BRAIN TUMOR DETECTION USING CNN

ADITYA JADHAV
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GUIDED BY
DR. GANESH PAKLE SIR

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INTRODUCTION

A brain tumor refers to an abnormal growth of cells within the brain. These tumors can develop in various areas of the brain and can be either benign (non-cancerous) or malignant (cancerous). Brain tumors are a serious health concern as they can interfere with the normal functioning of the brain and nervous system.

Types of brain tumor :

1.Gliomas tumor (malignant)
2.Meningiomas tumor (benign)
3.Pituitary tumor (benign)

Mission STATEMENT

Brain tumors are a significant health concern, and their early detection plays a crucial role in improving patient outcomes. Manual diagnosis of brain tumors from medical images is a time-consuming and challenging task, requiring expertise and precision. The aim of this project is to develop an automated system using Convolutional Neural Networks (CNNs) to accurately detect the presence of brain tumors in medical images.

LITERATURE SURVEY

PARAMETERS	METHODOLOGY	Dataset	OBJECTIVE	Performance
Brain Tumor Detection Using Convolutional Neural Network	Uses K-Means clustering and SVM for brain tumor detection in MR images.	Dataset with diverse tumor sizes, locations, shapes, and image intensities.	Aim to detect brain tumors and improve treatment.	Accuracy is 97.87 percentage.
Brain Tumour Detection Using Deep Learning	Utilizes Fuzzy C-Means clustering, traditional classifiers (SVM, KNN, MLP, etc.), and CNN for brain tumor extraction from MRI.	Real-time dataset with diverse tumor sizes, locations, shapes, and image intensities.	Focus on extracting brain tumors based on texture-based and statistical-based features.	Accuracy is 97.67 percentage.
Detection of Brain Tumors Using Image Processing	Applies Fuzzy C-Means clustering, traditional classifiers (SVM, KNN, MLP, etc.), and CNN for brain tumor segmentation.	Dataset details not specified	Objective is to identify abnormal images, segment tumor regions, and estimate density for therapy.	Accuracy is 96.96 percentage.

REMARK

- IN THIS PROJECT, WE ADDRESS THE PRESSING CHALLENGE OF BRAIN TUMOR DETECTION BY DEVELOPING AN AUTOMATED SYSTEM USING CT SCANS AND MRI. WITH APPROXIMATELY 700,000 ANNUAL DIAGNOSES WORLDWIDE, BRAIN TUMORS HAVE A SIGNIFICANT IMPACT ON GLOBAL HEALTH.

- BY HARNESSING THE POWER OF ADVANCED MACHINE LEARNING ALGORITHMS, OUR SYSTEM AIMS TO ENHANCE THE ACCURACY AND EFFICIENCY OF BRAIN TUMOR DETECTION.

- THIS WILL ENABLE EARLY AND TIMELY INTERVENTIONS, ULTIMATELY IMPROVING PATIENT OUTCOMES. THE INTEGRATION OF CT SCANS AND MRI PROVIDES COMPLEMENTARY INFORMATION, ALLOWING FOR A COMPREHENSIVE EVALUATION OF TUMORS.

- OUR PROJECT CONTRIBUTES TO THE FIELD OF MEDICAL IMAGING BY PROVIDING A RELIABLE AND ACCESSIBLE TOOL THAT CAN ASSIST HEALTHCARE PROFESSIONALS IN MAKING ACCURATE AND INFORMED DECISIONS FOR BRAIN TUMOR DIAGNOSIS AND TREATMENT.

TECHNOLOGICAL STACK

01

Programming language

Python : Python is widely used in the field of machine learning and deep learning. Its rich ecosystem of libraries and frameworks makes it a preferred choice for implementing CNN-based projects.

02

Deep Learning Framework

TensorFlow or PyTorch: These are the two most popular deep learning frameworks. TensorFlow is often chosen for its extensive community support and deployment capabilities, while PyTorch is known for its dynamic computational graph, making it more intuitive for research and experimentation.

03

High-Level Deep Learning API

Keras: Keras is an high-level neural networks API written in Python that runs on top of either TensorFlow or Theano. It provides a user-friendly interface for building and training neural networks, making it easier to implement CNN architectures.

04

IDE (Integrated Development Environment):

Jupyter Notebooks or IDE of Choice: Jupyter Notebooks are often used for interactive development and experimentation. IDEs like PyCharm or VSCode are also popular choices for larger projects.

THE DATA

•Dataset: Brain tumor images

•Tumor Types: Glioma tumor, Meningioma tumor, Pituitary tumor, No tumor

•Structure: Divided into "Training" and "Testing" folders

•Training Folder: Subfolders for each tumor type

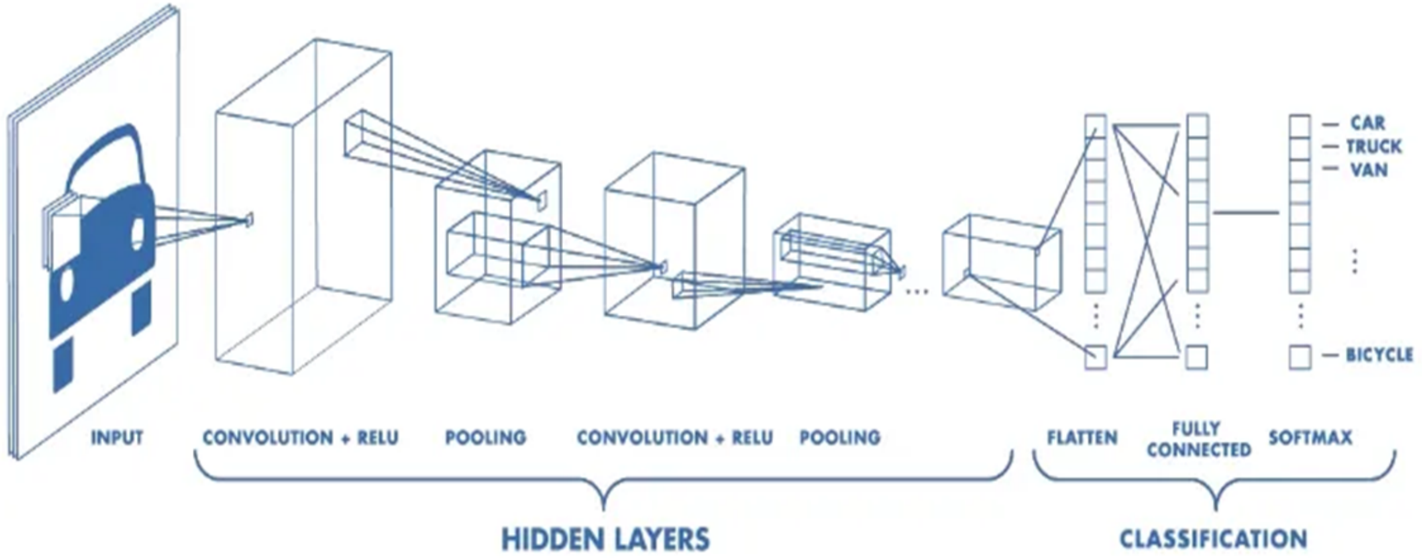
Testing Folder: Subfolders for each tumor type

•Purpose: Train a CNN model for accurate tumor classification

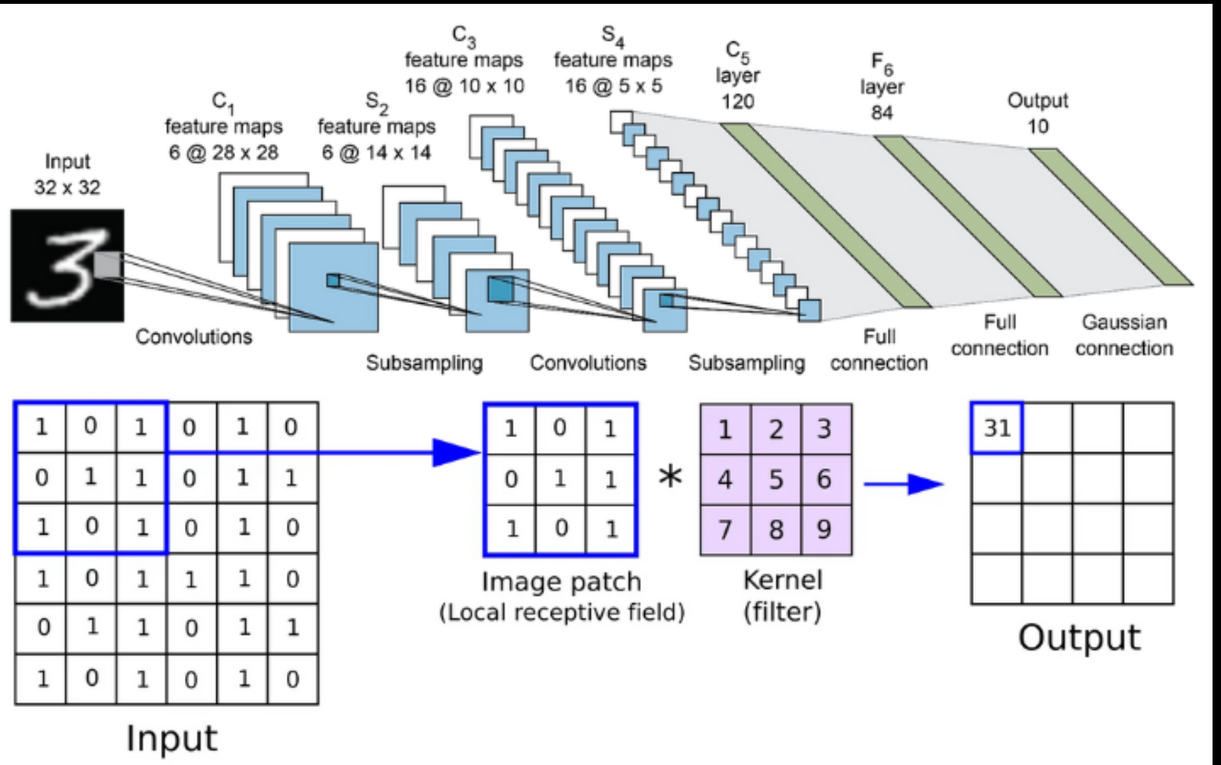
•Importance: Enables effective detection and classification of brain tumors

METHODS (CNN)

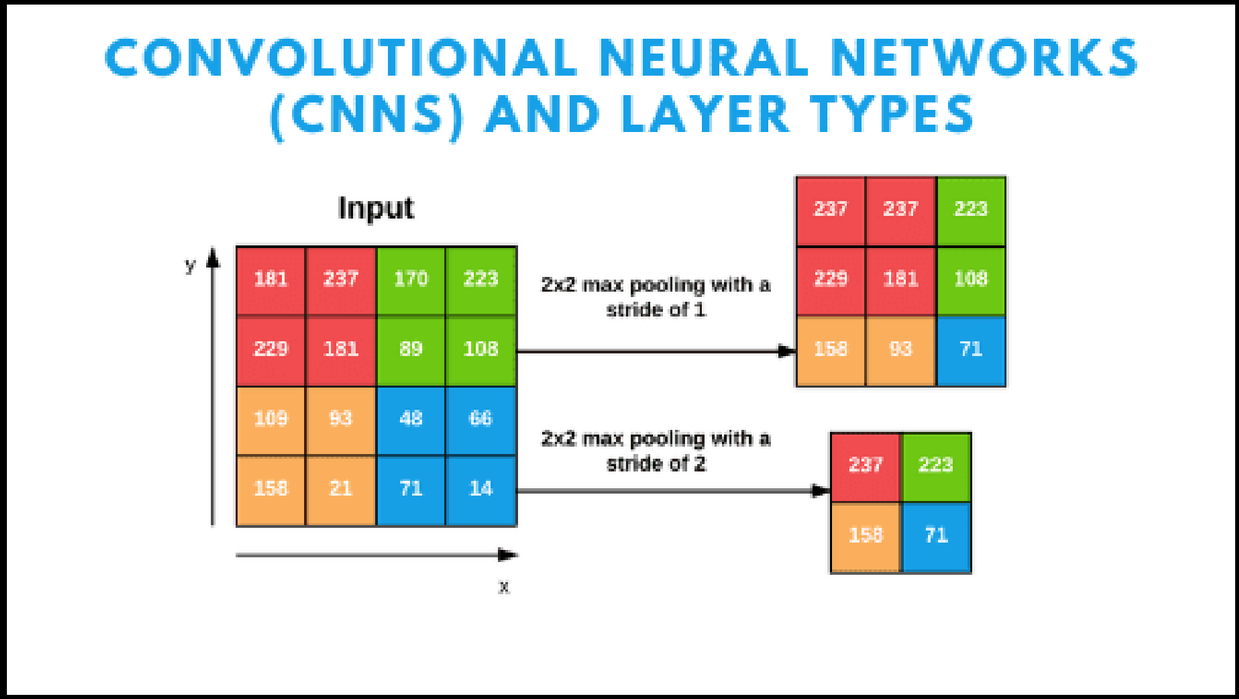
Convolutional Neural Networks (CNNs) are deep learning models specifically designed for image processing and computer vision tasks. CNNs excel at image analysis by automatically learning and extracting key features, enabling tasks such as object recognition, classification, and segmentation.



CONVOLUTIONAL LAYER



MAX POOLING LAYER



ACTIVATION FUNCTIONS

•ReLU: `activation='relu'`
act(y) = max(0,x)

•Sigmoid: `activation='sigmoid'`
act(y) = 1 / (1 + e^(-x))

LAYERS

•Conv2D: `Conv2D(filters, kernel_size, activation='relu', input_shape=input_shape)`

•MaxPooling2D: `MaxPooling2D(pool_size=(2, 2))`

•Flatten: `Flatten()`

•Dense: `Dense(units, activation='relu')`
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CONCLUSION

CONCLUSION 1

•This project successfully developed and trained a Convolutional Neural Network (CNN) model for the detection and classification of brain tumors.

CONCLUSION 2

•The model achieved promising results in accurately identifying four different tumor types: glioma tumor, meningioma tumor, pituitary tumor, and no tumor.

CONCLUSION 3

•The developed CNN model showcased the power of image processing and deep learning techniques in the field of medical diagnostics.

REFERNCES

RESEARCH PAPER

- https://www.researchgate.net/publication/337768246_Brain_Tumor_Detection_Using_Convolutional_Neural_Network
- https://www.researchgate.net/publication/372778182_Brain_Tumor_Detection_using_Deep_Learning
- https://www.researchgate.net/publication/365982354_Brain_Tumor_Detection_Using_Image_Processing_Approach

DATASET

- https://www.researchgate.net/publication/365982354_Brain_Tumor_Detection_Using_Image_Processing_Approach

VIDEO REFERENCES

- https://www.youtube.com/watch?v=sR-2KXuaQRw
- https://www.youtube.com/watch?v=Gc6MSamMtRo
- https://www.youtube.com/watch?v=x5b_q-RjvwM
- https://www.youtube.com/watchv=E5Z7FQp7AQQ&list=PLuhqtP7jdD8CD6rOWy20INGM44kULvrHu

THANK YOU

CONTACT

2020bit044@sggs.ac.in

+91 9370144795

SHRI GURU GOBIND SINGHJI INSTITUTE OF
ENGINEERING AND TECHNOLOGY
VISHNUPURI NANDED