Classification Insights into Brain MRI Classification: Techniques, Interpretability, and Future

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Abstract: *This research paper comprehensively analyses various techniques for classifying brain MRI images. Through an extensive literature survey, the study explores and evaluates the effectiveness of different methodologies, ranging from traditional machine learning approaches to advanced deep learning models, in the context of brain tumour classification. The review critically examines feature extraction, selection methods, and classification algorithms, focusing on their performance in enhancing diagnostic accuracy. The synthesis of existing literature provides valuable insights into the current landscape of brain MRI classification techniques, shedding light on their strengths, limitations, and potential areas for future research.*

Keywords: Brain MRI, Deep Learning, CNN, SVM, KNN, ML

REFERENCES

[1]. Sharif, Muhammad & Li, Jian & Amin, Javeria & Sharif, Abida, Brain Mri Feature Extraction and Classification." 2020 11th International Conference on Computing, Communication and Networking Technologies (Icccnt). Ieee, 2020.

[2]. Ameer Hussian Morad and Hadeel Moutaz Al-Dabbas, "Classification of Brain Tumor Area for Mri Images", Journal of Physics: Conference Series, 2020

[3]. Kate Himmelmann, Veronika Horber, Javier De La Cruz, Karen Horridge, Vlatka Mejaski-Bosnjak, Katalin Hollody, "Mri Classification System (Mrics) For Children with Cerebral Palsy: Development, Reliability, And Recommendations", Developmental Medicine & Child Neurology, 2016

[4]. Sravan, V., Swaraja, K., Meenakshi, K., Kora, P., Samson, M, "Magnetic Resonance Images Based Brain Tumor Segmentation-A Critical Survey." In 2020 4th International Conference on Trends In Electronics And Informatics (Icoei) (48184), 2020

[5]. Krisna Nuresa Qodri, Indah Soesanti, Hanung Adi Nugroho, "Image Analysis for Mri-Based Brain Tumor Classification Using Deep Learning", Ijitee, Vol 5, 2021

[6]. Soumick Chatterjee, Farazahmed Nizamani, Andreas Nürnberge & Oliver Speck, "Classifcation of Brain Tumours in Mr Images Using Deep Spatiospatial Models", Scientific Reports, 2022

[7]. Imayanmosha Wahlang, Arnab Kumar Maji, Goutam Saha, Prasun Chakrabarti, Michal Jasinski, Zbigniew Leonowicz and Elzbieta Jasinska, "Brain Magnetic Resonance Imaging Classification Using Deep Learning Architectures with Gender and Age", Mdpi Sensors 2022

[8]. Mittal, Mamta, "Deep Learning Based Enhanced Tumor Segmentation Approach for Mr Brain Images." Applied Soft Computing 78, 2019

[9]. Mohsen, Heba, Et Al. Classification Using Deep Learning Neural Networks for Brain Tumors. Future Computing and Informatics Journal, Vol 3, Pp 68-71, 2018

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[10]. Hajar Cherguif, Jamal Riffi, Mohamed Adnane Mahrez, Ali Yahaouy, And Hamid Tairi, "Brain Tumor Segmentation Based On Deep Learning," In International Conference On Intelligent Systems And Advanced Computing Sciences (Isacs), Ieee, 2019.

[11]. Alok Sarkar, Md. Maniruzzaman, Mohammad Ashik Alahe, And Mohiuddin Ahmad, "An Effective and Novel Approach for Brain Tumor Classification Using Alexnet Cnn Feature Extractor and Multiple Eminent Machine Learning Classifiers in Mris," Journal of Sensors, Hindawi, 2023

[12]. Sunita M. Kulkarni*, G. Sundari, "Comparative Analysis of Performance of Deep Cnn Based Framework for Brain Mri Classification Using Transfer Learning", Journal of Engineering Science And Technology Vol. 16, No. 4 (2021

[13]. Aggarwal, M., Tiwari, A.K., Sarathi, M. Et Al. An Early Detection And Segmentation Of Brain Tumor Using Deep Neural Network. Bmc Med Inform Decis Mak 23, 78 (2023).

[14]. N. Ghassemi, A. Shoeibi, And M. Rouhani, "Deep Neural Network with Generative Adversarial Networks Pre-Training for Brain Tumor Classification Based on Mr Images", Biomed. Signal Process. Control, Vol. 57, P. 101678, Mar. 2020.

[15]. Malla Pp, Sahu S, Alutaibi Ai. Classification Of Tumor in Brain Mr Images Using Deep Convolutional Neural Network and Global Average Pooling. *Processes*. 2023

[16]. Someswararao, Chinta & Reddy, Shiva & Appaji, Sangapu & Gupta, V, "Brain Tumor Detection Model From Mr Images Using Convolutional Neural Network", . Icscan49426, 2020

[17]. Seetha, J., And S. S. Raja. "Brain Tumor Classification Using Convolutional Neural Networks." Biomedical & Pharmacology Journal, Vol 11, 2018

[18]. Ozyurt F, Sert E, Avci E, Dogantekin E. "Brain Tumor Detection Based On Convolutional Neural Network With Neutrosophic Expert Maximum Fuzzy Sure Entropy. Measurement", Vol 147, J.Measurement.2019

[19]. Chirodip Lodh Choudhary, Chandrakanta Mahanty, Raghvendra Kumar, And Borjo Kishore Mishra, "Brain Tumor Detection and Classification Using Convolutional Neural Network and Deep Neural Network," In International Conference on Computer Science, Engineering and Applications (Iccsea), Ieee, 2020

[20]. Jia And Deyun Chen, "Brain Tumor Detection and Classification of Mri Images Using Deep Neural Network," In Ieee Access, Ieee 2020

[21]. Badza, M.; Barjaktarovic, C. "Classification Of Brain Tumors From Mri Images Using A Convolutional Neural Network". Journal Of Applied Science, 10(6),2020

[22]. Jayachandran And R. Dhanasekaran, "Multi Class Brain Tumor Classification of Mri Images Using Hybrid Structure Descriptor and Fuzzy Logic Based Rbf Kernel Svm", Iranian Journal of Fuzzy Systems Vol. 14, No. 3, (2017

[23]. Anil Kumar Mandle, Satya Prakash Sahu and Govind Gupta, "Brain Tumor Segmentation and Classification in Mri Using Clustering and Kernel-Based Svm", Biomedical & Pharmacology Journal, June 2022

[24]. Sowrirajan, S. R., Balasubramanian, S., & Raj, R. S. P." Mri Brain Tumor Classification Using A Hybrid Vgg16-Nade Model"., Brazilian Archives Of Biology And Technology, 66, E23220071, 2023

[25]. Vijay Wasule, Poonam Sonar, "Classification of Brain Mri Using Svm and Knn Classifier", Third International Conference on Sensing, Signal Processing and Security (Icsss), 2017

[26]. Sanjeev Kumar, Chetna Dabas, Sunila Godara, "Classification of Brain Mri Tumor Images: A Hybrid Approach", Information Technology and Quantitative Management, 2017

[27]. Ms. Swati Jayade, D. T. Ingole, And Manik D. Ingole, "Mri Brain Tumor Classification Using Hybrid Classifier," In International Conference On Innovative Trends And Advances In Engineering And Technology, Ieeee, 2019.

[28]. Saran Raj Sowrirajan, Surendiran Balasubramanian, Raja Soosaimarian Peter Raj, "Mri Brain Tumor Classification Using a Hybrid Vgg16- Nade Model", Brazilian Archives of Biology and Technology. Vol.66, 2023

[29]. Chaudhary A, Bhattacharjee V. An Efficient Method for Brain Tumor Detection and Categorization Using Mri Images By K-Means Clustering & Dwt. Int J Inform Technol. 2020

[30]. Amin J, Sharif M, Gul N, Yasmin M, Shad Sa. Brain Tumor Classification Based on Dwt Fusion of Mri Sequences Using Convolutional Neural Network. Pattern Recognit Lett. 2020

[31]. Sungheetha, Akey, And Rajesh Sharma. "Gtikf-Gabor-Transform In Corporated K-Means And Fuzzy C Means Clustering For Edge Detection In Ct And Mri." Journal Of Soft Computing Paradigm (Jscp) 2, 2020

[32]. N. Varuna Shree, T. N. R. Kumar, "Identification and Classification of Brain Tumor Mri Images with Feature Extraction Using Dwt and Probabilistic Neural Network", Brain Informatics, 2018

[33]. Pranian Afshar, Arash Mohammadi, And Konstantinos N.Plataniotis, "Bayescap: A Bayesian Approach To Brain Tumor Classification Using Capsule Networks," Ieee Signal Processing Letters(Volume 27),2020.

[34]. Akshi Ahuja, B.K Panigrahi, And Tapan Gandhi, "Transfer Learning Based Brain Tumor Detection And Segmentation Using Superpixel Technique," In International Conference On Contemporary Computing And Applications, Ieee, 2020.

[35]. Ahmad Habbie Thias, Donny Danudirdjo, Abdullah Faqih Al Mubarok, Tati Erawati Rajab, And Astri Handayani, "Brain Tumor Semi-Automatic Segmentation On Mri T1-Weighted Images Using Active Contour Models," In International Conference On Mechatronics, Robotics And Systems Engineering (Morse), Ieeee, 2019.

[36]. Shaik, Nagur & Cherukuri, Teja, "Multi-Level Attention Network: Application to Brain Tumor Classification". Signal, Image and Video Processing.,2022

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