

DETECTION OF BRAIN TUMOUR DIAGNOSIS USING AI

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Introduction

Brain tumors pose a serious health risk and often go undetected until advanced stages. Early detection significantly improves treatment outcomes. Most current systems focus on detecting existing tumors via imaging. However, our approach emphasizes prevention. We propose a predictive model that estimates the future risk of brain tumors by analyzing patient history, lifestyle habits, genetic predispositions, and other medical data. This system aims to support healthcare professionals by identifying high-risk individuals early, enabling timely monitoring and intervention. It combines imaging, personal data, and lifestyle metrics to predict the probability of tumor development before symptoms appear..

Literature Survey

Research Focus	Key Contributions
MRI-based Detection	CNNs classify tumors from MRI scans (Pereira et al., 2016).
Genetic Factors	Family history and mutations impact risk (Bondy et al., 2008).
Lifestyle Risks	Smoking, diet, and radiation considered in other cancers.
AI in Healthcare	EHR-based disease risk prediction (Rajkomar et al., 2018).
Multimodal Analysis	"Deep Patient" uses EHRs for long-term prediction (Miotto et al., 2016).

Problem Statement

Brain tumors are often diagnosed late due to the absence of early symptoms. Traditional imaging methods only detect existing tumors. There is a need for a predictive system that analyzes patient history and lifestyle data to forecast future brain tumor risk. This model would allow for earlier preventive action, improving outcomes

Proposed Method

Component	Description
Data Sources	Patient medical history, lifestyle habits, and MRI images
Preprocessing	Normalize images, encode health data, and augment datasets.
Model Approach	Hybrid ML model using CNN for MRI and traditional classifiers for tabular data.
Prediction Output	Probability score of brain tumor development in the future.
Evaluation	Accuracy, Precision, Recall, AUC metrics.

Implementation Status

- MRI data preprocessing completed (resizing, normalization).
- CNN model trained using MRI images for tumor classification.
- Tabular data preparation ongoing (synthetic data considered for patient lifestyle).
- Working on combining imaging and tabular inputs into a multi-input neural network..

Libraries and Tools Used

Tool	Purpose	Install Command
Pandas, NumPy	Data processing	<code>pip install pandas numpy</code>
Scikit-learn	ML models	<code>pip install scikit-learn</code>
TensorFlow/Keras	CNN models	<code>pip install tensorflow keras</code>
Matplotlib, Seaborn	Data visualization	<code>pip install matplotlib seaborn</code>
OpenCV	Image processing	<code>pip install opencv-python</code>

Thank you