

Detecting Brain Tumors

Link to GitHub: <https://github.com/awhitehouse1/DS4002-CS3>

Context:

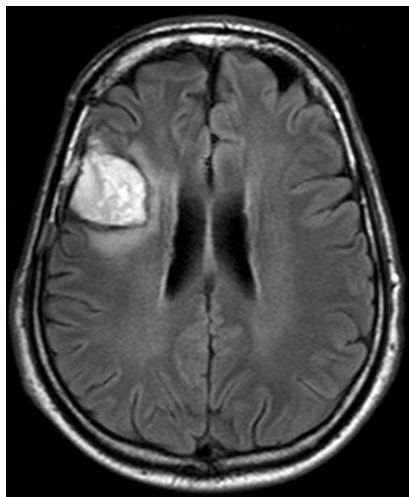
Around 90,000 people in the U.S are diagnosed with brain tumors every year [1]. These tumors can have dangerous complications, including blocking the flow of fluid around the brain, increasing pressure inside the skull, and becoming cancerous. Tumors can form on any part of the brain and can be detected by neurological exams, CT scans, and MRIs. Once a tumor is identified through imaging, it can be biopsied to determine the type of tumor it is and the appropriate treatment [2]. Early tumor detection is critical for patients because the sooner a tumor is identified, the faster the patient can receive treatment and reduce the risk of complications.

Motivation:

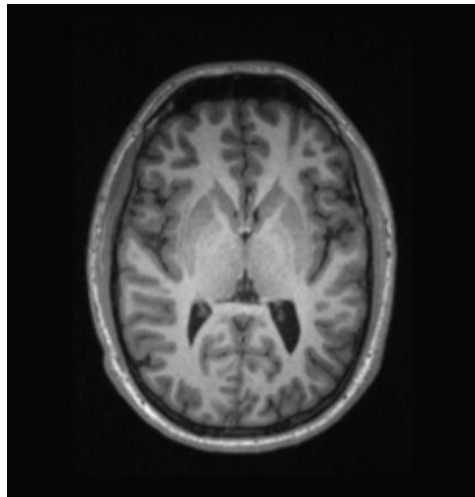
You are a data scientist who has been hired by The National Institutes of Health (NIH) to develop a machine learning model that detects brain tumors using MRI brain scans. Your model could be used by researchers and medical professionals to automate the tumor detection process, allowing them to more quickly identify tumors in their patients. Your work has the potential to save many lives.

Deliverable:

The NIH needs you to create a model that can classify MRI brain scans as either “tumor” or “no tumor”. You will use a dataset containing 253 labeled MRI scans, which you can find in the GitHub repository for this case study. Example “tumor” and “no tumor” images are included below. Then you will select and build a convolutional neural network (CNN) architecture of your choice, such as ResNet50 or VGG19. You will train and test your model using the provided dataset. You will then visualize and analyze your model’s accuracy and loss over multiple epochs, and attempt to improve these numbers through preprocessing and changing hyperparameters.



Tumor



No Tumor

References

- [1] American Brain Tumor Association. "Brain Tumor FAQs - Learn More or Donate Today! | ABTA." *American Brain Tumor Association*, <https://www.abta.org/about-brain-tumors/brain-tumor-education>. Accessed 8 December 2024.
- [2] Johns Hopkins Medicine. "Brain Tumors and Brain Cancer." *Johns Hopkins Medicine*, <https://www.hopkinsmedicine.org/health/conditions-and-diseases/brain-tumor#diagnosis>. Accessed 8 December 2024.