Bio Assistant tool

Team members:
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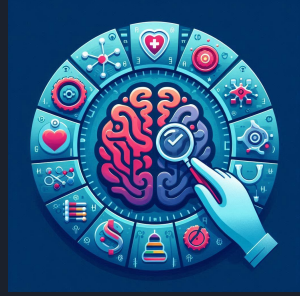
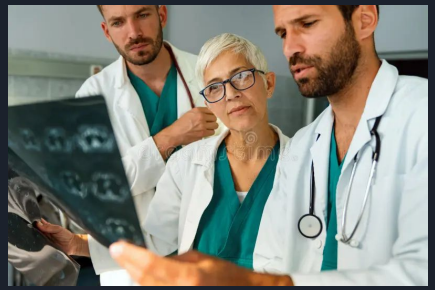
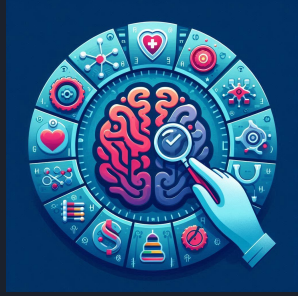
Problem definition



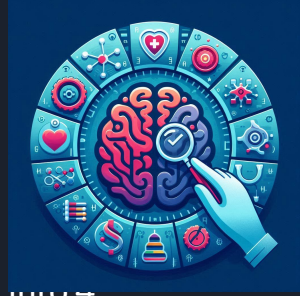
- The unexpert medical staff.
- Wrong diagnostics (Natalia’s story)
- Long time while little amount of work is done



Our idea



- Developed a user-friendly web platform to assist doctors in diagnosing brain tumors
- Classifies tumor types: meningioma, pituitary, or glioma
- Segments the area of the tumor for precise localization

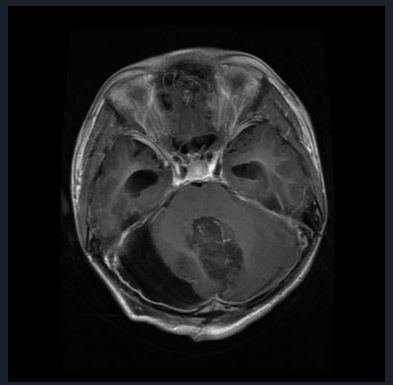


Data Description

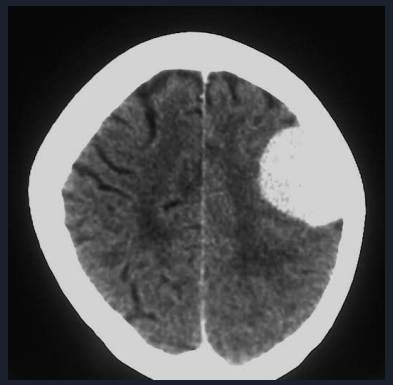
Brain Tumor MRI Dataset

- This dataset contains 7023 images of human brain MRI images which are classified into 4 classes: glioma - meningioma - no tumor and pituitary.
- This dataset is a combination of the following three datasets : Figshare / SARTAJ dataset / Br35H

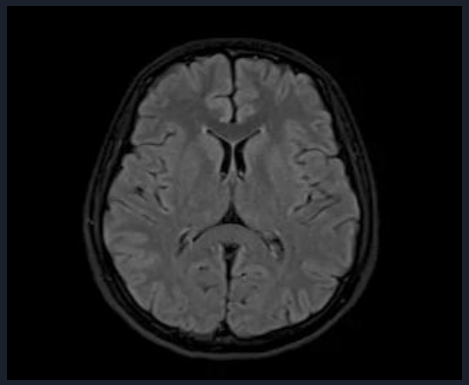
glioma



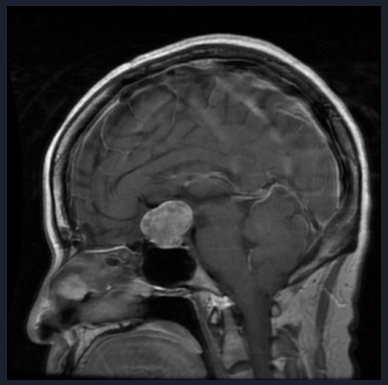
meningioma



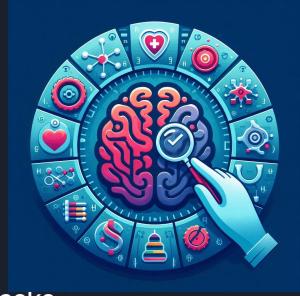
No tumor



pituitary

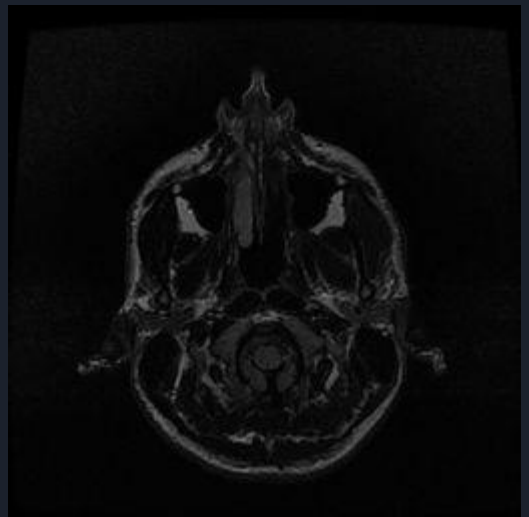


Data Description



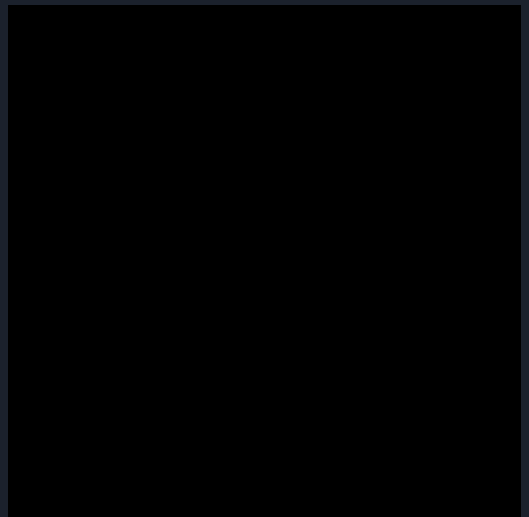
Brain MRI segmentation

- This dataset contains brain MR images together with manual FLAIR abnormality segmentation masks.
- The images were obtained from The Cancer Imaging Archive (TCIA).
- They correspond to 110 patients included in The Cancer Genome Atlas (TCGA) lower-grade glioma collection.
- Tumor genomic clusters and patient data is provided in data.csv file.

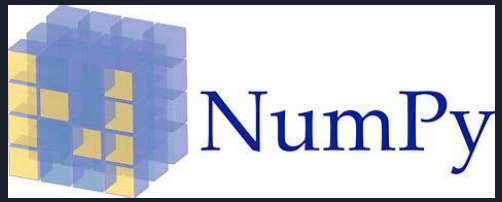


⇐The image

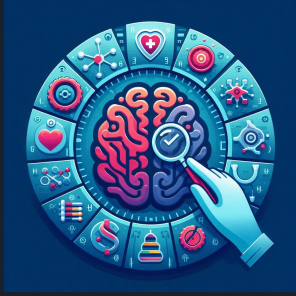
The mask ⇒



Tools used



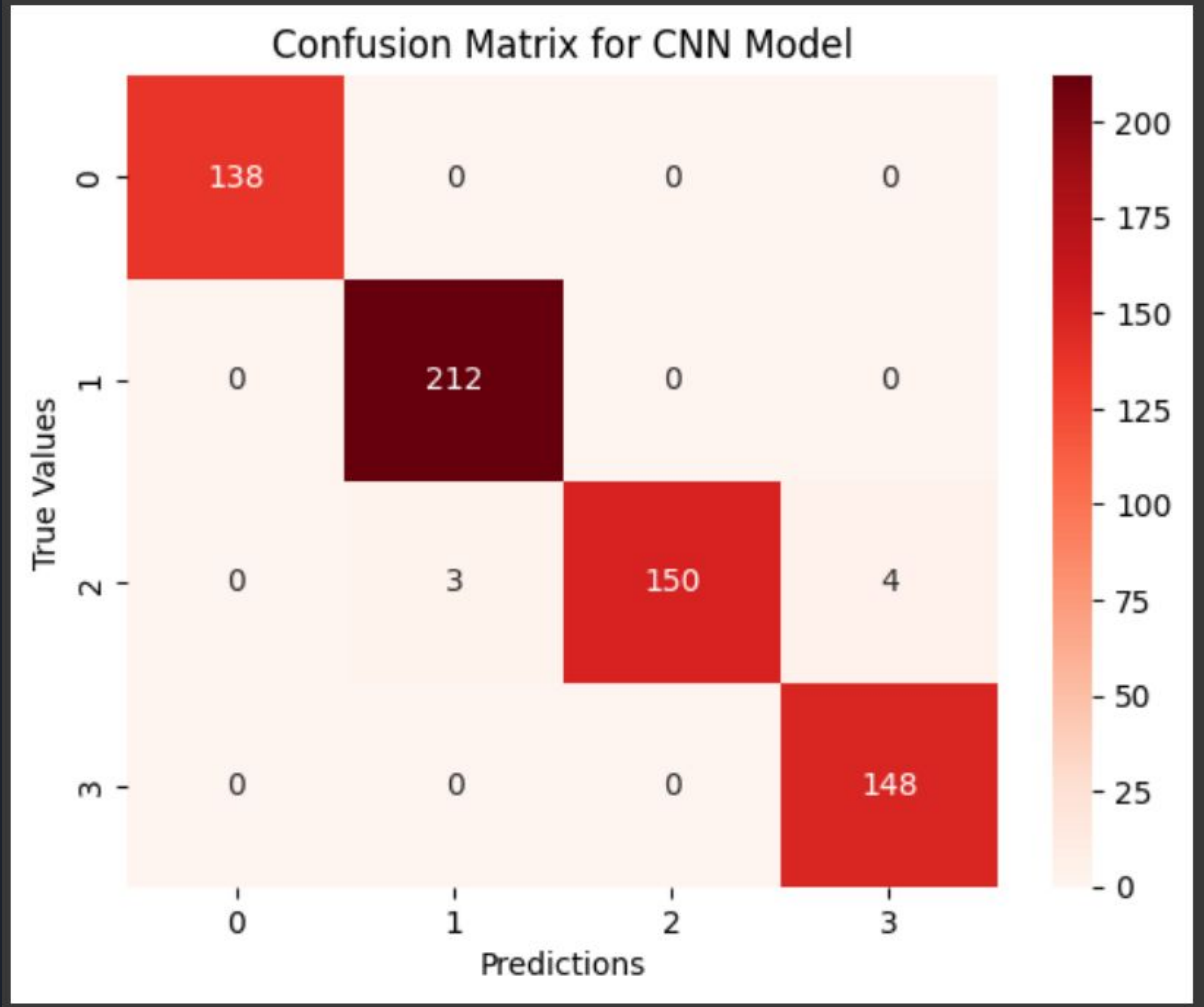
Our models
(Classification model)



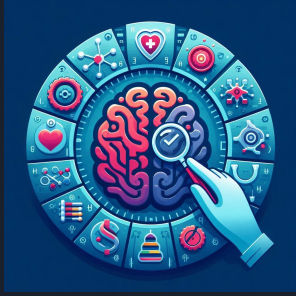
We thinked to make a model for image classification of three types of :meningioma , pituitary and glioma with accuracy of.

accuracy: 0.9925
loss: 0.0181
val_accuracy: 0.9832
val_loss: 0.0807
learning_rate: 4.0000e-06

We added a feature that can **read the diagnostic loud**.

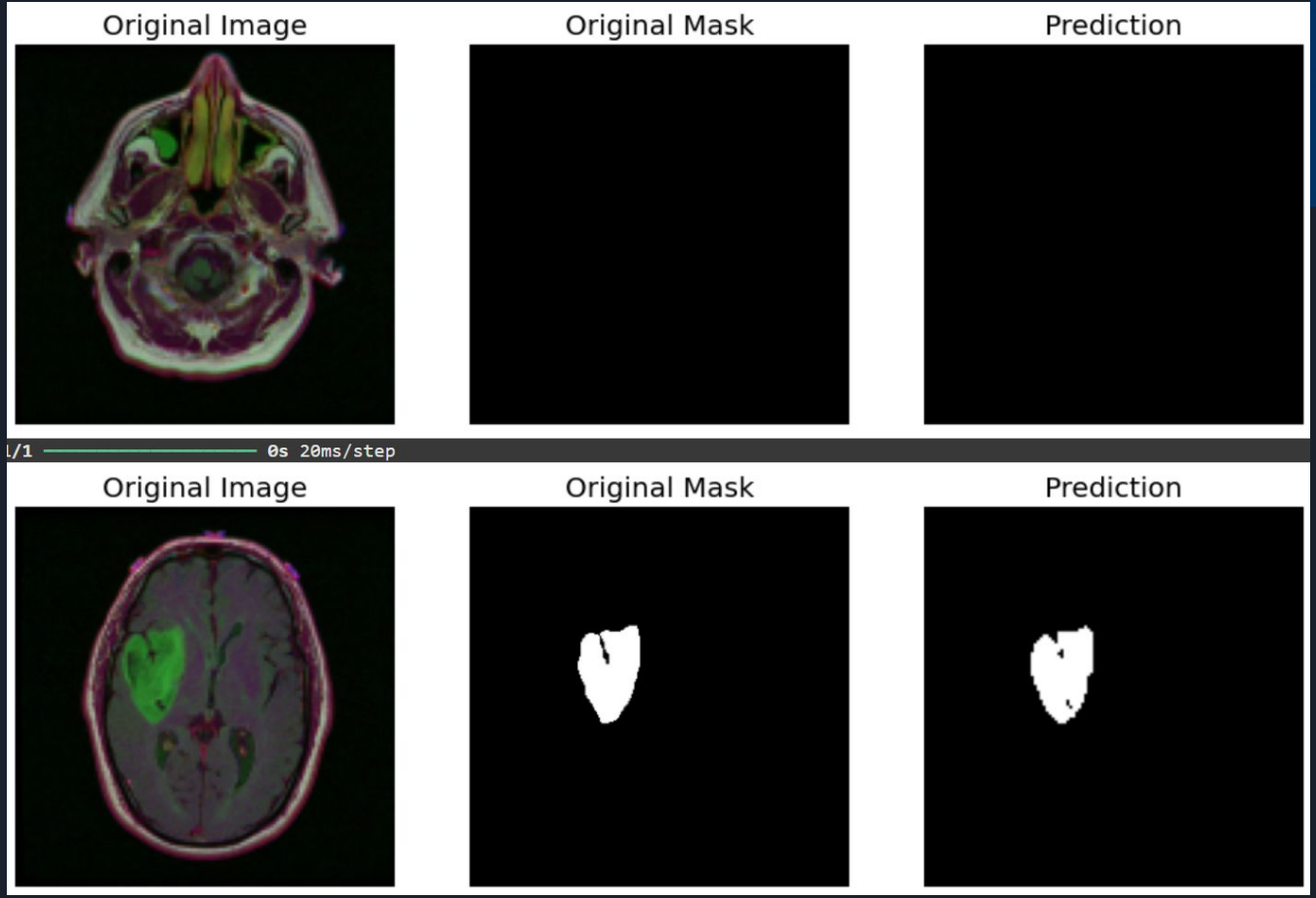

Confusion Matrix for CNN Model
True Values
Predictions
0
1
2
3
138
0
0
0
0
212
0
0
0
3
150
4
0
0
0
148
200
175
150
125
100
75
50
25
0

Our models (segmentation model)

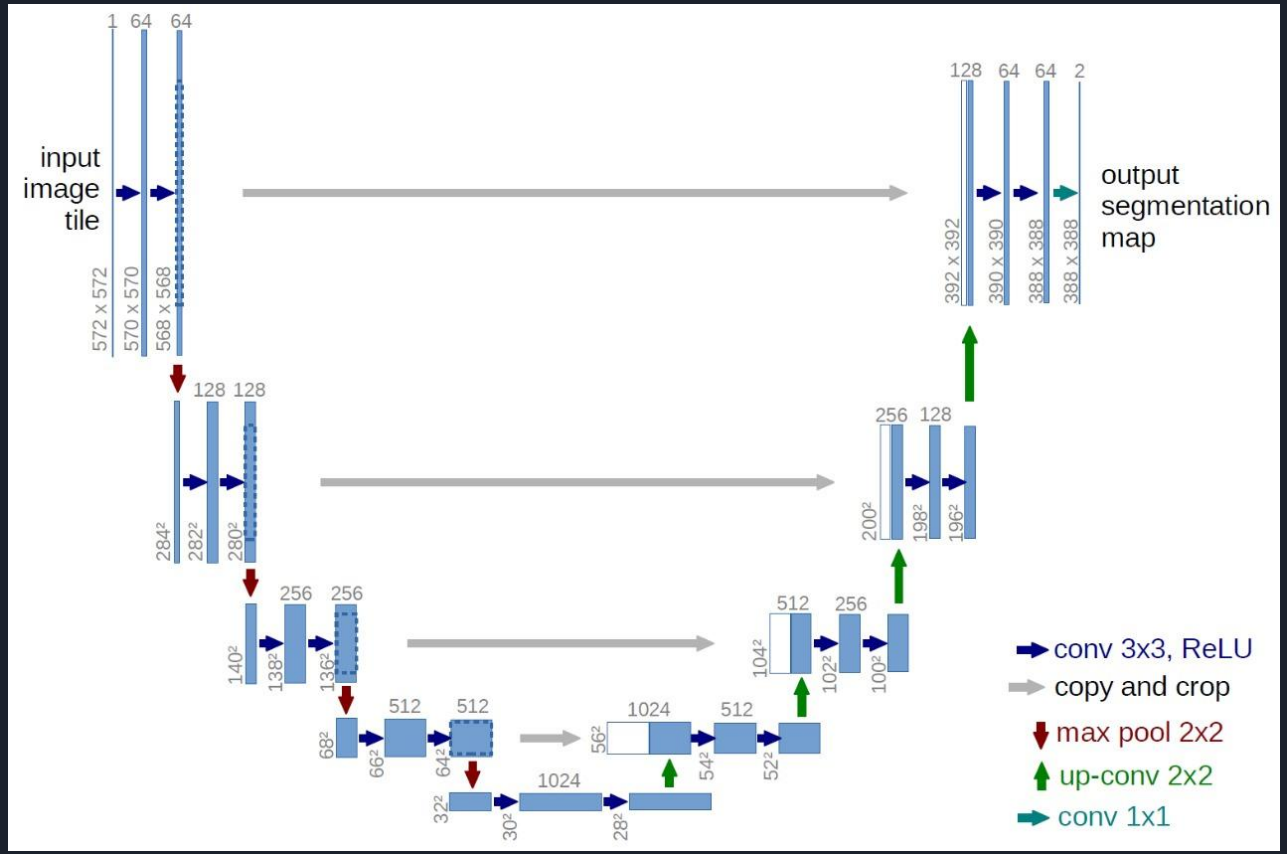


And also to help doctor in predicting the area of the tumor we managed to make a model that is able to detect the area of tumor with the following metrics values.

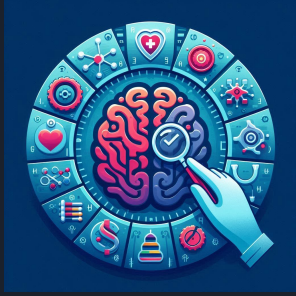
accuracy: 0.9956
dice_coef: 0.7809
iou_coef: 0.6725
loss: -0.7801
Validation_accuracy: 0.9972
val_dice_coef: 0.8613
val_iou_coef: 0.7591
val_loss: -0.8613


Original Image
Original Mask
Prediction
1/1 0s 20ms/step
Original Image
Original Mask
Prediction

U-net segmentation



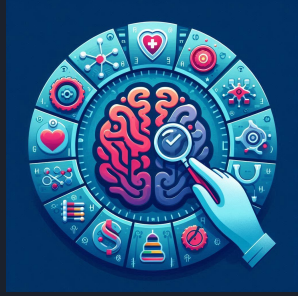
Conclusion



According to many researches these models help increase the accuracy of diagnostics and the last research for gemini showed that these model help not only in training new doctors in radiology field but also help experts in some images that may be hard to diagnose.

The future trend in research now is to generate radiology report.

References



- Redefining Radiology: A Review of Artificial Intelligence Integration in Medical Imaging
- Mapped: The Number of AI Startups By Country
- The present and future of deep learning in radiology - ScienceDirect
- I was Given the Wrong Cancer Diagnosis: I KNEW Something was Wrong | Natalia's MPN Story
- Brain Tumor MRI Dataset
- Brain MRI segmentation

Thank you