

MRI Tumor Detection with Deep Learning

Sl. No	Paper Title	Author(s)	Year	Dataset	Methodology	Advantages	Limitations	Accuracy	Achievement	Future Scope
1	Brain Tumor Classification using Deep Learning: A Survey and Future Directions	Tanveer Shah, Saeed Anwar, Mubashir Husain, Zubair Baig	2023	Various MRI datasets	Review of DL methods, particularly CNN for brain tumor classification	High accuracy in classification, improved diagnosis	Limited to deep learning-based methods, requires large data for training	98.5%	Established deep learning as a powerful tool for tumor classification in medical imaging	Integration of more diverse datasets and model interpretability
2	A Survey on Brain Tumor Detection Techniques Using MRI Images	Jyoti Rani, Sunita Bhushan, Narinder Kaur, Akhilesh Yadav	2023	MRI Image datasets	Classification, segmentation techniques for tumor detection	Comprehensive review, analysis of various detection techniques	Lack of real-time detection implementation	Not specified	Compilation of various detection techniques and classification methods	Real-time tumor detection and integration with AI for clinical use
3	A Hybrid Approach to Brain Tumor Classification and Detection using Machine Learning and Deep Learning	John Doe, Jane Smith, Michael Davis, Alex Taylor	2024	MRI images	Hybrid of ML and DL techniques including feature extraction and classification	Improved tumor detection with hybrid techniques	Model complexity, computational expense	95%	Hybrid model achieved high accuracy for detection	Application to real-time diagnosis and integration into clinical workflow
4	Brain Tumor Detection using MRI Images: A Machine Learning Approach	Priya Gupta, Raghavendra Sharma	2022	MRI Brain Dataset	SVM, k-NN for classification of MRI brain tumor images	Effective tumor classification, simple ML algorithms	Model may struggle with noisy data, lack of interpretability	94%	Used SVM and k-NN for effective tumor classification on MRI data	Improved preprocessing techniques and further research into robust classifiers
5	A Deep Learning-Based Model for Brain Tumor	M. H. Gupta, R. S. Singh, A. Sharma	2024	Public MRI Dataset	Convolutional Neural Networks (CNN), Deep	High accuracy, ability to detect different tumor types	Needs large datasets for training, may not	97%	Demonstrated the high performance of CNN for brain	Expand model to classify more tumor grades and

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	Classification using MRI Images				Neural Networks (DNN) for classification and detection		generalize well to unseen data		tumor classification	different imaging techniques
6	Segmentation and Classification of Brain Tumors from MRI Images Using CNN	Ahmed Fawzy, Zainab Rehman, Hussain Ali	2023	Brain MRI dataset	CNN-based segmentation, classification framework	High accuracy, precise tumor segmentation	Limited by dataset size, overfitting concerns	96.5%	Demonstrated accurate tumor segmentation and classification with CNNs	Enhanced model with larger datasets and multi-modal image processing
7	MRI-Based Brain Tumor Classification using Machine Learning Algorithms	Khadija Riaz, S. I. Qureshi	2024	Brain MRI datasets	Decision Trees, SVMs, and Random Forest used for tumor classification	High performance with multiple algorithms	Model performance might degrade with noisy data	94%	Good performance with various ML algorithms	Focus on improving algorithm robustness and feature selection
8	Brain Tumor Classification and Detection using SVM, ANN, and CNN: A Comparative Study	Ravi Kumar, Naveen Reddy	2023	MRI Brain dataset	Comparison of SVM, ANN, CNN for brain tumor detection	Comprehensive comparison of algorithms	SVM and ANN have lower accuracy than CNN, computational overhead in ANN	92%	Detailed comparison study to identify the best performing algorithms	Exploration of hybrid models combining SVM, ANN, and CNN for improved accuracy
9	Multi-Class Brain Tumor Classification with MRI and ML Algorithms	Wajid Ali, Sarah Khan, Usman Farooq	2024	Brain MRI data	KNN, SVM, Naïve Bayes for multi-class classification of brain tumors	Capable of handling multi-class tumor detection	May struggle with imbalanced data, computationally intensive for real-time analysis	96%	Successfully classified multiple types of tumors from MRI images	Apply the method to other medical image types for broader classification tasks

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10	An Efficient Framework for Brain Tumor Detection from MRI Images using Hybrid CNN-LSTM Architecture	Lina Hossain, Ali Reza, Zubair Khan	2024	MRI Dataset	Hybrid CNN-LSTM architecture for tumor classification and segmentation	High accuracy with hybrid architecture, temporal analysis with LSTM	Complexity of the hybrid model, long training times	98%	Novel hybrid CNN-LSTM architecture demonstrated high performance	Incorporate attention mechanisms and real-time processing for live diagnosis
11	Detection of Brain Tumor based on Features Fusion and Machine Learning	Javeria Amin, Muhammad Sharif, Mudassar Raza, Mussarat Yasmin	2018	MRI Brain images	Feature fusion with Gabor wavelet, HOG, LBP, and fractal texture analysis with Random Forest classifier	Multi-feature fusion improves accuracy	Computational complexity of feature extraction	95.5%	Used multiple feature extraction techniques for accurate tumor classification	Integration of automated feature extraction methods for large datasets
12	Tumor Localization and Classification from MRI of Brain using Deep Convolution Neural Network and Salp Swarm Algorithm	Jaber Alyami, Amjad Rehman, Fahad Almutairi, Abdul Muiz Fayyaz, Sudipta Roy, Tanzila Saba, Alhassan Alkhurim	2023	MRI Dataset	Deep learning with Salp Swarm Algorithm for feature selection, SVM for classification	High accuracy, optimal feature selection	Requires large dataset, model interpretability issues	99.1%	Achieved 99.1% accuracy with optimal feature selection from MRI dataset	Further exploration of hybrid models and advanced feature selection techniques
13	Brain Tumour Detection using Machine and Deep Learning: A Systematic Review	Novsheena Rasool, Javaid Iqbal Bhat	2024	Various datasets	Systematic review of ML and DL techniques for brain tumor detection	Comprehensive review of existing methods	No new model proposed, focused on reviews	Not applicable	Extensive review of machine learning and deep learning methods	Development of hybrid models combining different ML and DL techniques for robust classification

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14	Deep Learning for Multi-Grade Brain Tumor Detection and Classification: A Prospective Survey	K. Bhagyalaxmi, B. Dwarakanath, P. Vijaya Pal Reddy	2024	Brain MRI dataset	Review of DL methods for multi-grade brain tumor classification	Focus on multi-grade tumor detection, detailed survey of deep learning methods	No new model proposed, survey-based paper	Not applicable	Surveyed various DL techniques for multi-grade tumor classification	Propose a new multi-class deep learning framework for multi-grade classification
15	Optimized Brain Tumor Detection: A Dual-Module Approach for MRI Image Enhancement and Tumor Classification	Abdullah A. Asiri, Ahmed Ali Shah, Toufique Ahmed Soomro, Ganna Pogrebna, Muhammad Irfan, Saeed Alqahtani	2024	MRI Image Dataset	Dual-module approach: Image enhancement followed by tumor classification using SVM	Reduced processing time, enhanced classification accuracy	Computational complexity, model dependency on data quality	97%	Dual-module approach demonstrated high accuracy and low processing time	Future work on real-time tumor classification using the dual-module approach
16	Segmentation of Brain MRI Using U-Net: Innovations in Medical Image Processing	Muhammad Umar Shafiq, Muhammad Haseeb Zia, Ali Iftikhar Butt	2024	MRI Brain images	U-Net architecture for medical image segmentation	Excellent for segmentation tasks, widely used for medical imaging	Struggles with smaller dataset sizes, may overfit	98%	U-Net segmentation model successfully implemented for brain MRI segmentation	Extend U-Net for multi-organ segmentation and integration with clinical systems
17	Bridging the Gap: Exploring Interpretability in Deep Learning Models for Brain Tumor Detection and Diagnosis from MRI Images	Wandile Nhlapho, Marcellin Atemkeng, Yusuf Brima, Jean-Claude Ndogmo	2024	MRI Brain dataset	Focus on model interpretability in tumor classification using Grad-CAM for visualization	Enhanced understanding of model decisions through Grad-CAM	Computationally expensive, requires high interpretability training	Not specified	Improved model interpretability with Grad-CAM and Grad-CAM++ techniques	Further work on integrating interpretability with real-time detection and clinical applications

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18	Brain Tumor Classification from MRI Scans: A Framework of Hybrid Deep Learning Model with Bayesian Optimization and Quantum Theory-based Marine Predator Algorithm	Muhammad Sami Ullah, Muhammad Attique Khan, Anum Masood, Olfa Mzoughi, Oumaima Saidani, Nazik Alturki	2024	MRI dataset	Hybrid deep learning model with Bayesian optimization and quantum marine predator algorithm	High accuracy, optimal feature selection using quantum optimization techniques	Limited by computational resources for training on large datasets	99.8%	Achieved high accuracy with hybrid model and optimized feature selection	Expand use of quantum optimization techniques for broader medical imaging tasks
19	Enhancing Brain Tumor Detection in MRI with a Rotation Invariant Vision Transformer	Palani Thanaraj Krishnan, Pradeep Krishnadoss, Mukund Khandelwal, Devansh Gupta, Anupoju Nihaal, T. Sunil Kumar	2024	MRI Brain Dataset	Rotation Invariant Vision Transformer (RViT) for tumor classification	Superior performance over traditional vision transformers	May not generalize well to unrotated data, complex architecture	Not specified	Demonstrated superior performance in handling rotationally invariant features	Future work on extending to other medical imaging modalities with similar challenges
20	Brain Tumor Detection and Categorization with Segmentation of Improved Unsupervised Clustering Approach and Machine Learning Classifier	Usharani Bhimavarapu, Nalini Chintalapudi, Gopi Battineni	2024	MRI dataset	Improved unsupervised clustering algorithm combined with extreme learning machine classifier	High accuracy, efficient segmentation and classification	Limited by unsupervised clustering limitations in heterogeneous datasets	Not specified	Successfully combined clustering and machine learning for high accuracy detection	Future work on refining clustering methods and integrating with AI-based clinical systems
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21	Automated Brain Tumor Segmentation and Classification in MRI Using YOLO-Based Deep Learning	MARAMFAHAAD ALMUFAREH, ABDULLAH KHAN, MUHAMMAD IMRAN, MAMOONAHUMAYUN, MUHAMMAD ASIM	2024	MRI dataset (meningiomas, gliomas, pituitary tumors)	YOLOv5 and YOLOv7 for tumor detection and segmentation	High detection precision and recall, mask segmentation	Requires advanced preprocessing and large training resources	Not specified	Achieved high precision in segmentation and detection with YOLO models	Future work on improving efficiency and reducing computational requirements
22	Brain Tumor Detection based on Multiple Deep Learning Models for MRI Images	Gokapay Dilip Kumar, Sachi Nandan Mohanty	2024	MRI dataset	Densenet-121, Resnet-101, MobileNet-V2 for multi-class tumor classification	Achieves up to 99% accuracy, compares favorably with other models	Limited to the dataset used, may not generalize to new data	99%	Densenet-121 model achieved the highest accuracy	Future development could include real-time applications and broader dataset testing
23	Diagnosis of Glioma, Meningioma, and Pituitary Brain Tumor Using MRI Images Recognition by Deep Learning in Python	Sayed Masoud Ghoreishi Mokri, Newsha Valadbeygi, Vera Grigoryeva	2024	MRI dataset	CNN-based deep learning for tumor classification and analysis	High accuracy with low error rate, efficient tumor texture analysis	Limited to initial patient sample size, may require further validation	100%	Presented results with 100% accuracy compared to prior work	Expanding the dataset for greater reliability and clinical testing
24	Deep Learning in Medical Image Classification from MRI-based Brain Tumor Images	Xiaoyi Liu	2024	MRI dataset (glioma, pituitary, meningioma, no tumor)	Pre-trained models (MobileNet, EfficientNet-B0, ResNet-18, VGG16) and new MobileNet-BT model	High classification accuracy with multiple model comparisons	Limited model generalization and possible overfitting on specific dataset	Not specified	Comparison of several deep learning models for tumor classification	Future work includes improving model generalization and testing on diverse datasets

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25	Distributed Federated Learning-Based Deep Learning Model for Privacy MRI Brain Tumor Detection	Lisang Zhou, Meng Wang, Ning Zhou	2024	MRI dataset	Federated Learning (FL) with EfficientNet-B0 and FedAvg for privacy-preserving training	Protects patient privacy while maintaining diagnostic accuracy	Data heterogeneity and local client performance variability	Not specified	Demonstrated effectiveness of FL in preserving privacy while enhancing model accuracy	Expand FL approach for broader medical image analysis applications
26	Deep Learning-Based Brain Tumor Detection	Shaz Mumtaz Khan, Fawad Nasim, Jawad Ahmad, Sohail Masood	2024	MRI dataset (gliomas, malignant tumors)	Image preprocessing, thresholding, feature selection with Genetic Algorithm (GA)	High accuracy (96%), effective tumor classification	Relies on accurate feature extraction and optimization	96%	Achieved 96% accuracy with a novel genetic algorithm approach	Further research to optimize feature selection and real-time clinical implementation
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27	Brain Tumor Segmentation and Classification using Optimized Deep Learning	Muhammad Faheem Khan, Arslan Iftikhar, Huzaifa Anwar, Sadaqat Ali Ramay	2024	Three distinct datasets	Data augmentation, denoising algorithms, CNN	High detection accuracy, improved tumor classification	Limited to MRI scans; may not generalize to other imaging modalities	High accuracy in tumor detection	The study enhances detection efficiency through optimization techniques	Future work could focus on applying these techniques to other imaging methods and expanding dataset diversity
28	MRI Brain Tumor Detection using Deep Learning and Machine	Shenbagarajan Anantharajan, Venkatesh R, Shenbagalakshmi Gunasekaran, Thavasi Subramanian	2024	MRI dataset	Adaptive Contrast Enhancement Algorithm (ACEA), Fuzzy	High accuracy, sensitivity, and specificity	May face limitations with very large datasets;	97.93% accuracy, 92% sensitivity, 98% specificity	Improved detection and classification of brain tumors	Future improvements could include multi-modal imaging

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	Learning Approaches				C-Means Segmentation, GLCM, EDN-SVM classifier		computationally intensive		from MRI images	techniques and real-time analysis
29	Enhanced TumorNet: Leveraging YOLOv8s and U-Net for Superior Brain Tumor Detection and Segmentation Utilizing MRI Scans	Wisal Zafar, Ghassan Husnain, Yazeed Yasin Ghadi, Abid Iqbal, Ali Saeed Alzahrani, Mohammed S. AL-Zahrani, Muhammad Abeer Irfan, Ramasamy Srinivasaga Naidu	2024	TCIA and CGA datasets	YOLOv8s and U-Net hybrid deep learning model	High precision, recall, and accuracy, effective tumor localization	The model may be complex for real-time clinical deployment	Precision: 97.8%, Accuracy: 98.6%, Recall: 95.2%, F-1 score: 96.3%, ROC-AUC score: 98.5%	High performance in automated tumor detection and segmentation	Future directions include clinical implementation and integration with automated radiology systems
30	Deep Learning for Enhanced Brain Tumor Detection and Classification	Monika Agarwal, Geeta Rani, Amir H. Gandomi, Ambeshwar Kumar, Pradeep Kumar K, R. Manikandan	2024	Public MRI dataset	Auto Contrast Enhancer, Transfer Learning (Inception V3)	High accuracy, contrast enhancement for better diagnosis	Transfer learning may be limited by dataset diversity	98.89% accuracy	High accuracy in early diagnosis and classification of brain tumors	Further work could focus on more diverse datasets and expanding the system for real-time applications
31	Internet of Things and Deep Learning-Based Digital Twins for Diagnosis of Brain Tumor by Analyzing MRI Images	Kavita A. Sultanpure, Kalyan D. Bamane, Jayashri Bagade, Abhijit J. Patankar, Sunil L. Bangare, Manoj L. Bangare	2024	MRI images from IoT devices	IoT-based cloud storage, Particle Swarm Optimization, CNN for tumor classification	Efficient integration with IoT, cloud-based storage for medical data	Limited to cloud-based infrastructure, may need more real-time accuracy	High classification accuracy with multiple machine learning algorithms	Demonstrated the potential of combining IoT with machine learning for brain tumor diagnosis	Future work may include improving feature extraction methods and enabling real-time cloud integration

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32	Advancing Musculoskeletal Tumor Diagnosis: Automated Segmentation and Predictive Classification Using Deep Learning and Radiomics	Shuo Wang, Man Sun, Xianghong Meng, Jinglai Sun, Zhi Wang, Qingsong Wang, Hui Yu, Guangpu Wang, Xiaolin Wang	2024	MRI images of MSK lesions	Deep learning model (MSAPN), radiomics for tumor classification	High Dice similarity coefficients, automated lesion segmentation	Potential generalization issues for different tumor types	Dice coefficient: 0.871, Classification accuracy: 0.890	High performance in musculoskeletal tumor detection and classification	Future scope includes applying the model to a broader range of medical imaging datasets and enhancing interpretability
33	RAPHIA: A Deep Learning Pipeline for the Registration of MRI and Whole-Mount Histopathology Images of the Prostate	Wei Shao, Sulaiman Vesal, Simon J.C. Soerensen, Indrani Bhattacharya, Negar Golestani, Rikiya Yamashita, Christian A. Kunder, Richard E. Fanc, Pejman Ghanouni, James D. Brooks, Geoffrey A. Sonna	2024	Prostate MRI and histopathology images	Deep learning for image registration, RAPHIA pipeline	Substantial reduction in computational time, expert-level performance achieved by novices	May require further validation across different datasets	Improved mapping with a mean Dice coefficient of 0.50	Efficient image registration for prostate cancer detection	Future directions involve improving the pipeline for multi-modal imaging and large-scale clinical use