Brain Tumor Classification

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Agenda

1. **Business Understanding**
   Why it matters?
2. **Data Understanding**
   How was the model trained?
3. **Model Understanding**
   What was the best result?
4. **Deployment**
   How is it useful?

Business Understanding

Siemens Healthineers provide diagnostic support software for Neuropathologist/Neurologist to make conclusions of brain lesions

- The objective would be to develop a diagnostic tool
  - Create insight
  - Classify brain lesions

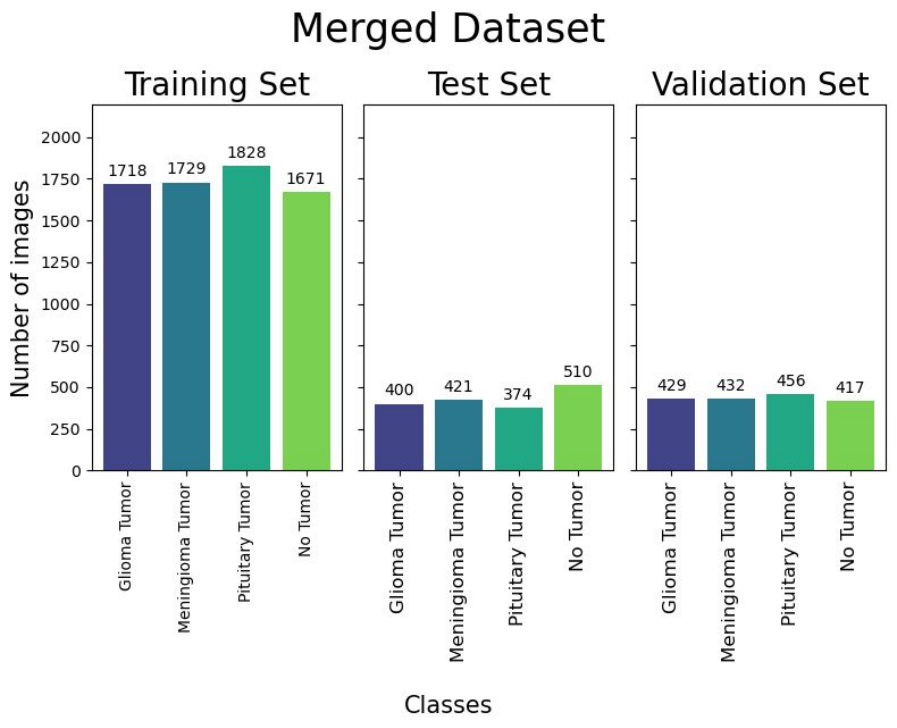
Modeling efforts should prioritize Sensitivity

- Capturing all possibilities of brain lesions outweighs misclassifying someone with a brain lesion

Data Understanding

Sourced From: (Kaggle)

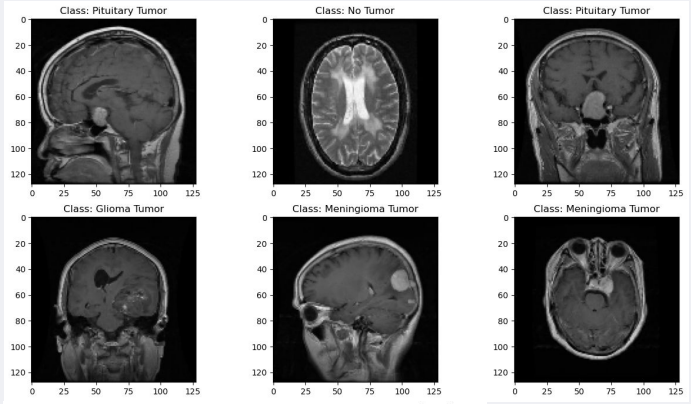
1. ‘Brain Tumor Classification (MRI)
2. ‘Brain Tumor MRI Dataset
3. ‘Brain MRI Images for Brain Tumor Detection’

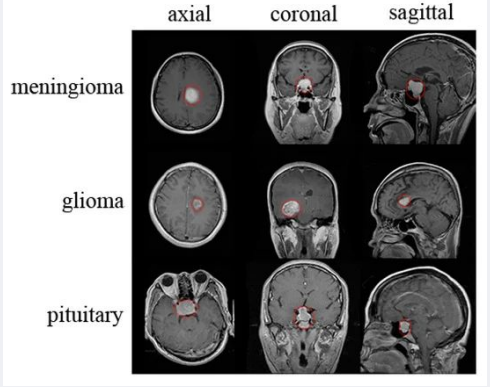


Data Understanding

Preparation of Images:

1. Grayscale → RGB
2. Consistent dimension
   a. (128 x 128)
3. Normalization of image pixel value
   a. Range: 0←→ 1
4. Create associated labels for images
   a. Gloma: 0
   b. Meningioma: 1
   c. No_tumor: 2
   d. Pituitary: 3

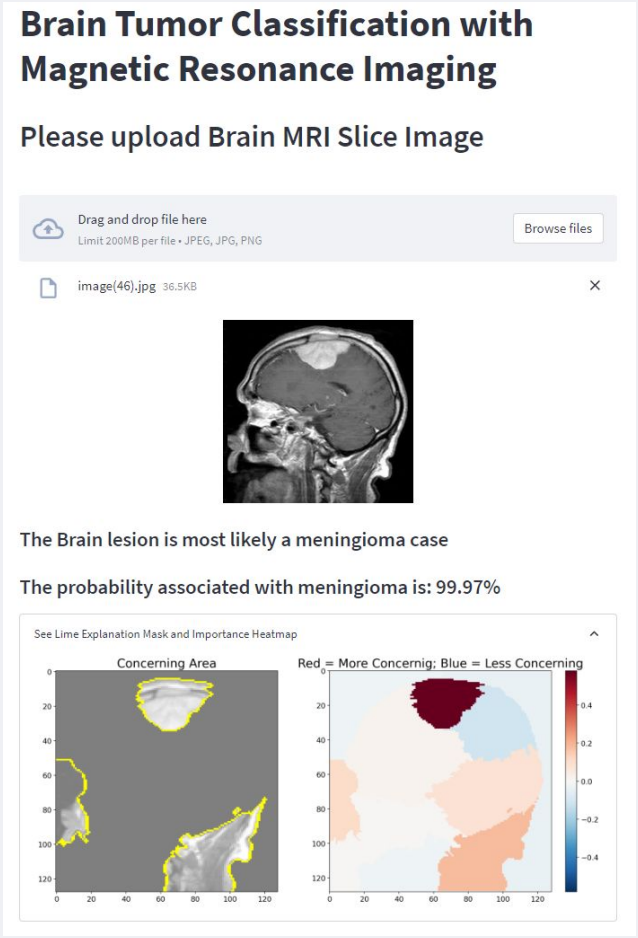




(Badža & Barjaktarović, 2020)

Model Understanding

Testing Performance				
Model	Sensitivity	Specificity	Accuracy	Validation Loss
Augmented Model	92.37%	93.14%	92.37%	0.584
Optimized Model	92.49%	92.98%	92.49%	0.727
Developed Model	91.96%	92.01%	91.96%	0.728



Deployment

- Provides:
  - Prediction
  - Diagnostic image mask of concerning area
  - Heatmap of concerning areas

Conclusion

Recommendation: Integrate model into brain lesion diagnostic software

- Increase diagnostic evaluation time
- Provide supplementary insight for pathological evaluation

Future Steps:

- Redefine Segmentation process using Convolutional Upscaling rather than LIME

Thank You

Any Questions?

References

Badža, M. M., & Barjaktarović, M. Č. (2020). Classification of Brain Tumors from MRI Images Using a Convolutional Neural Network. *Applied Sciences*, *10*(6), 1999–1999. https://doi.org/10.3390/app10061999