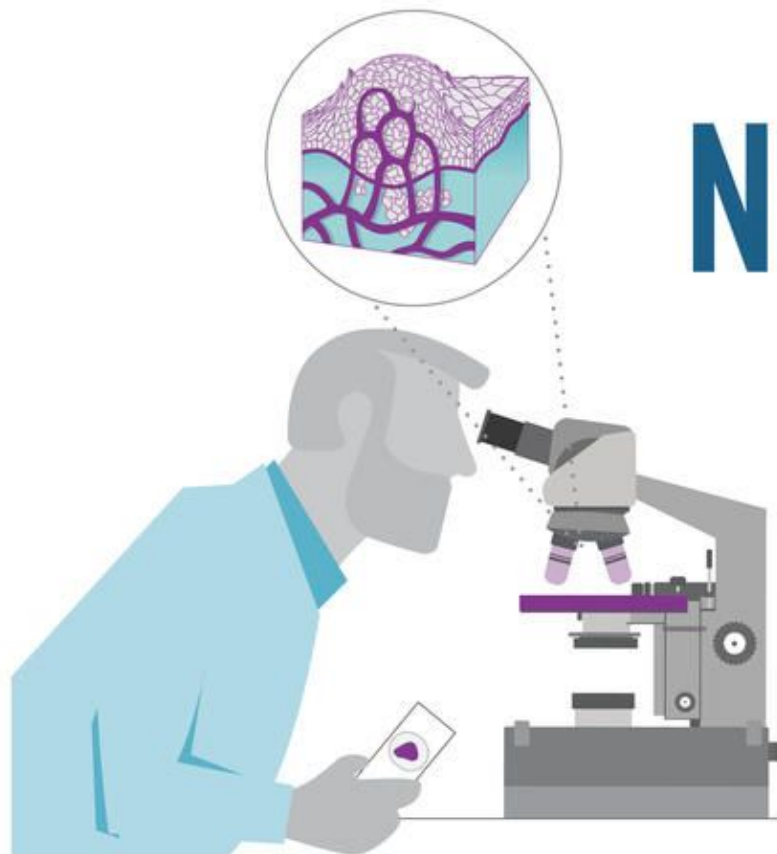
cancer.gov/nci-connect

The Approach

- Model trained on over 6,600 images across five classes (glioma, meningioma, pituitary, other, and no tumor) and tested on over 1,500 more - no significant class imbalance

- Make predictions using convolutional neural networks with varying degrees of depth and see which produces the best results

- Emphasis on creating a model that is accurate overall, with a secondary goal of maximizing recall for gliomas - want to avoid false negatives
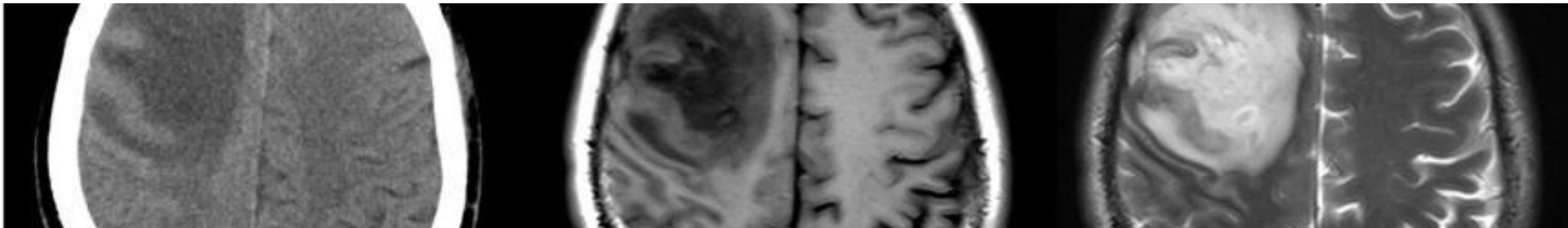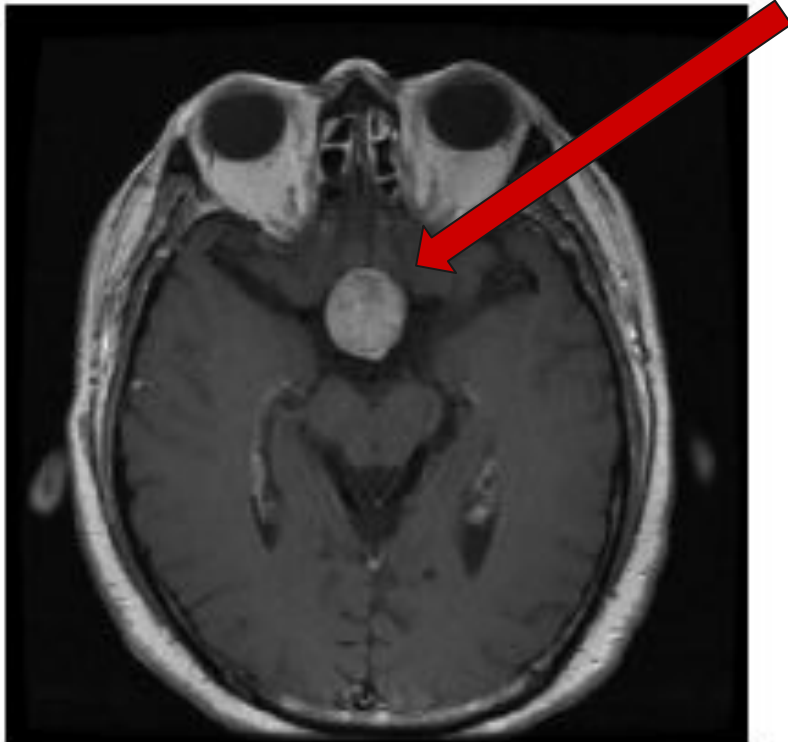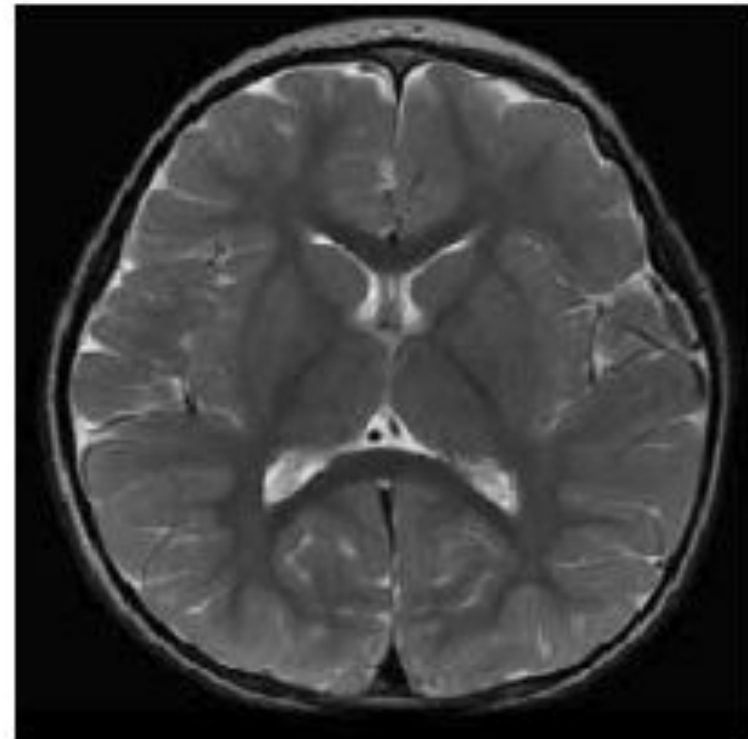
Distribution of Tumors in Data

Distribution of tumor type in training data

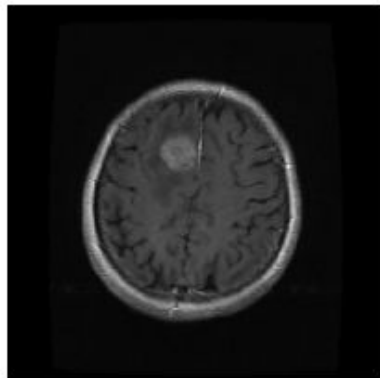Distribution of tumor type in test data
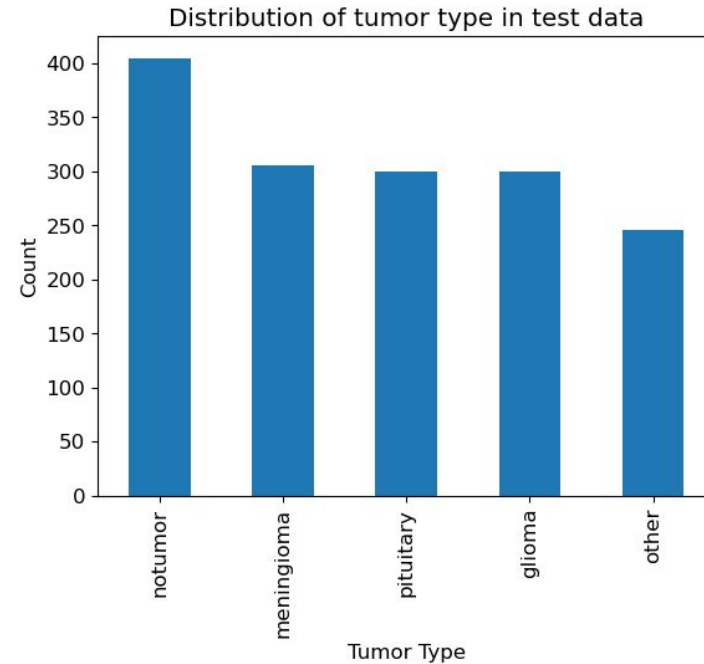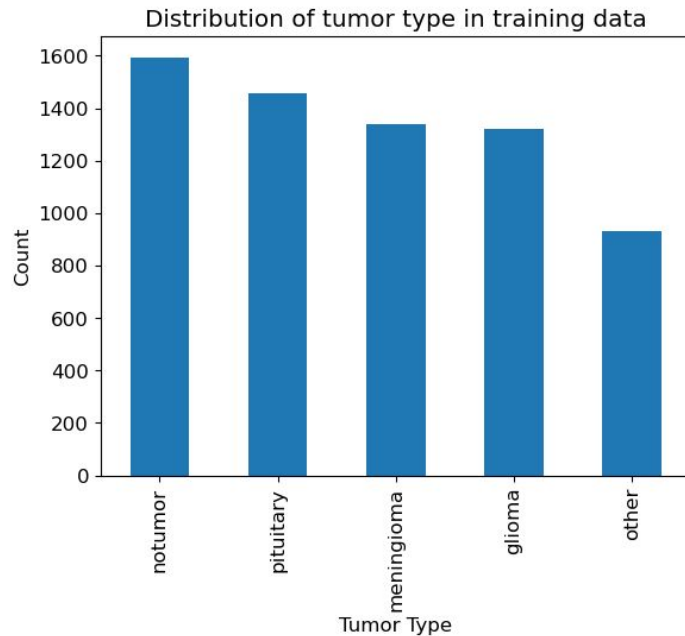
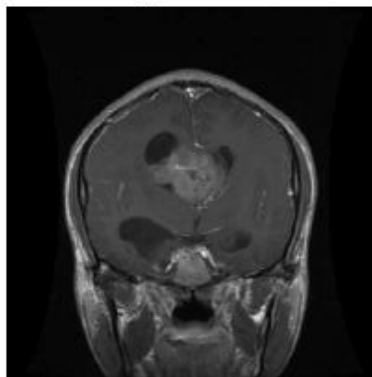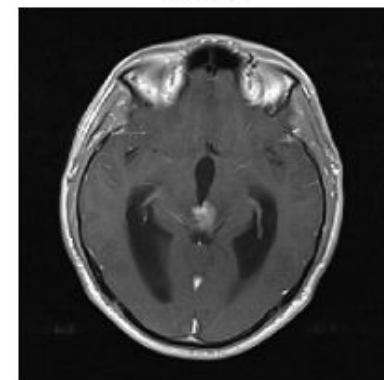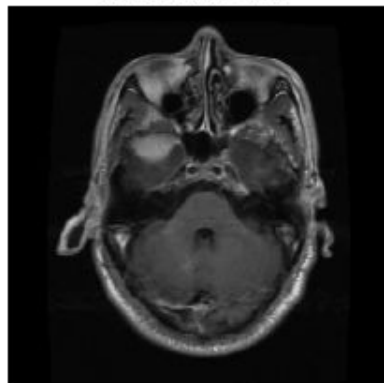**Some tumor types are harder to identify using an MRI than others.**
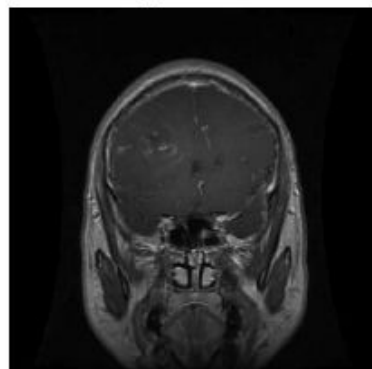
pituitary

notumor

meningioma

glioma

other
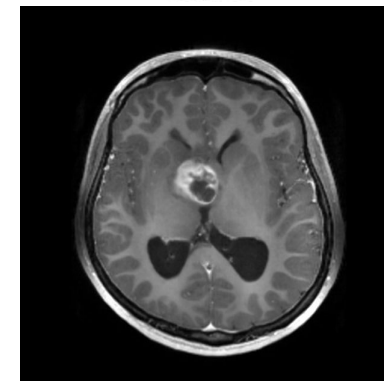

meningioma

glioma

other

Gliomas and meningiomas were difficult for the model.
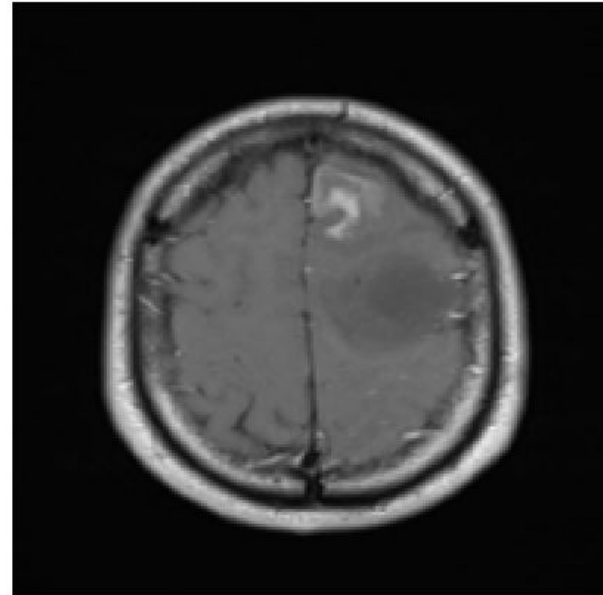

VGG-16 - Feature Extraction
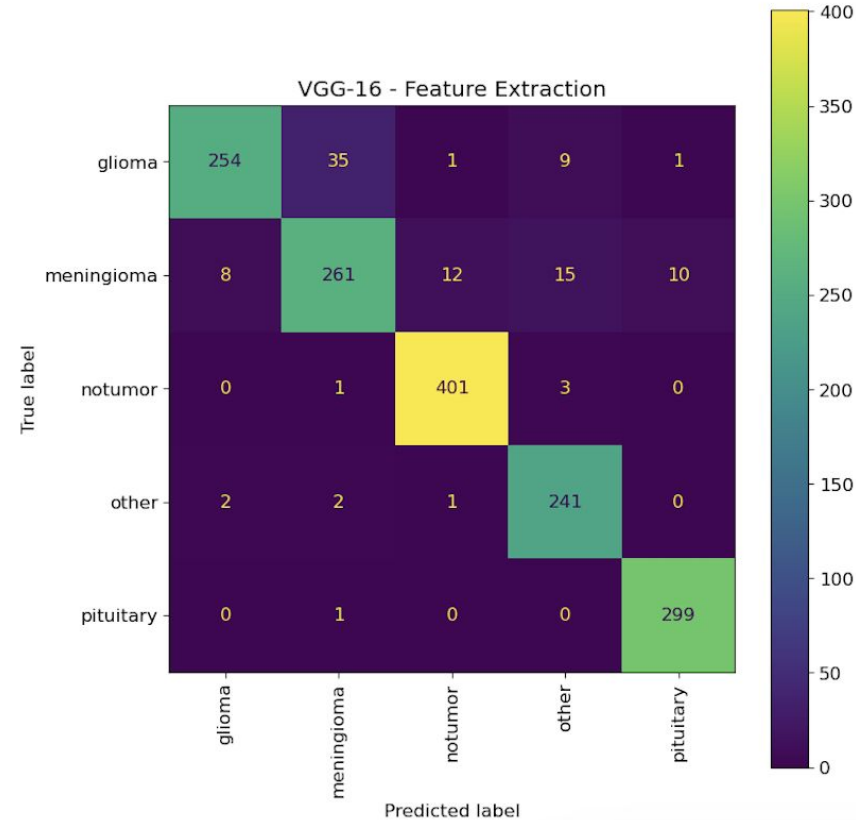
Some incorrect predictions made sense...

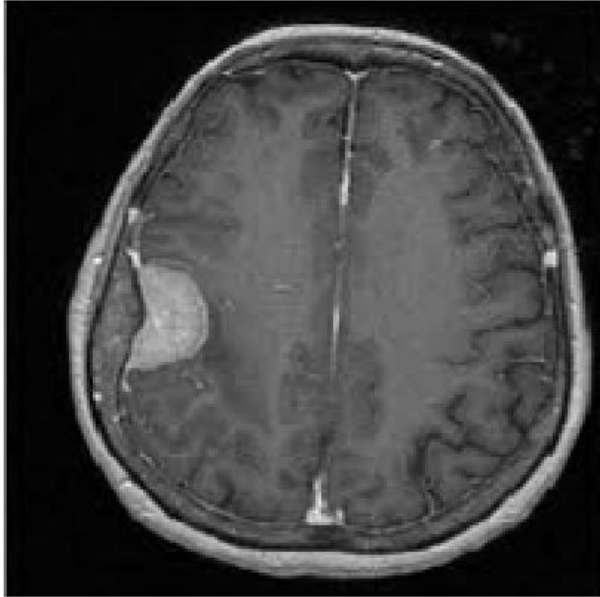True: meningioma
Predicted: pituitary
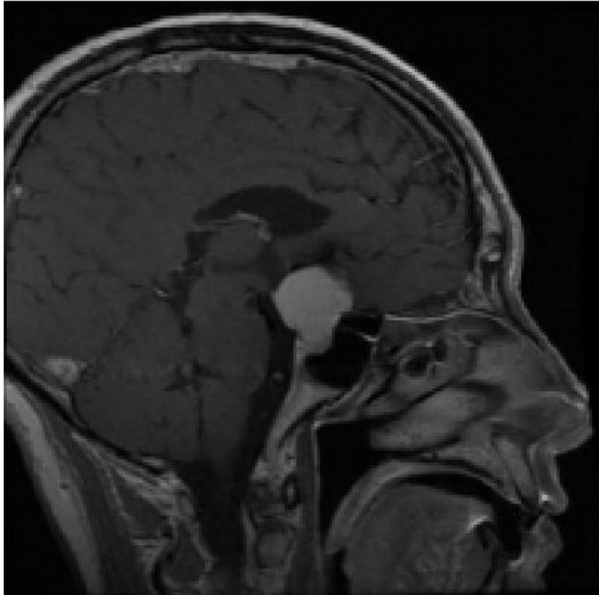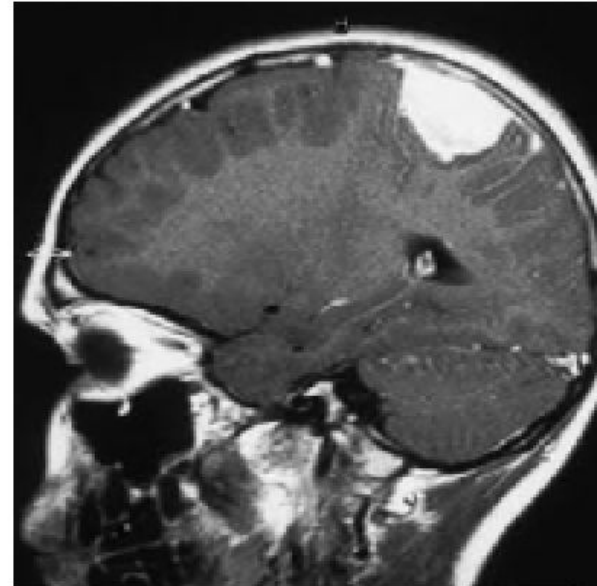
True: other
Predicted: glioma

Others show why we the model needs more work.

True: meningioma
Predicted: notumor

True: meningioma
Predicted: notumor

Next Steps

- Preprocess the images further by thresholding and cropping the skull/brain, to reduce the amount of black space and other potential noise present in each image before modeling.

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- Expand the number of classes further to make more granular classification predictions possible.

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- Test additional transfer learning approaches, such as AlexNet and GoogLeNet.

Thank you.

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GitHub Repository Link