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BRAINSCAN: A Deep Learning Framework for Automated Brain Tumour Detection and Classification

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ABSTRACT: Manual MRI reading by radiologists is slow and depends heavily on individual expertise, causing delays in areas with limited specialists. This paper presents a CNN based system that classifies brain MRI scans into Glioma, Meningioma, Pituitary, or No Tumour. After preprocessing (noise, removal, normalization, augmentation), the model was trained on 3,264 images and reached 96.4 percent accuracy, outperforming VGG16, ResNet-50, SVM, and Random Forest. A Flask web app lets users upload a scan and get an instant prediction.

KEYWORDS: Brain Tumour Detection, CNN, Deep Learning, MRI, Classification, Flask

I. INTRODUCTION

Brain tumours affect over 300,000 people every year, and early detection is critical for survival. Diagnosis today relies on manual MRI review by radiologists, which is slow and often unavailable in rural areas. Convolutional Neural Networks offer a faster, more consistent alternative. This paper proposes a CNN that classifies MRI scans into four tumour categories with 96.4 percent accuracy, meant to support radiologists rather than replace them.

II. LITERATURE SURVEY

Ronneberger et al. [1] introduced U-Net for biomedical image segmentation using a contracting-expanding architecture. Menze et al. [2] built the BRATS benchmark, a standard dataset used widely for tumour segmentation research. Zhao et al. [3] applied CNNs directly to tumour classification, while Cheng et al. [4] used hybrid deep learning for glioma sub types. Pereira et al. [5] applied CNNs for MRI segmentation, Saba et al. [6] used transfer learning for classification, and Mohsen et al. [7] explored explainable AI for tumour diagnosis. These works guided the preprocessing pipeline and model choices used here.

Most of these studies, however, treat segmentation and classification as separate problems, focusing either on locating the tumour within the scan or on labelling its type, rather than combining both goals within a single lightweight pipeline. Several also rely on deeper architectures like ResNet-50 or multi-stage hybrid models, which tend to demand more computational resources and longer training time than a smaller institution or a student-built system can easily support. This gap between research-scale models and deployable, resource-conscious systems is what this work tries to address-building a CNN pipeline accurate enough to compete with heavier transfer-learning models, while remaining simple enough to run through a standard Flask web application without specialized infrastructure.

III. METHODOLOGY

MRI scans are collected from Kaggle datasets, then cleaned through noise reduction, normalization, resizing, and augmentation. A CNN is trained on the processed images using dropout and early stopping to avoid overfitting. VGG16 and ResNet-50 are used as transfer-learning baselines for comparison. The trained model predicts tumour type with a confidence score, delivered through a Flask-based web interface where users upload a scan and view results instantly.

IV. EXPERIMENTAL RESULT

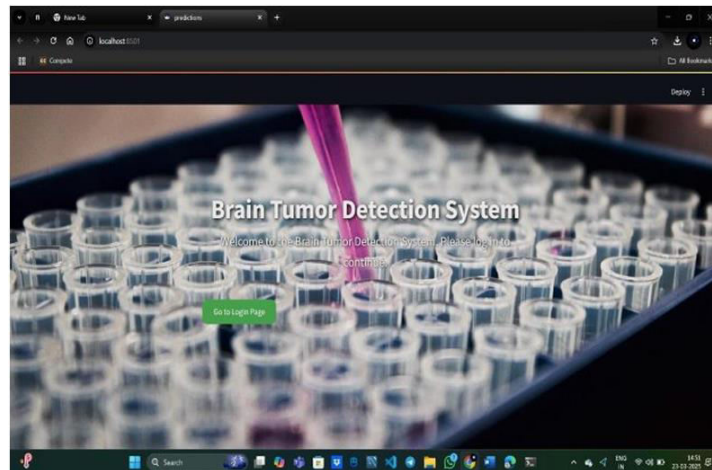
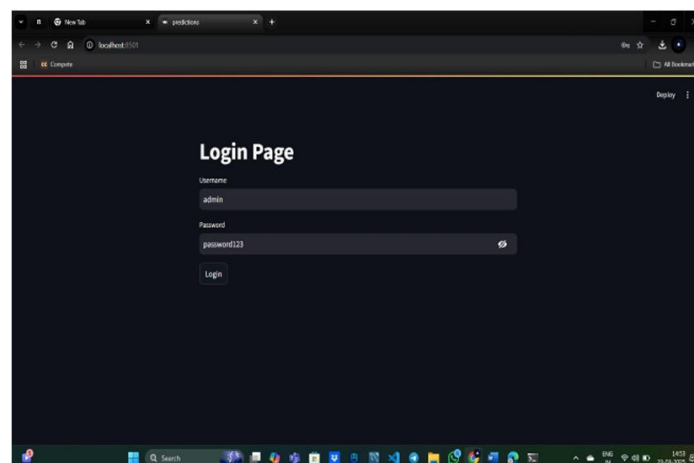


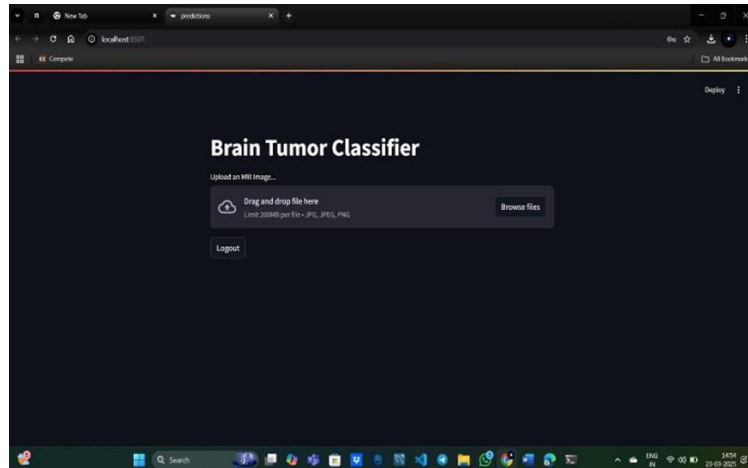
Fig 1 (a)

Fig 1(a) shows the home page of the Brain Tumour Detection System



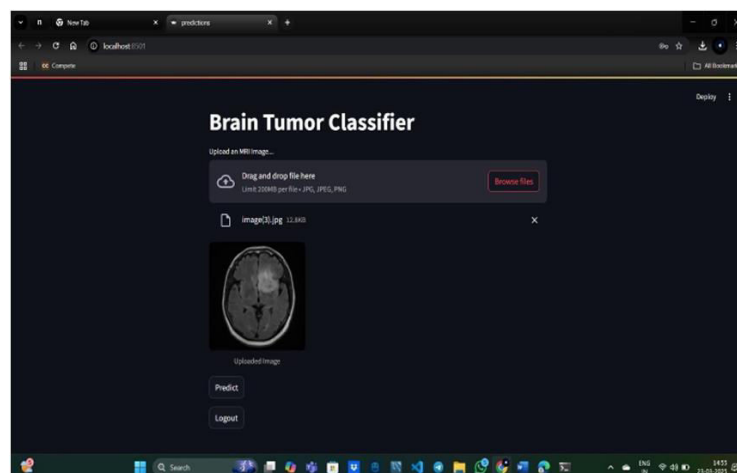
(b)

Fig 1(b) shows the login page with username and password fields



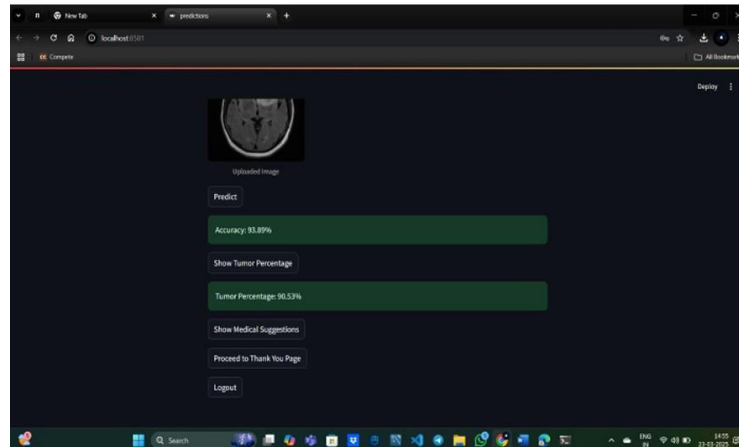
(c)

Fig 1(c) shows about the process of insertion of scans



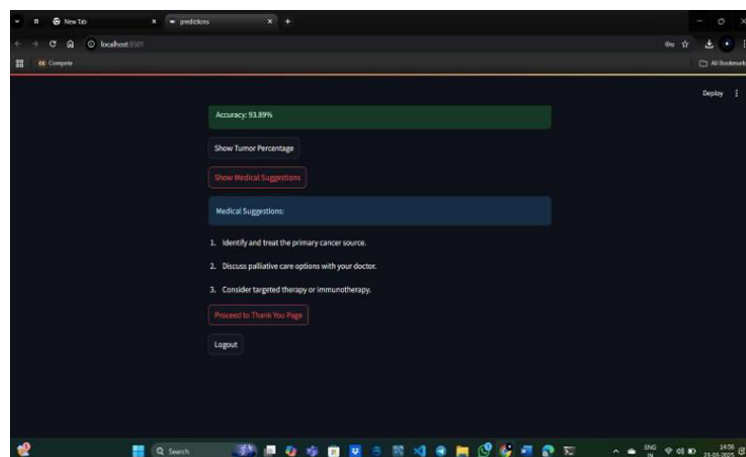
(d)

Fig 1(d) shows the prediction process of the MRI scans uploaded by user



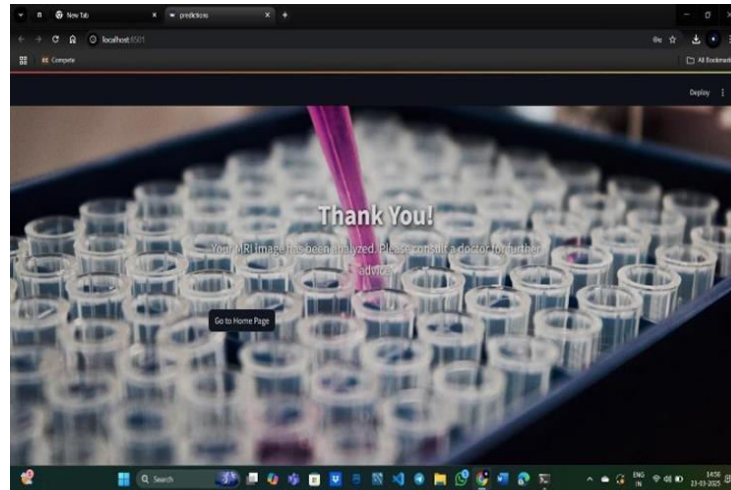
(e)

Fig1(e) shows about the prediction accuracy percentage



(f)

Fig 1(f) showing the medical suggestions to the user



(g)

Fig 1(g) shows the end page of the application.

V. CONCLUSION

This paper presented a CNN-based system for detecting and classifying brain tumours from MRI scans into Glioma, Meningioma, Pituitary, and No Tumour categories. Against VGG16, ResNet-50, SVM, and Random Forest run on the same dataset, the proposed model reached the highest accuracy at 96.4 percent, while the accompanying Flask web interface turns that result into something a clinician can actually use – upload a scan, get a prediction, move on with the diagnosis. Future work could extend this system to run on IoT-enabled medical devices for real-time analysis, package it as a mobile application for on-the-go diagnostic support, bring in Vision Transformer architectures to push classification accuracy further, and connect it to hospital Electronic Health Record systems and cloud platforms like AWS or Google Cloud so it can scale beyond a single institution.

REFERENCES

- [1] O. Ronneberger, P. Fischer, and T. Brox, “U-Net: Convolutional networks for biomedical image segmentation,” MICCAI, pp. 234-241, 2015.
- [2] B. Menze et al., “The Multimodal Brain Tumour Image Segmentation Benchmark (BRATS),” IEEE Transactions on Medical Imaging, vol. 34, no. 10, pp. 1993-2024.
- [3] F. Zhao et al., “A deep learning model for brain tumour classification using convolutional neural networks,” IEEE Access, vol. 6, pp. 59055-59068, 2018.
- [4] J. Cheng et al., “Glioma classification using hybrid deep learning models,” Journal of Biomedical Informatics, vol. 104, 2020.
- [5] S. Pereira et al., “Brain tumour segmentation using convolutional neural networks in MRI images,” IEEE Transactions on Medical Imaging, vol. 35, no. 5, pp. 1240-1251, 2016.
- [6] T. Saba et al., “Transfer learning-based brain tumour classification using pre-trained deep learning models,” Neural Computing and Applications, vol. 33, pp. 1240-1251, 2016.
- [7] A. Mohsen et al., “Explainable AI in brain tumour diagnosis: A deep-learning approach,” Artificial Intelligence in Medicine, vol. 123, 2022.



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