BRAIN TUMOR DETECTION USING CNN

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ISE 244

OVERVIEW

- Problem Definition
- Need for a new approach
- Project Objectives
- Project architecture and flow
- Results
- Discussion
- Evaluation and Reflection
- Conclusion

PROBLEM DEFINITION

A brain tumor is a growth of abnormal cells in the brain. Some brain tumors can be cancerous or can become cancerous. Early detection of brain tumors is very essential as it can become very fatal if left unattended.

Benign	Malignant
Menignoma, Pitutary	Glioma

NEED FOR A NEW APPROACH

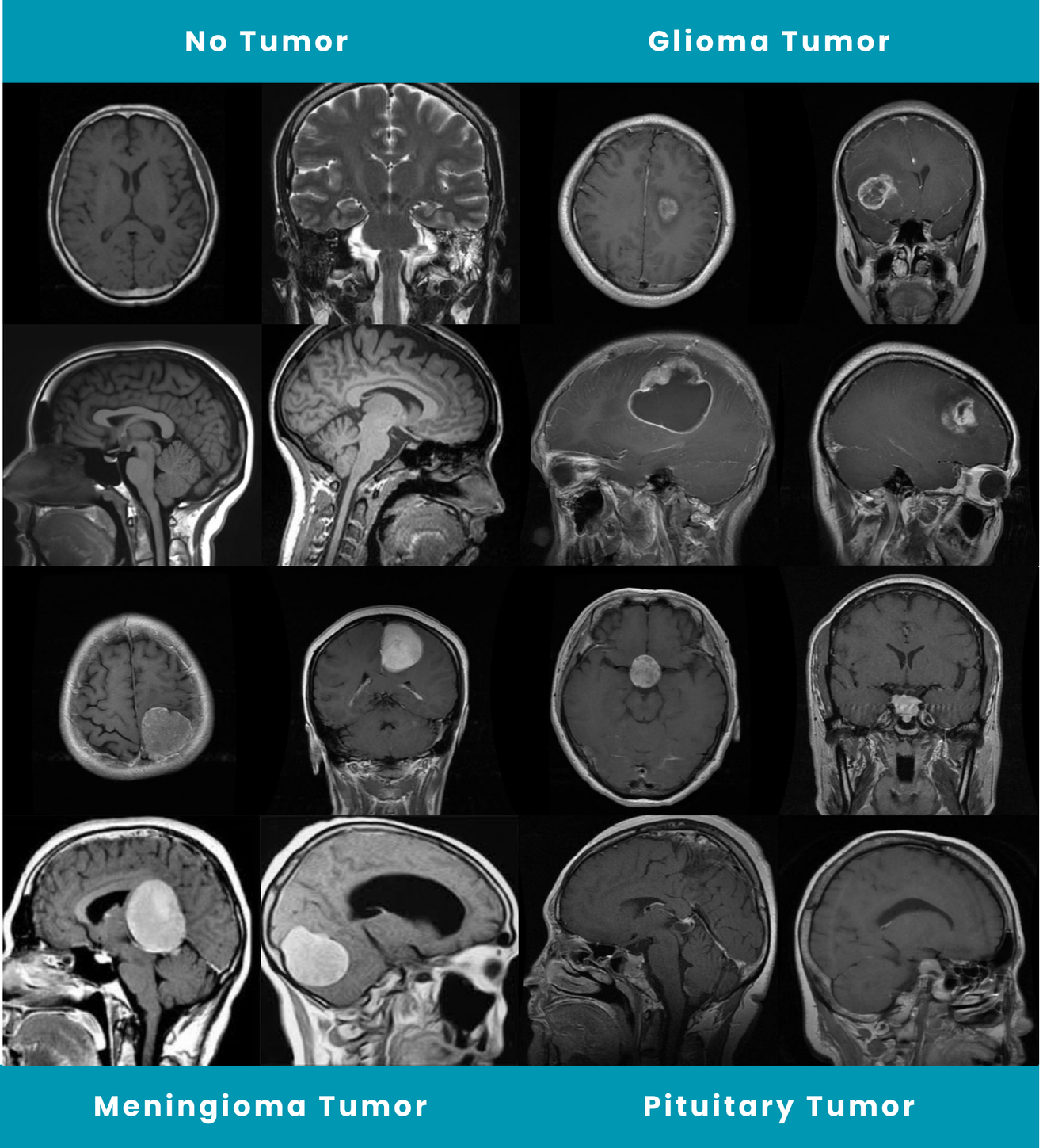
- Insufficient data.
- The model is only able to predict whether a tumor is present or not.
- The model does not comprise images from all sides of the brain.
- There is no discussion regarding a stable platform to deploy the model.

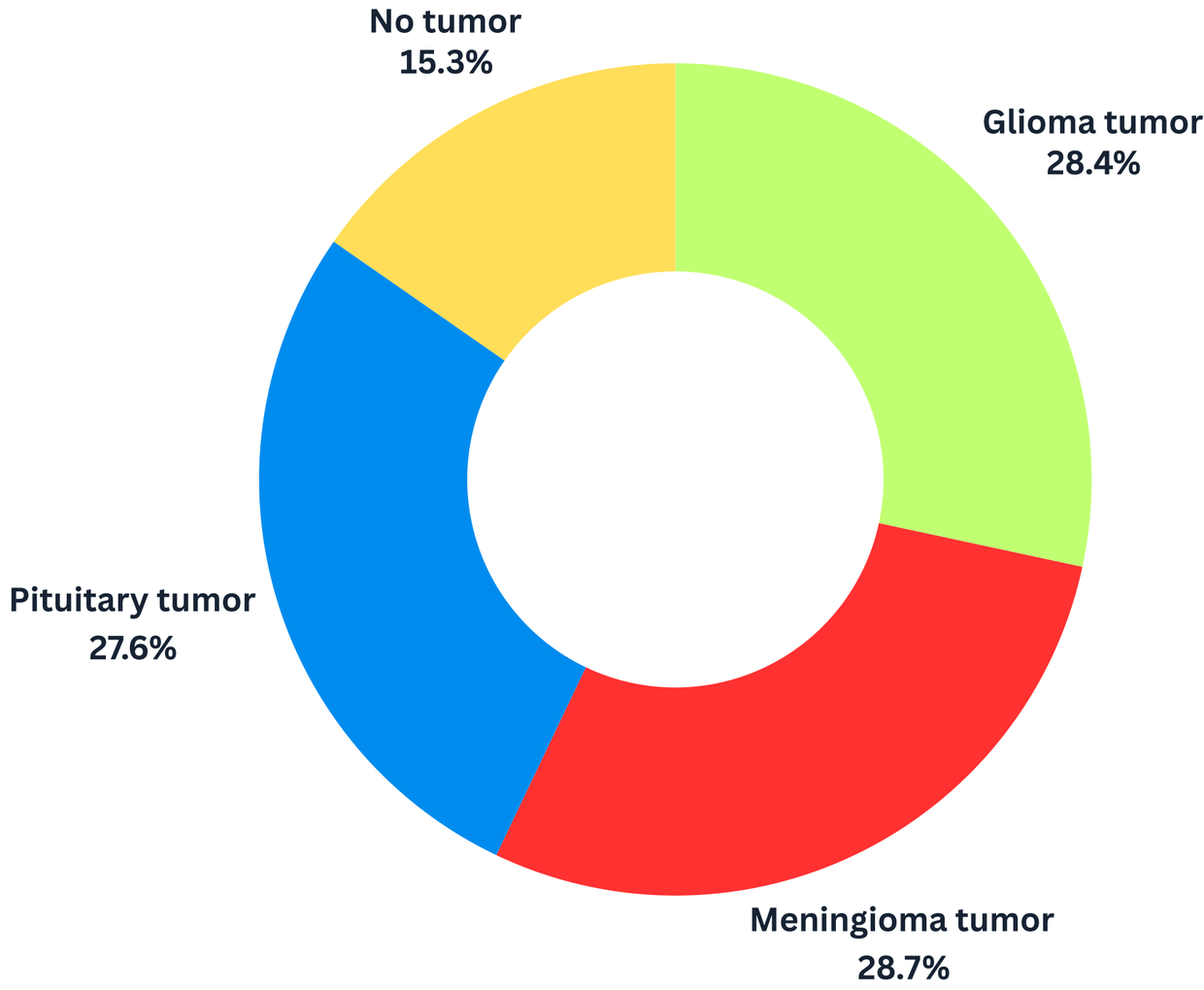
PROJECT OBJECTIVES

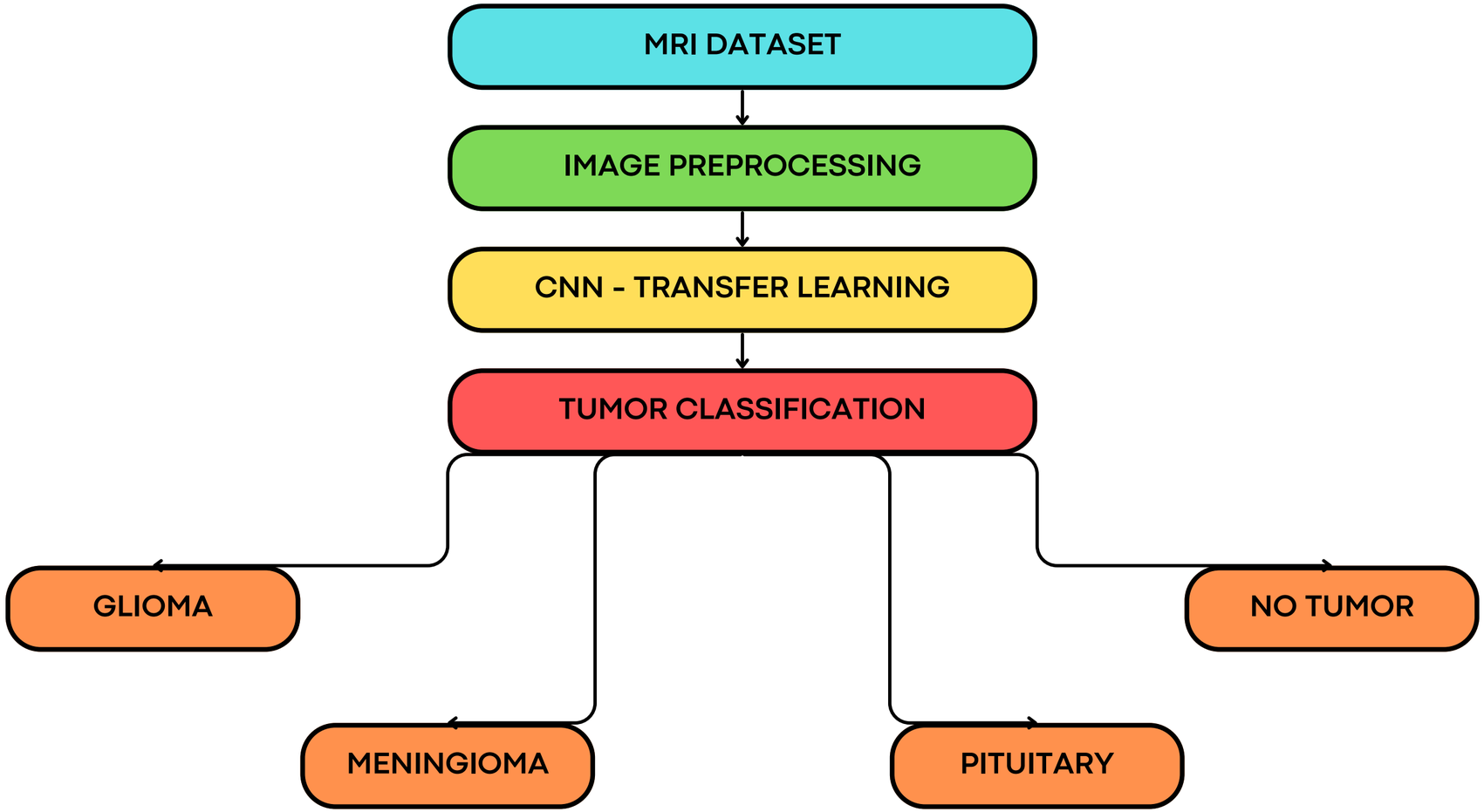
- Dataset Selection
- Data Augmentation / Pre-processing
- Model Implementation
- Performance Evaluation
- Deployment.

PROJECT ARCHITECTURE AND FLOW

- Dataset Overview
- Data Pre-processing and Augmentation
- Model Implementation
- Result analysis
- Model Selection


No Tumor
Glioma Tumor
Meningioma Tumor
Pituitary Tumor

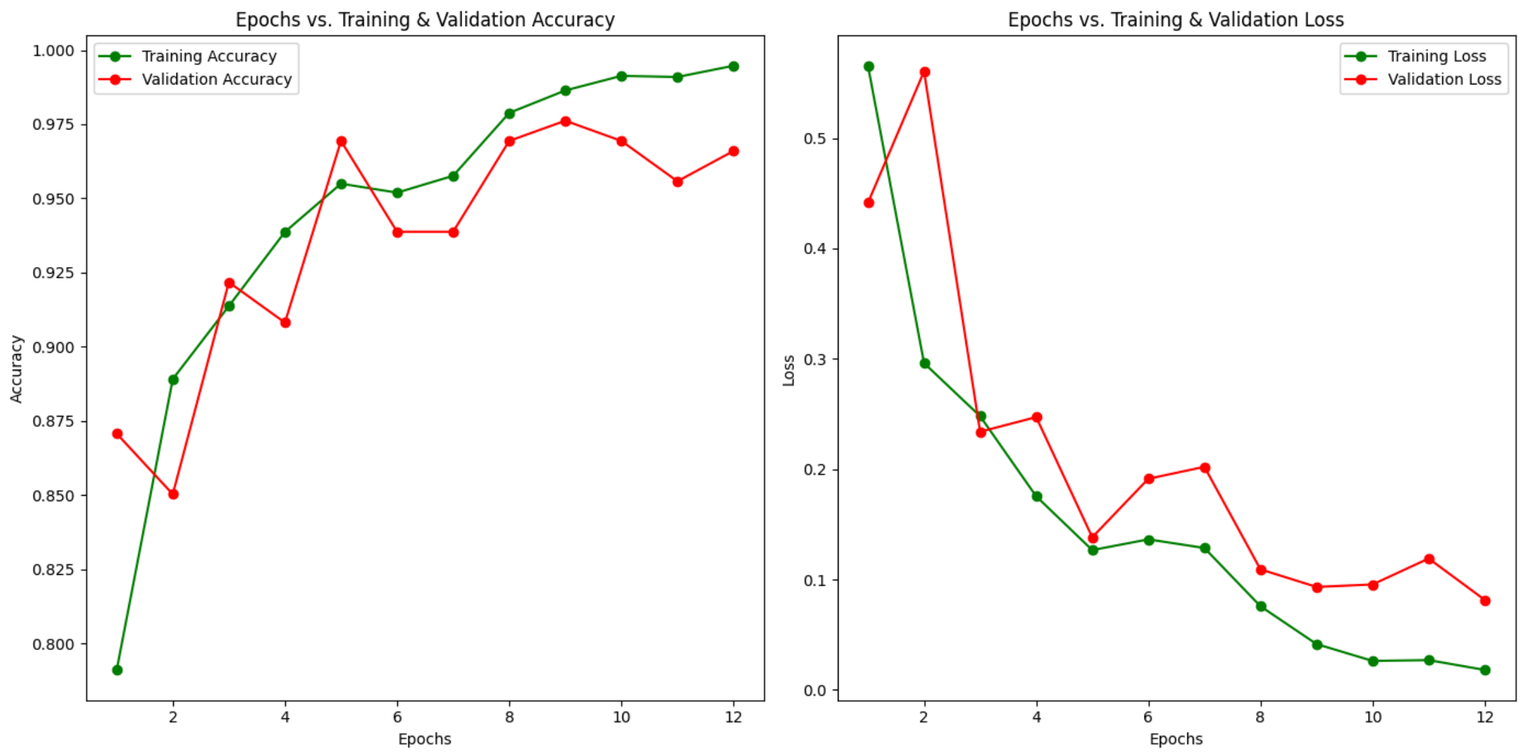

No tumor
15.3%
Glioma tumor
28.4%
Pituitary tumor
27.6%
Meningioma tumor
28.7%


MRI DATASET
IMAGE PREPROCESSING
CNN - TRANSFER LEARNING
TUMOR CLASSIFICATION
GLIOMA
MENINGIOMA
PITUITARY
NO TUMOR

CNN Models used
EfficientNet
ResNet
DenseNet
MobileNet
Xception
Inception

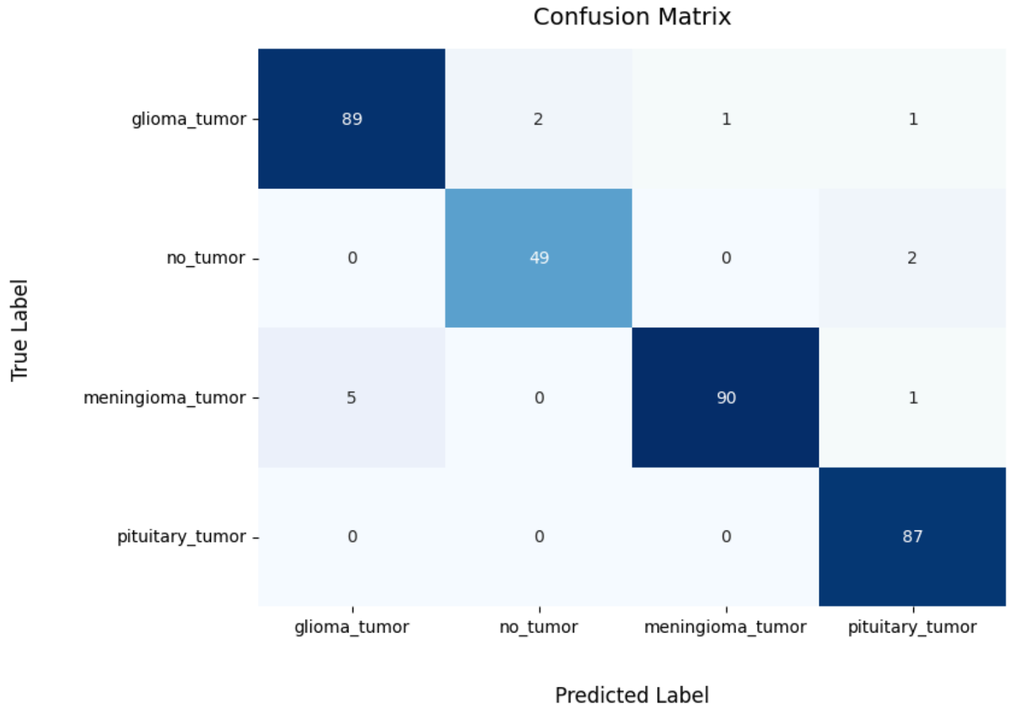
RESULTS

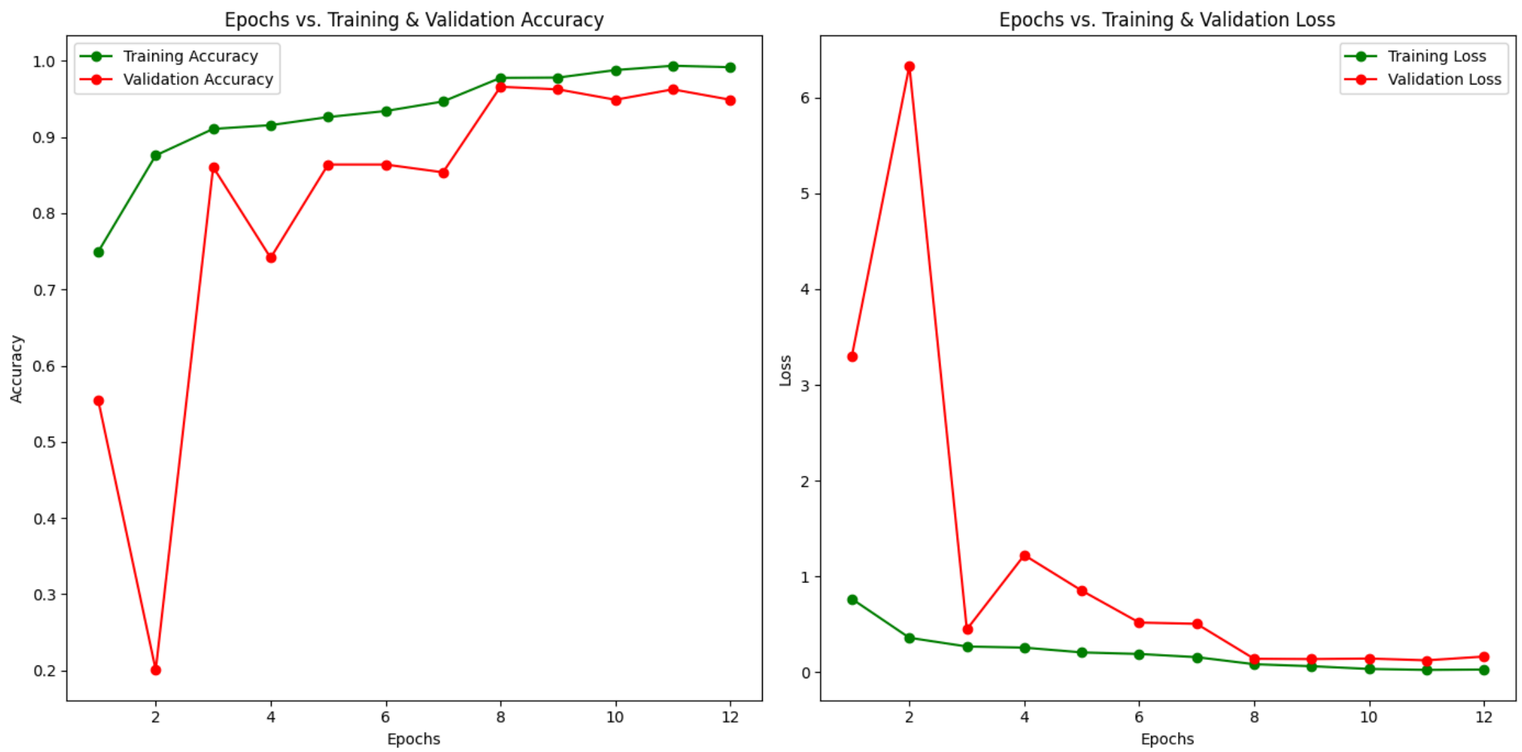
Model Performance
Confusion Matrix Analysis
Evaluation Parameter Analysis



Model : EfficientNetV2

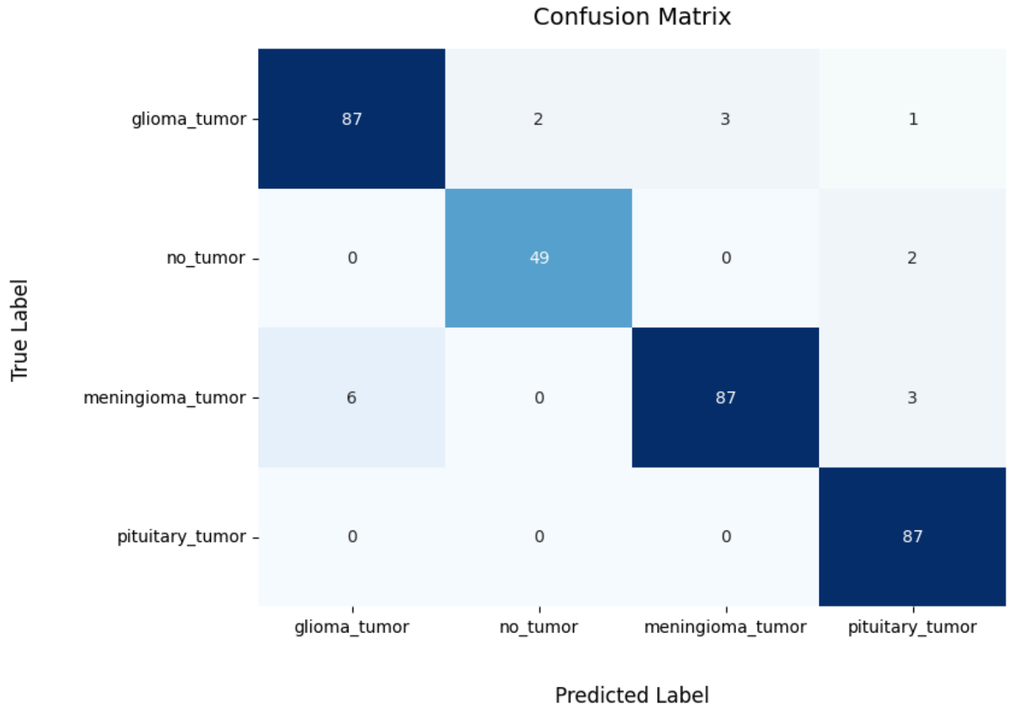
	precision	recall	f1-score	support
0	0.95	0.96	0.95	93
1	0.96	0.96	0.96	51
2	0.99	0.94	0.96	96
3	0.96	1.00	0.98	87
accuracy			0.96	327
macro avg	0.96	0.96	0.96	327
weighted avg	0.96	0.96	0.96	327

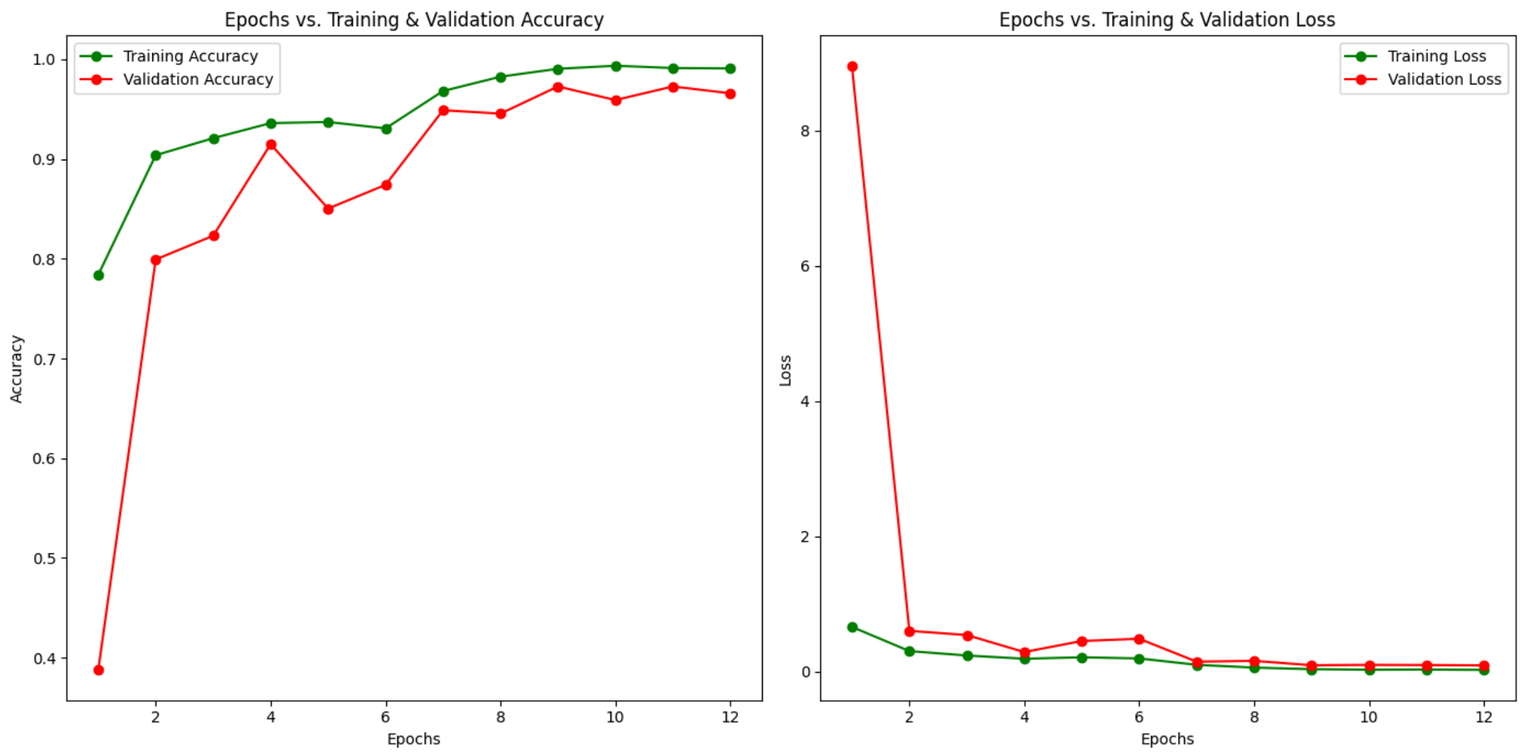




Model : DenseNet

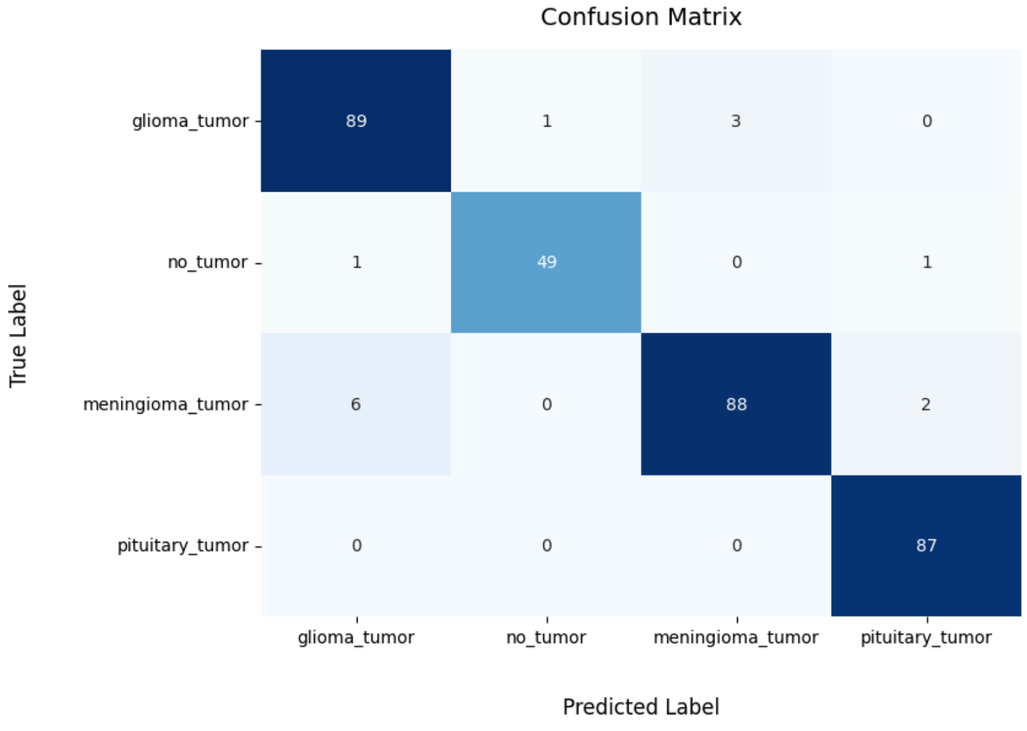
	precision	recall	f1-score	support
0	0.94	0.94	0.94	93
1	0.96	0.96	0.96	51
2	0.97	0.91	0.94	96
3	0.94	1.00	0.97	87
accuracy			0.95	327
macro avg	0.95	0.95	0.95	327
weighted avg	0.95	0.95	0.95	327





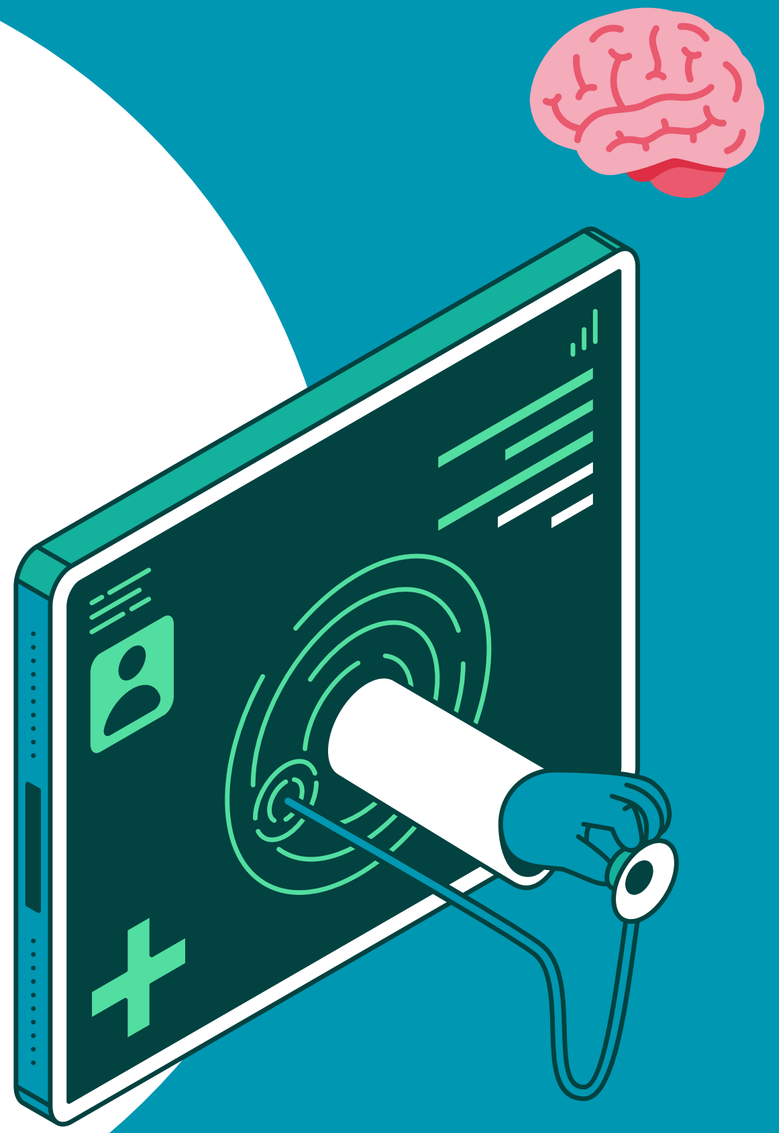
Model : Inception

	precision	recall	f1-score	support
0	0.93	0.96	0.94	93
1	0.98	0.96	0.97	51
2	0.97	0.92	0.94	96
3	0.97	1.00	0.98	87
accuracy			0.96	327
macro avg	0.96	0.96	0.96	327
weighted avg	0.96	0.96	0.96	327

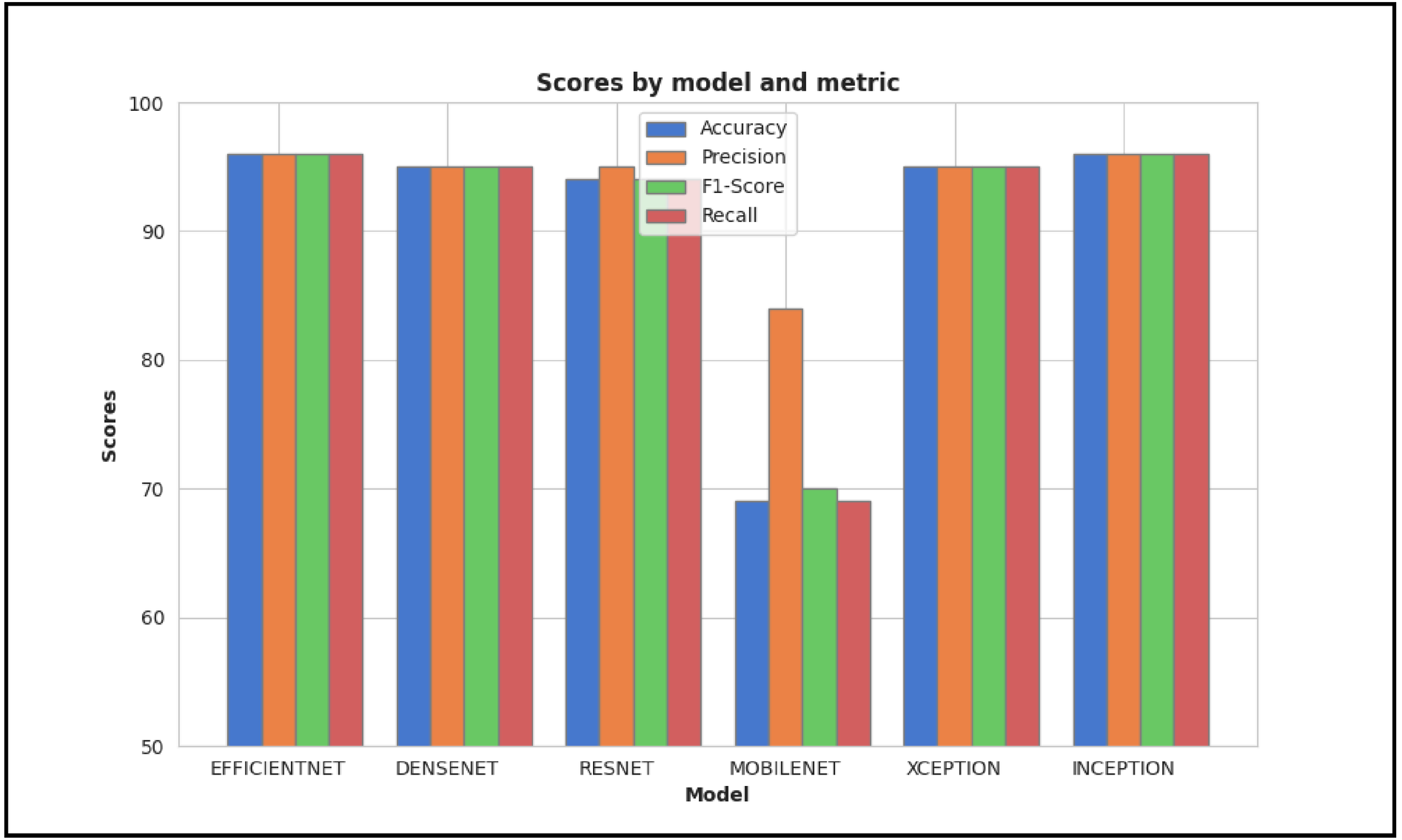


DISCUSSION

Model comparison
Model selection

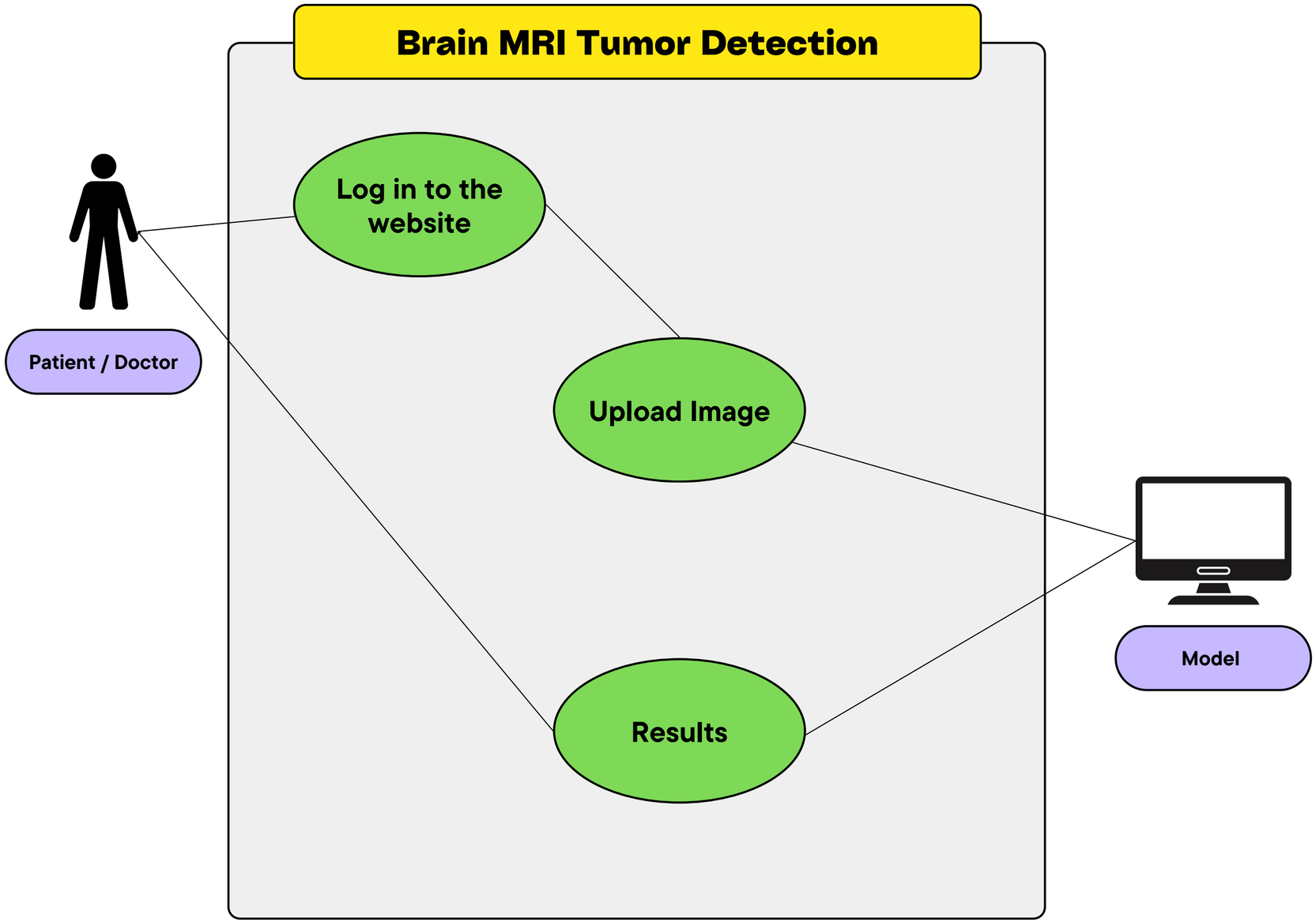


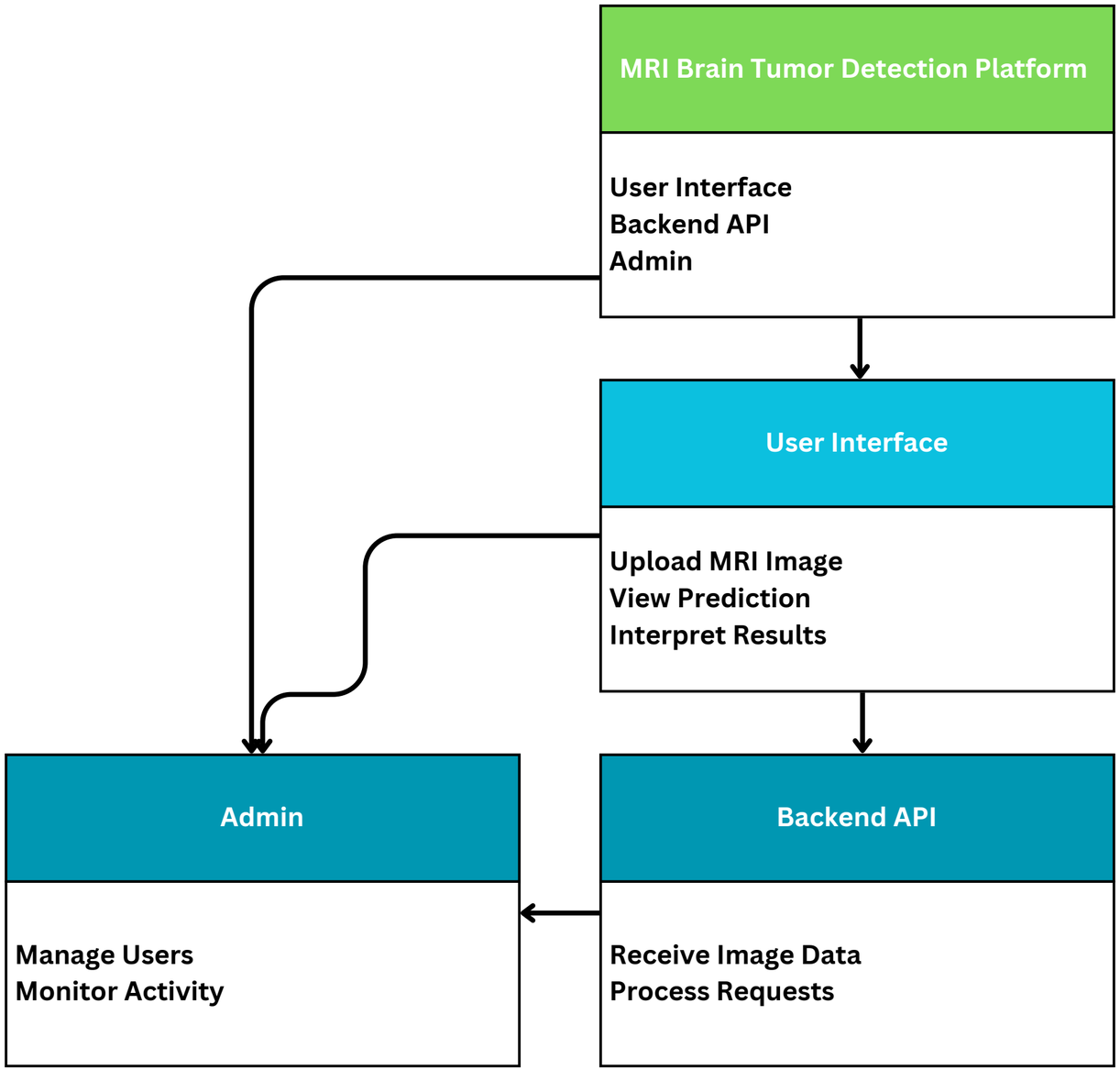
	ACCURACY	PRECISION	F1	RECALL
EFFICIENTNET	96%	96%	96%	96%
DENSENET	95%	95%	95%	95%
RESNET	94%	95%	94%	94%
MOBILENET	69%	84%	70%	69%
XCEPTION	95%	95%	95%	95%
INCEPTION	96%	96%	96%	96%

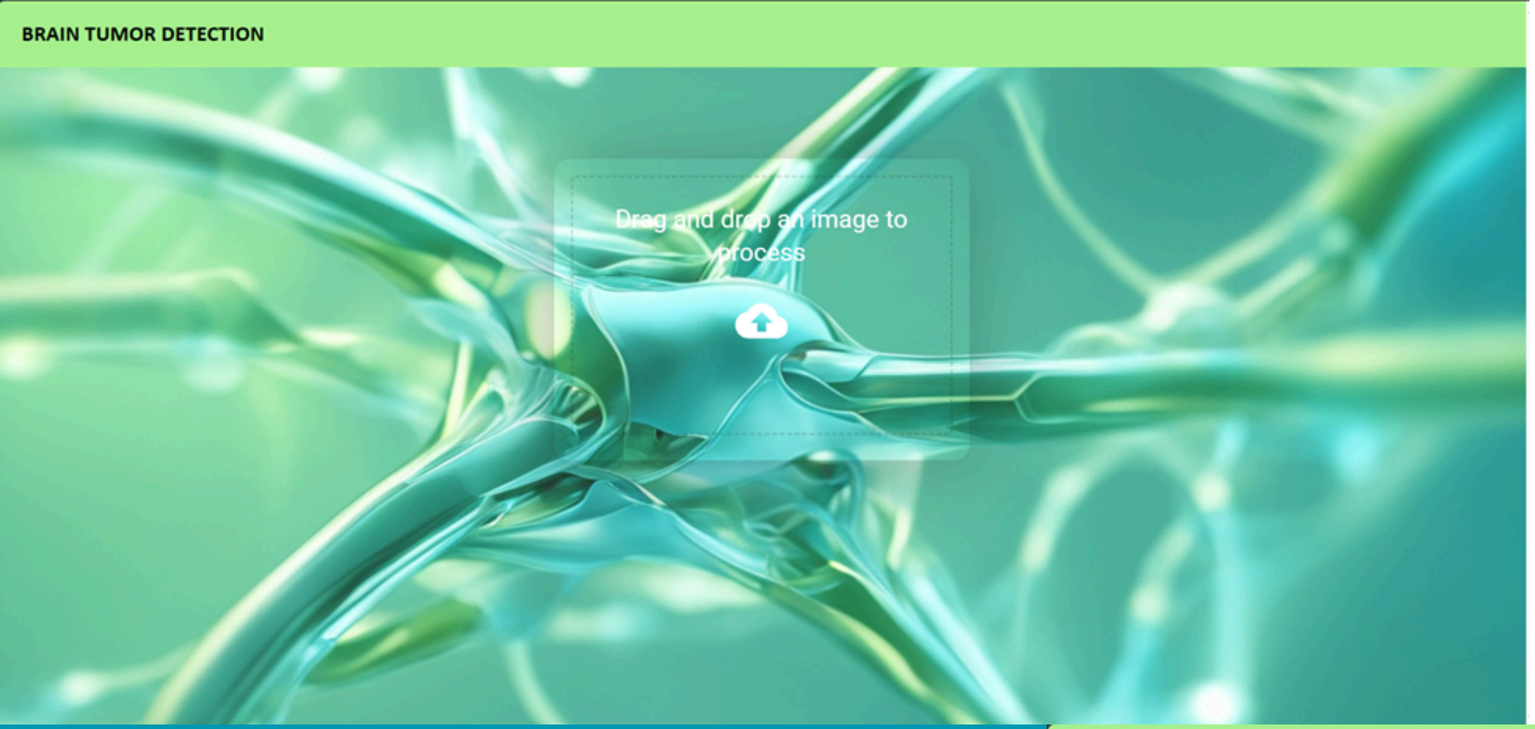

Scores by model and metric
Accuracy
Precision
F1-Score
Recall
100
90
80
70
60
50
Scores
EFFICIENTNET
DENSENET
RESNET
MOBILENET
XCEPTION
INCEPTION
Model

EVALUATION AND REFLECTION

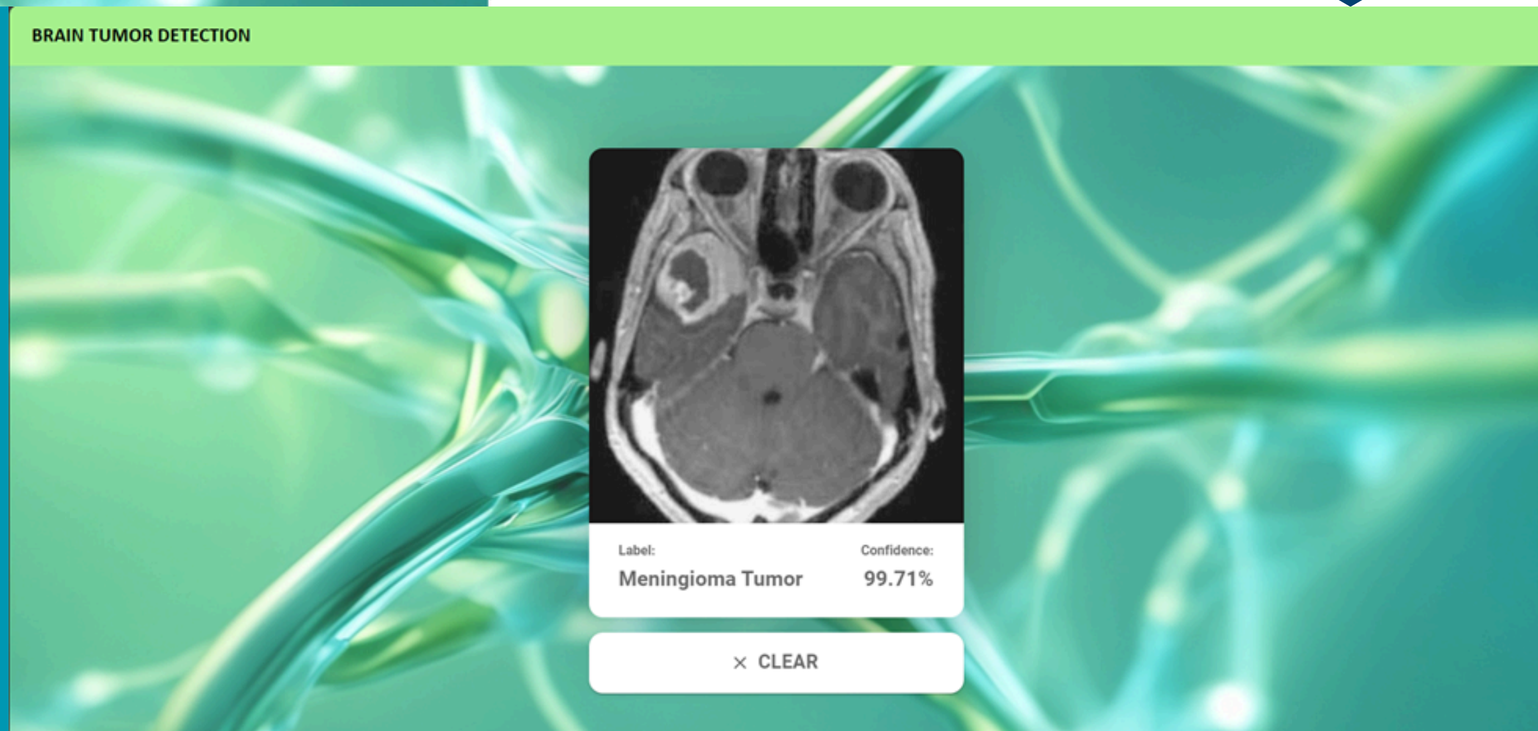
UML and Block Diagrams
Assumptions and solutions


Brain MRI Tumor Detection
Log in to the website
Upload Image
Results
Patient / Doctor
Model


MRI Brain Tumor Detection Platform
User Interface
Backend API
Admin
User Interface
Upload MRI Image
View Prediction
Interpret Results
Admin
Manage Users
Monitor Activity
Backend API
Receive Image Data
Process Requests



Web platform Using FastAPI



ASSUMPTION

- Old model’s 3d inability
- Lack of data volume
- Tumor type detection not possible
- Model Accuracy on CNN
- No platform to deploy model

SOLUTIONS

- Tumor detection from all sides
- 12 times more data
- Accurate tumor type detection
- Transfer Learning
- Deployed a platform for model deployment

CONCLUSION

Project Achievements
Future Directions

Thank You

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