



# Brain Tumor Detection using MRI Images

**GTC Final Project – Team 14**



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# Problem Statement

Brain tumors are life-threatening and require early, accurate detection.

Manual analysis of MRI scans is:

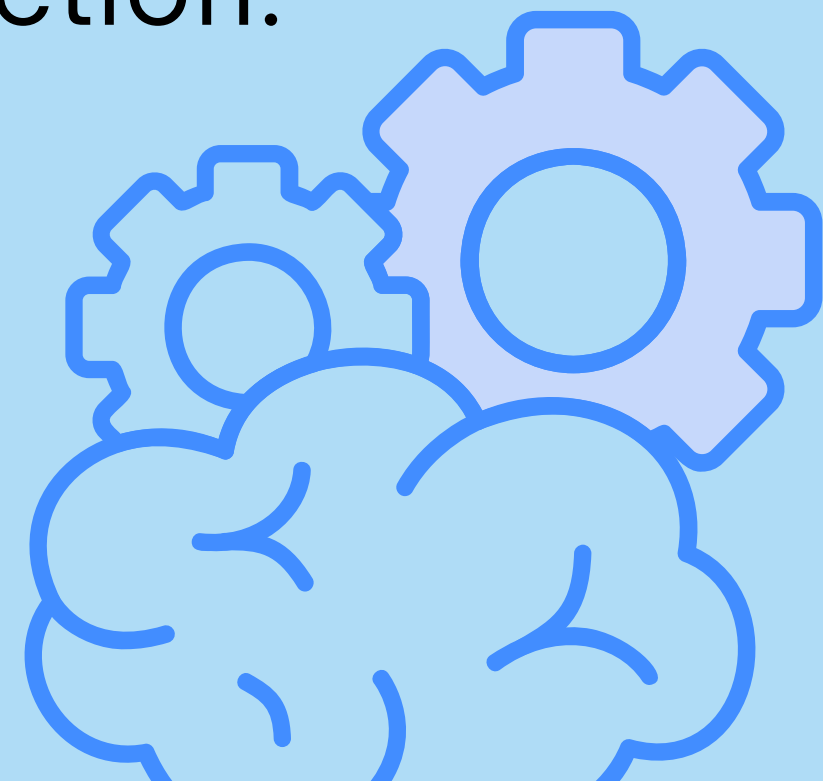
- Time-consuming
- Subject to human error

Need for an automated, reliable solution.



# Project Overview

- Built a machine learning pipeline for brain tumor classification.
- Compared baseline models with deep learning CNN.
- Final solution → Web application for real-time detection.



# Dataset & Preprocessing



## Dataset

Public dataset contains MRI scans classified into 4 classes:

- Glioma
- Meningioma
- Pituitary
- No Tumor

## Preprocessing Steps:

01

### Image Resizing & Normalization

- Resize all MRI images to 128×128 pixels
- Normalize pixel values to range 0–1

02

### Data Augmentation:

- Apply transformations (rotation, flipping, zooming)
- Increases dataset diversity & reduces overfitting

03

### Dataset Splitting

- Split into Training / Validation / Test sets
- Ensures reliable evaluation of model performance

# Data Preparation



## Dataset Shuffling

- Ensures randomness and prevents order bias

## Data Balancing

- Reduces overfitting toward majority classes

# Batching

- Splitting data into manageable mini-batches

## Ready-to-Model Format

- Processed and augmented data is fed into the models



# Feature Building

**CNN Filters extract meaningful features**

- **Low-level: edges, shapes**
- **Mid-level: textures**
- **High-level: tumor patterns**

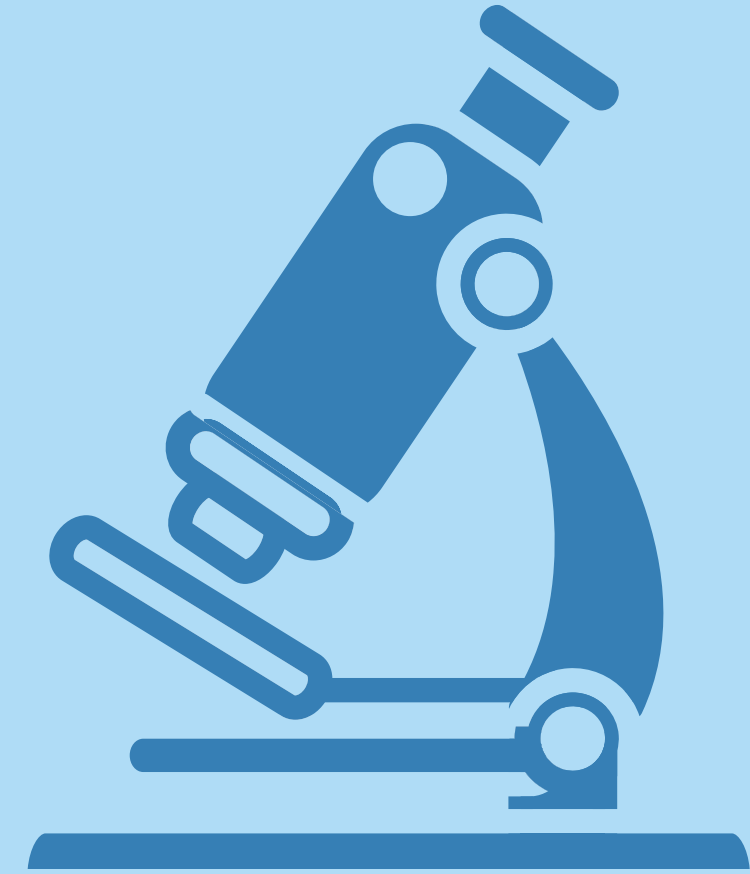
**These features are used by:**

- **SVM (baseline)**
- **MobileNetV2 (transfer learning)**
- **CNN (custom architecture)**






# Modeling & Results




## Models Tested:

- Support Vector Machine (SVM) → Accuracy: 65%
- MobileNetV2 (Transfer Learning) → Accuracy: 87.7%
- Convolutional Neural Network (CNN) → Accuracy: 95.5% 

## **Best Model (CNN):**

- Achieved high precision, recall, and F1-scores across all tumor classes
- Especially strong performance on Glioma and Pituitary detection
- Selected as the final deployed model in the web application



 For full model results and detailed metrics, check the report:

 View Full Report [Here](#)

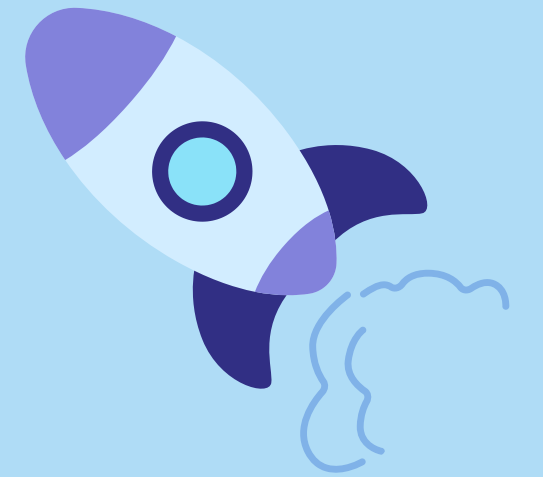


# Web Application (User-Friendly Interface)

Simple and intuitive web application

Easy image upload for tumor detection

Real-time predictions with high accuracy



 **View the Project Web Application [Here](#)**

 **Watch the Demo Video [Here](#)**



## Brain Tumor Detection

Upload an MRI scan to detect the tumor type:

Choose an MRI image...



Drag and drop file here

Limit 200MB per file • JPG, PNG, JPEG

[Browse files](#)

# Impact / Real-World Use Case

## Why This Matters?

Early detection saves lives

Helps radiologists with faster diagnosis

Potential integration with hospital systems



# Meet Our Team & See Each Member's Contribution:

- **Sama Mobtasem** → Data Preparation
- **Hoor Ashraf** → Exploratory Data Analysis (EDA)
- **Sama Samer** → Feature Building & demo video
- **Maysoun Hassan** → Model Training
- **Aya Ayman** → Validation
- **Rawan Sotohy** → Web application deployment, Presentation design & Report writing



***Thanks for watching our presentation***

## **Project Links** 📌

- 🔗 View the Project Repository [Here](#)
- 🔗 View the Web Application [Here](#)

