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BRAIN TUMOR DETECTION

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ABSTRACT: Brain tumors can cause cancer if not detected and diagnosed at early stages. Currently Brain tumor detection and classification is done by performing Biopsy which is a very time consuming process. Improvement in technology and Machine learning algorithms can help radiologists in tumor diagnostics in less time and effort. We propose a model that would first segment the MR image and identify the presence of tumor in brain and if detected then a deep learning based SVM/KMEANS architecture that would classify the tumors in MRI images into Benign and Malignant tumors and act as a strong base for the staff to decide the curing procedure. The development of the model will be divided into training and testing phases and would be tested using multiple databases and different methods. Having achieved high accuracy, reliability and execution speed, the developed SVM/KMEANS architecture would act as strong decision supportive tool in medical diagnostics for radiologists.

I. INTRODUCTION

Accurate brain MRI images are very important for the clinical diagnosis of tumor in brain. Since the tumors have almost similar structures, it is very difficult to identify the exact portion and type of tumor even for experienced doctors. It also depends on availability of radiologist. Automatic detection and classification of tumor without much human interference would be a very useful solution to this difficult problem. In order to build such a well trained and reliable model, Deep learning algorithms particularly.SVM/KMEANS can examine the images, identify useful information and extract patterns that can be used for classification. MRI images are very clear, precise and provide information about size, shape and the position of tissues with very less ion radiation. Hence MRI images instead of CT images have been used in training this model. MRI images do contain many unnecessary information hence before feeding as input to the SVM/KMEANS model, we need to extract only the useful portion from the image. For this task we are using Skull stripping, clustering and segmentation using FCM and tumor contouring. The output image will be directly fed as input to the SVM/KMEANS module. Accuracy and reliability are very important features especially in a medical domain project. Hence we are using a multilayer SVM/KMEANS model and also large datasets from kaggle,BraTS'2020 data and other websites to train and test the model in order to increase its accuracy and reliability

II. LITERATURE SURVEY

• **Paper-1:** Image Analysis for MRI Based Brain Tumor Detection and Feature Extraction Using Biologically Inspired BWT and SVM
• **Publication Year:** 6 March 2017
• **Author:** Nilesh Bhaskarrao Bahadure, Arun Kumar Ray, and Har Pal Thethi
• **Journal Name:** Hindawi International Journal of Biomedical Imaging
• **Summary:** In this paper using MR images of the brain, we segmented brain tissues into normal tissues such as white matter, gray matter, cerebrospinal fluid (background), and tumor-infected tissues. We used pre-processing to improve the signal-to-noise ratio and to eliminate the effect of unwanted noise. We can used the skull stripping algorithm its based on threshold technique for improve the skull stripping performance.

• **Paper-2:** A Survey on Brain Tumor Detection Using Image Processing Techniques
• **Publication Year:** 2017
• **Author:** Luxit Kapoor, Sanjeev Thakur
• **Journal Name:** IEEE 7th International Conference on Cloud Computing, Data Science & Engineering
• **Summary:** This paper surveys the various techniques that are part of Medical Image Processing and are prominently used in discovering brain tumors from MRI Images. Based on that research this Paper was written listing the various techniques in use. A brief description of each technique is also provided. Also of All the various steps involved in the process of detecting Tumors, Segmentation is the most significant.
Paper-3: Identification of Brain Tumor using Image Processing Techniques
• **Publication Year:** 11 September 2017
• **Author:** Praveen Gamage
• **Journal Name:** Research gate

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• **Summary:** This paper survey of Identifying brain tumors through MRI images can be categorized into four different sections; pre-processing, image segmentation, Feature extraction and image classification.

Paper-4: Review of Brain Tumor Detection from MRI Images • Publication Year: 2016
• **Author:** Deepa, Akansha Singh
• **Journal Name:** IEEE International Conference on Computing for Sustainable Global Development
• **Summary:** In this paper, some of the recent research work done on the Brain tumor detection and segmentation is reviewed. Different Techniques used by various researchers to detect the brain Tumor from the MRI images are described. By this review we found that automation of brain tumor detection and Segmentation from the MRI images is one of the most active Research areas.
Paper-5: An efficient Brain Tumor Detection from MRI Images using Entropy Measures
• **Publication Year:** December 23-25, 2016
• **Author:** Devendra Somwanshi , Ashutosh Kumar, Pratima Sharma, Deepika Joshi
• **Journal Name:** IEEE International Conference on Recent Advances and Innovations in Engineering
• **Summary:** In this paper, we have investigated the different Entropy functions for tumor segmentation and its detection from various MRI images. The different threshold values are obtained depend on the particular definition of the entropy. The threshold values are dependent on the different entropy function which in turn affects the segmented results.

III. MODULE IDENTIFICATION

3.1 Data Preparation :

We will utilize BraTS 2020 dataset The picture information comprises 369 multi-contrast MR checks from glioma patients, out of which are low-grade (lgg) and some are high grade(hgg) glioma patients. The pictures in datasets are formed by following kind of MRI strategies:T1, T2, FLAIR. The dataset we are going to use is from BraTS 2020, kaggle.

1. Data Augmentation : Data Augmentation can be used to increase the available data for training models, by modifying existing training dataset. Data imbalance issue can be solved using data Augmentation.

2. Data Preprocessing : We are going to use following pre-processing steps for every image in dataset: Convert the image from 3D MRI image of .nii file format to .jpg format using med2Image python library. Then we are going to resize the image because for creation and making of SVM/kmeans we need image of same size also we are going to crop the image so that only brain remains in the image for better creation of SVM/KMEANS .

3. Data Split : We will split data in following way: For Training:80%, For Testing:20%. We are going to use a separate dataset for validation(Development) consisting of 125 images.

3.2 Processing :

1) Image Pre-Processing : Initially ,We will collect the patient's details such as age, gender etc. and MRI scan of Brain. Then we will perform pre-processing on the MRI image to remove the noise and non useful parts from the MRI image such as the skull. Brain Tumor Detection And Classification Using SVM/kmeans

The Pre-Processing Steps are:

• Skull Stripping: Skull stripping is a process of removing skull from brain MRI image. We will implement skull stripping using OTSU thresholding and connected component analysis.

• Gaussian filtering: We will use gaussian filtering to remove noise from the image.

• Image Enhancement: Image enhancement will be used to improve image quality. For image enhancement we will use the add-weighted method.

2) Tumor Segmentation: We will perform following operation to find out location of brain tumor in MRI image:

• **Segmentation:** Segmentation process will be used to separate tumor from brain MRI image. We will use fuzzy c-means algorithm for segmentation of tumor.

• **Tumor Contouring:** Contours can be explained simply as a curve, having the same color or intensity. We are going to use edge detection and findContours() algorithms to contour tumors in the brain.

3)SVM/KMEANS based Classification model: We will use a trained SVM/KMEANS model that will predict the tumor type(E.g. Benign and Malignant).

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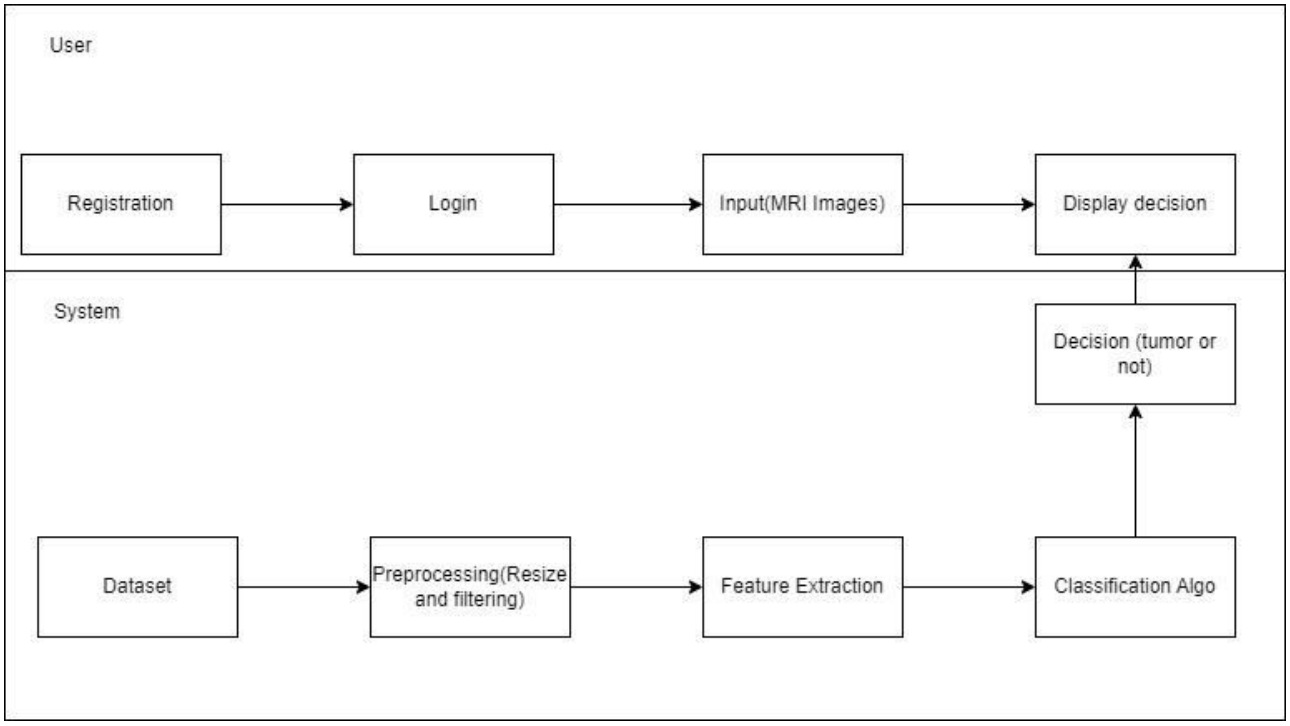
IV. PROPOSED DESCRIPTION



V. CONCLUSION

We have proposed a model that first studies the Brain MR images and predicts the tumor in brain also highlighting the tumor region and providing necessary information such that it is easily understandable by everyone. The proposed model first does preprocessing on the dataset and extract useful information to predict the presence of tumor.

If the tumor is present, then the SVM/KMEANS architecture performs operations and classifies the tumor into Benign or Malignant types. Our proposed system will act as strong decision supportive tool for radiologist in clinical diagnosis. By achieving high accuracy and reliability, we hope to replace the existing system in future

REFERENCES

[[1]L.Guo,L.Zhao,Y.Wu,Y.Li,G.Xu,andQ.Yan,"Tumordetection in MR images using oneclass immune feature weighted SVMs," IEEE Transactions on Magnetics, vol. 47, no. 10, pp. 3849–3852,2011.

[2]R.Kumari,"SVMclassificationanapproachondetectingabnormalityinbrainMRIimages,"Inter nationalJournalofEngineeringResearchandApplications,vol.3,pp.1686–1690,2013.

[3]DICOM Samples Image Sets, http://www.osirix-viewer.com/.

[4]"Brainweb:SimulatedBrainDatabase" http://brainweb.bic.mni.mcgill.ca/cgi/brainweb1.

[5]Obtainable Online: www.cancer.ca/~/media/CCE 10/08/2015.

[6] J. C. Buckner, P. D. Brown, B. P. O'Neill, F. B. Meyer , C. J. Wetmore,J. H Uhm, "Central nervous system tumors." In Mayo Clinic Proceedings,Vol. 82, No. 10, pp. 1271- 1286, October 2007.

[7] Deepa , Singh Akansha. (2016). - Review of Brain Tumor Detection from tomography. International Conference on Computing for Sustainable Global Development (INDIACom)

[8] R. A. Novellines, M. D. - Squire's fundamentals of radiology; Six Edition; UPR, 2004.

[9] preston, D. c. (2006). Magnetic Resonance Imaging (MRI) of the Brain and Spine from Basics. casemed.case.edu .

[10] Hendrik RE. (2005) Glossary of MR Terms from American College of Radiology . .

[11].A. Demirhan, M. Toru, and I. Guler, "Segmentation of tumor and edema along with healthy tissues of brain using wavelets and neural networks," IEEE Journal of Biomedical and Health Informatics, vol. 19, no. 4, pp. 1451–1458, 2015.

[12] Nilesh Bhaskarrao Bahadure, A.K. (2017, March 6). Retrieved from https://www.hindawi.com/journals/ijbi/2017/9749108/.

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[13] S. Mohsin, S. Sajjad, Z. Malik, and A. H. Abdullah, "Efficient way of skull stripping in MRI to detect brain tumor by applying morphological operations, after detection of false background," International Journal of Information and Education Technology, vol. 2, no. 4, pp. 335–337, 2012.

[14] Gavale, P. M., Aher, P. V., & Wani, D. V. (2017, April 4). Retrieved from https://www.irjet.net/archives/V4/i4/IRJET-V4I462.pdf.

[15] N. Gordillo, E. Montseny, and P. Sobrevilla, "State of the art survey on MRI brain tumor segmentation,"Magnetic Resonance Imaging, vol. 31, no. 8, pp. 1426–1438, 2013.

[16] Samantaray, M.(2016, November 3). Retrieved from http://ieeexplore.ieee.org/document/7727089/ .

[17] Nandi, A. (2016, April 11) Retrieved from http://ieeexplore.ieee.org/document/7449892/

[18] C. C. Benson and V. L. Lajish, "Morphology based enhancement and skull stripping of MRI brain images," in Proceedings of the international Conference on Intelligent Computing Applications (ICICA '14), pp. 254–257, Tamilnadu, India, March 2014.

[19] S. Z. Oo and A. S. Khaing, "Brain tumor detection and segmentation using watershed segmentation and morphological operation," International Journal of Research in Engineering and Technology, vol. 3, no. 3, pp. 367–374, 2014.

[20] R. Roslan, N. Jamil, and R. Mahmud, "Skull stripping magnetic resonance images brain images: region growing versus mathematical morphology," International Journal of Computer Information Systems and Industrial Management Applications, vol. 3, pp. 150– 158, 2011.

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