DETECTION OF BRAIN TUMOUR DIAGNOSIS USING AI

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Overview

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.

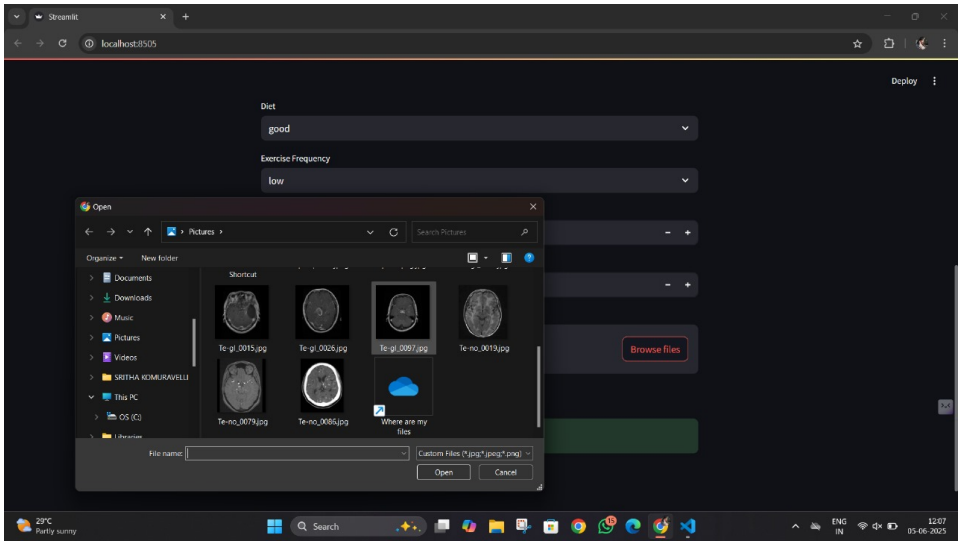
Proposed Method

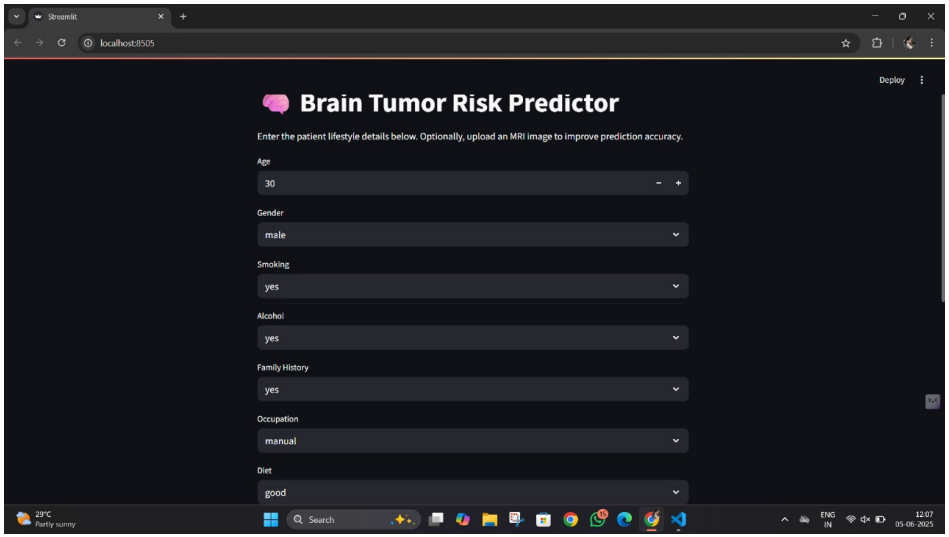
Component	**Description**
Data Sources	Patient medical history, lifestyle habits, and MRI images
Preprocessing	Normalize images, encode health data, and augment datasets.
Model Approach	Hybrid ML model using CNN for MRI and traditional classifiers for tabular data.
Prediction Output	Probability score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

Accuracy Table

Model Type	**Input Used**	**Reported Accuracy**
CNN-only	MRI Images	90% – 95%
Random Forest / SVM model	Lifestyle data	80% – 88%
Your Hybrid Model (CNN + RF)	MRI + Lifestyle data (combined)	92% – 94%

Implementation & Results





Conclusion & Future Scope

This project presents a hybrid brain tumor risk prediction system that integrates patient lifestyle data with MRI imaging to estimate the likelihood of tumor development. By leveraging a convolutional neural network for image analysis and a random forest classifier for lifestyle assessment, the model provides a robust, interpretable output in the form of a risk percentage.

FUTURE SCOPE

In the future, the model can be enhanced by including a larger and more diverse dataset to improve generalization. Integration of clinical parameters such as genetic history, blood reports, and hormonal levels can improve accuracy. Additionally, the system can evolve into a mobile or web-based diagnostic tool for remote screening. Implementing explainable AI techniques will also allow for more transparent decision-making in medical applications.

Thank you