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Brain Tumour Diagnosis Based on Hybrid Artificial Intelligence Algorithm

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ABSTRACT: Brain tumors are one of the main causes of most tumors deaths international. Early detection of mind tumor is tough due to the fact most tumors-specific symptoms arise best in superior degrees and there may be no dependable screening device to pick out high-chance sufferers. But if brain most tumors is detected early, it can be cured. This project tries to stumble on brain tumors from CT pics. It uses a number picture processing techniques and architectural fashions to stumble on tumors. After image pre-processing, the architectural version is used to locate the tumor area in the photo. The tumor detection accuracy throughout education is approximately 98.7%.

KEYWORDS: Brain Tumor, MRI, Deep Learning, Tumor, CNN

INTRODUCTION

Medical services area is very surprising from other industry. It is on high need area and individuals expect most elevated level of care and administrations paying little mind to cost. After the progress of profound learning in other true application, it is likewise giving energizing arrangements great exactness for clinical imaging and is a critical strategy for future applications in wellbeing area. Mind is an organ that controls exercises of the multitude of parts of the body. Acknowledgment of robotized cerebrum growth in Attractive reverberation imaging (X-ray) is a troublesome undertaking because of intricacy of size and area changeability. In this examination measurable examination morphological and thresholding strategies are proposed to handle the pictures got by X-ray forCancer Identification from Cerebrum X-ray Pictures. Feed-forward backprop brain organization will be utilized to order the exhibition of growths part of the picture. The accuracy will improve as a result of this strategy, and the number of iterations will be reduced.

https://www.leadingindia.ai/downloads/projects/HC/hc_2.pdf diagnosing a mind cancer consumes a large chunk of the day and depends vigorously on the radiologist's capacities and experience. How much information that should be dealt with has expanded decisively as the quantity of patients has expanded, making old strategies both exorbitant and inadequate. Numerous specialists explored various calculations for recognizing and arranging cerebrum cancers that were both exact and quick. Profound Learning (DL) approaches have as of late been famous in creating robotized frameworks prepared to do precisely diagnosing or dividing cerebrum growths significantly quicker. DL

empowers a pre-prepared Convolutional Brain Organization (CNN) model for clinical pictures, explicitly for grouping mind malignant growths. The proposed Mind Growth Grouping Model in view of CNN (BCM-CNN) is a CNN hyper parameters improvement utilizing a versatile unique sine-cosine wellness dark wolf enhancer (ADSCFGWO) calculation. There is a streamlining of hyper parameters followed by a preparation model worked with Origin ResnetV2. The model utilizes normally utilized pre-prepared models (Commencement ResnetV2) to further develop cerebrum growth conclusion, and its result is a paired 0 or 1 (0: Typical, 1: Tumor). Hyper parameters are primarily divided into two categories: I) hyper parameters that decide the basic organization structure; (ii) a hyper parameter that controls how the network is trained. The ADSCFGWO calculation draws from both the sine cosine and dark wolf calculations in a versatile structure that utilizes the two calculations' assets. The trial results show that the BCM-CNN as a classifier accomplished the best outcomes because of the upgrade of the CNN's presentation by the CNN improvement's hyper parameters. With the BRaTS 2021 Task 1 dataset, the BCM-CNN achieved an accuracy of 99.98%.**https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9854739**The scientific community defines a brain tumor as the development of abnormal brain cells, some of which may develop into cancer. The conventional strategy to distinguish cerebrum cancers is atomic attractive reverberation (X-ray). Having the X-ray pictures, data about the uncontrolled development of tissue in the mind is distinguished. In a few examination articles, cerebrum growth recognition is finished through the utilization of AI and Profound Learning calculations. At the point when these frameworks are applied to X-ray pictures, cerebrum growth forecast is done rapidly and more noteworthy precision assists with conveying treatment to patients. The radiologist is also able to make quick decisions thanks to these predictions. In the proposed work, a bunch of Fake Brain Organizations (ANN) are applied in the discovery of the presence of mind growth, and its exhibition is broke down through various measurements.

RELATED WORK

1. Jakesh Bohaju, (2020, July). Brain Tumor, Version 3. Retrieved September 22, 2020, from https://www.kaggle.com/jakeshbohaju/brain-tumor.

Brain Tumor Detection is one of the most difficult tasks in medical image processing. The detection task is diffult to perform because because there is a lot of diversity in the images as brain tumors come in different shapes and textures. Brain tumors arise from different types of cells and the cells can suggest things like the nature, severity and rarity of the tumor. Tumors can occur in different locations and the location of tumors can suggest something about the type of cells causing the tumors can suggest something about the type of cells causing the tumor which can aid further diagnosis. The task of brain tumor detection can become aggravating by the problems which are present in almost all digistal images eg. Illumination problems. Tumor and nontumor images can have overlapping image intensities which makes it difficult for any model to make good predictions from raw images. This paper proposes a novel method to detect brain tumors from various brain images by first carrying out different images pre-processing methods

2. Navoneel Chakrabarty, (2019, April). Brain MRI Images for Brain Tumor Detection, Version 1. Retrieved September 18, 2020, from https://www.kaggle.com/navoneel/brain-mri-images-for-brain-tumordetection

In the present era, human brain tumor is the extremist dangerous and devil to the human being that leads to certain death. Furthermore, the brain tumor arises more complexity of patients life with time. As a result, early detection of tumors is most crucial to save and prolong the patient's lifetime. Therefore, enhanced brain tumor detection is required in medical fields. Automatic human brain tumor detection in magnetic resonance imaging (MRI) is playing a vital role in several symptomatic and cures applications. However, the existing schemes (e.g., random forest, Fuzzy C-means, artificial neural network (ANN) and wavelet transform) can detect brain tumors with insufficient accuracy and longer execution time (in minutes). In this paper, we propose an enhanced brain tumor detection scheme based on the template-based K-means (TK) algorithm with superpixels and principal component analysis (PCA) which efficiently detects the human brain tumors in lower execution time. At first, we extract essential features using both superpixels and PCA which helps accurately to detect brain tumors. Then, image enhancement is done using a filter that helps to improve accuracy. Finally, the image segmentation is performed through TK-means clustering algorithm to detect the brain tumor. The experimental results show that the proposed detection scheme achieves a better

accuracy and a reduced execution time (in seconds) than other existing schemes for the detection of brain tumor in MR image.

3. Sartaj, (2020, May). Brain Tumor Classification (MRI), Version 2. Retrieved September 23, 2020 from https://www.kaggle.com/sartajbhuvaji/brain-tumor-classification-mri

The independent detection and classification of brain malignancies using magnetic resonance imaging (MRI) can present challenges and the potential for error due to the intricate nature and time-consuming process involved. The complexity of the brain tumor identification process primarily stems from the need for a comprehensive evaluation spanning multiple modules. The advancement of deep learning (DL) has facilitated the emergence of automated medical image processing and diagnostics solutions, thereby offering a potential resolution to this issue. Convolutional neural networks (CNNs) represent a prominent methodology in visual learning and image categorization. The present study introduces a novel methodology integrating image enhancement techniques, specifically, Gaussian-blur-based sharpening and Adaptive Histogram Equalization using CLAHE, with the proposed model. This approach aims to effectively classify different categories of brain tumors, including glioma, meningioma, and pituitary tumor, as well as cases without tumors. The algorithm underwent comprehensive testing using benchmarked data from the published literature, and the results were compared with pre-trained models, including VGG16, ResNet50, VGG19, InceptionV3, and MobileNetV2. The experimental findings of the proposed method demonstrated a noteworthy classification accuracy of 97.84%, a precision success rate of 97.85%, a recall rate of 97.85%, and an F1-score of 97.90%. The results presented in this study showcase the exceptional accuracy of the proposed methodology in accurately classifying the most commonly occurring brain tumor types. The technique exhibited commendable generalization properties, rendering it a valuable asset in medicine for aiding physicians in making precise and proficient brain diagnoses.

4.Nilesh Bhaskarrao Bahadure, Arun Kumar Ray, Har Pal Thethi, "Image Analysis for MRI Based Brain Tumor Detection and Feature Extraction Using Biologically Inspired BWT and SVM", International Journal of Biomedical Imaging, vol. 2017, Article ID 9749108, 12 pages, 2017. https://doi.org/10.1155/2017/9749108.

The segmentation, detection, and extraction of infected tumor area from magnetic resonance (MR) images are a primary concern but a tedious and time taking task performed by radiologists or clinical experts, and their accuracy depends on their experience only. So, the use of computer aided technology becomes very necessary to overcome these limitations. In this study, to improve the performance and reduce the complexity involves in the medical image segmentation process, we have investigated Berkeley wavelet transformation (BWT) based brain tumor segmentation. Furthermore, to improve the accuracy and quality rate of the support vector machine (SVM) based classifier, relevant features are extracted from each segmented tissue. The experimental results of proposed technique have been evaluated and validated for performance and quality analysis on magnetic resonance brain images, based on accuracy, sensitivity, specificity, and dice similarity index coefficient. The experimental results achieved 96.51% accuracy, 94.2% specificity, and 97.72% sensitivity, demonstrating the effectiveness of the proposed technique for identifying normal and abnormal tissues from brain MR images. The experimental results also obtained an average of 0.82 dice similarity index coefficient, which indicates better overlap between the automated (machines) extracted tumor region with manually extracted tumor region by radiologists. The simulation results prove the significance in terms of quality parameters and accuracy in comparison to state-of-the-art techniques.

5. Arakeri, M.P., Ram Mohana Reddy, G. An intelligent content -based image retrieval system for clinical decision support in brain tumor diagnosis. Int J Multimed Info Retr 2, 175–188 (2013). https://doi.org/10.1007/s13735-013-0037-5.

Consider the possibility that we live in an area far from a doctor, or that we may not have enough resources to pay the hospital cost, or that we may not have enough time to take off work. The use of advanced computers to diagnose diseases will be lifesaving in such situations. Scientists have developed a number of artificially intelligent diagnostic algorithms for illnesses such as cancer, lung disease and Parkinson's disease. Deep learning employs massive artificial neural network layers of interlinked nodes that can reorganize themselves in response to updated data. This

approach enables machines to self-learn without the need for assistance from humans. The emphasis of this article is on current developments in machine learning that have had major effects on identification for the detection of a variety of illnesses, such as brain tumor segmentation. Human-assisted manual categorization may lead to erroneous prediction and diagnosis, thus one of the most important and a useful technique is brain tumor segmentation tasks in medical image processing that are difficult. Furthermore, it is a difficult challenge because there is a vast volume of data to assist. Since brain tumors have such a wide range of appearances and since tumor and normal tissues are so close, extracting tumor regions from photographs becomes difficult. The advancement of clinical decision systems of support necessitates the identification and recognition of the appropriate biomarkers in relation to specific health problems. It has been established that handwriting deficiency is proportionate to the severity of the situation of individuals' Parkinson's disease (PD).

6. Sachdeva J, Kumar V, Gupta I, Khandelwal N, Ahuja CK. Segmentation, feature extraction, and multiclass brain tumor classification. Journal of Digital Imaging. 2013 Dec;26(6):1141-1150. DOI: 10.1007/s10278-013-9600-0.

Multiclass brain tumor classification is performed by using a diversified dataset of 428 post-contrast T1-weighted MR images from 55 patients. These images are of primary brain tumors namely astrocytoma (AS), glioblastoma multiforme (GBM), childhood tumor-medulloblastoma (MED), meningioma (MEN), secondary tumor-metastatic (MET), and normal regions (NR). Eight hundred fifty-six regions of interest (SROIs) are extracted by a content-based active contour model. Two hundred eighteen intensity and texture features are extracted from these SROIs. In this study, principal component analysis (PCA) is used for reduction of dimensionality of the feature space. These six classes are then classified by artificial neural network (ANN). Hence, this approach is named as PCA-ANN approach. Three sets of experiments have been performed. In the first experiment, classification accuracy by ANN approach is performed. In the second experiment, PCA-ANN approach with random sub-sampling has been used in which the SROIs from the same patient may get repeated during testing. It is observed that the classification accuracy has increased from 77 to 91 %. PCA-ANN has delivered high accuracy for each class: AS—90.74 %, GBM—88.46 %, MED—85 %, MEN—90.70 %, MET—96.67 %, and NR—93.78 %. In the third experiment, to remove bias and to test the robustness of the proposed system, data is partitioned in a manner such that the SROIs from the same patient are not common for training and testing sets. In this case also, the proposed system has performed well by delivering an overall accuracy of 85.23 %. The individual class accuracy for each class is: AS—86.15 %, GBM—65.1 %, MED—63.36 %, MEN—91.5 %, MET—65.21 %, and NR—93.3 %. A computer-aided diagnostic system comprising of developed methods for segmentation, feature extraction, and classification of brain tumors can be beneficial to radiologists for precise localization, diagnosis, and interpretation of brain tumors on MR images.

7.D. Sridhar and I. Murali Krishna, "Brain Tumor Classification using Discrete Cosine Transform and Probabilistic Neural Network," 2013 International Conference on Signal Processing, Image Processing & Pattern Recognition, Coimbatore, 2013, pp. 92-96, doi: 10.1109/ICSIPR.2013.6497966.

In this paper, a new method for Brain Tumor Classification using Probabilistic Neural Network with Discrete Cosine Transformation is proposed. The conventional method for computerized tomography and magnetic resonance brain images classification and tumor detection is by human inspection. Operator assisted classification methods are impractical for large amounts of data and are also non reproducible. Computerized Tomography and Magnetic Resonance images contain a noise caused by operator performance which can lead to serious inaccuracies in classification. The use of Neural Network techniques shows great potential in the field of medical diagnosis. Hence, in this paper the Probabilistic Neural Network with Discrete Cosine Transform was applied for Brain Tumor Classification. Decision making was performed in two steps, i) Dimensionality reduction and Feature extraction using the Discrete Cosine Transform and ii) classification using Probabilistic Neural Network (PNN). Evaluation was performed on image data base of 20 Brain Tumor images. The proposed method gives fast and better recognition rate when compared to previous classifiers. The main advantage of this method is its high speed processing capability and low computational requirements.

8. Padma Nanthagopal, A., Sukanesh Rajamony, R. Automatic classification of brain computed tomography images using wavelet - based statistical texture features. J Vis 15, 363–372 (2012). https://doi.org/10.1007/s12650-012-0140-3.

Brain Tumor Detection is one of the most difficult tasks in medical image processing. The detection task is diffult to perform because because there is a lot of diversity in the images as brain tumors come in different shapes and textures. Brain tumors arise from different types of cells and the cells can suggest things like the nature, severity and rarity of the tumor. Tumors can occur in different locations and the location of tumors can suggest something about the type of cells causing the tumors can suggest something about the type of cells causing the tumor which can aid further diagnosis. The task of brain tumor detection can become aggravating by the problems which are present in almost all digistal images eg. Illumination problems. Tumor and nontumor images can have overlapping image intensities which makes it difficult for any model to make good predictions from raw images. This paper proposes a novel method to detect brain tumors from various brain images by first carrying out different images pre-processing methods

9. Mariam Saii, Zaid Kraitem, Automatic Brain Tumor Detection in MRI Using Image Processing Techniques, Biomedical Statistics and Informatics. Vol. 2, No. 2, 2017, pp. 73-76. doi: 10.11648/j.bsi.20170202.16.

The research offers a fully automatic method for tumor segmentation on Magnetic Resonance Images MRI. In this method, at first in the preprocessing level, anisotropic diffusion filter is applied to the image by 8-connected neighborhood for removing noise from it. In the second step, using Support Vector Machine SVM Classifier for tumor detection accurately. After creating the appropriate mask image, based on the symmetry property in axial and coronary magnetic resonance images. The tumor detected and segmented (Dice coefficient > 0.90) in a few seconds. The method applied on several MR images with different types regardless of the degree of complexity in those images.

10. L. Guo, L. Zhao, Y. Wu, Y. Li, G. Xu and Q. Yan, "Tumor Detection in MR Images Using One-Class Immune Feature Weighted SVMs," in IEEE Transactions on Magnetics, vol. 47, no. 10, pp. 3849-3852, Oct. 2011, doi: 10.1109/TMAG.2011.2158520.

Tumor detection using medical images plays a key role in medical practices. One challenge in tumor detection is how to handle the nonlinear distribution of the real data. Owing to its ability of learning the nonlinear distribution of the tumor data without using any prior knowledge, one-class support vector machines (SVMs) have been applied in tumor detection. The conventional one-class SVMs, however, assume that each feature of a sample has the same importance degree for the classification result, which is not necessarily true in real applications. In addition, the parameters of one-class SVM and its kernel function also affect the classification result. In this study, immune algorithm (IA) was introduced in searching for the optimal feature weights and the parameters simultaneously. One-class immune feature weighted SVM (IFWSVM) was proposed to detect tumors in MR images. Theoretical analysis and experimental results showed that one-class IFWSVM has better performance than conventional one-class SVM.

11. Nair M, Varghese C, Swaminathan R. Cancer: Current Scenario, Intervention Strategies and Projections for 2015. NCMH Background Papers; 2015.

Background: Cervical cancer is a significant health issue worldwide**.** Improving women knowledge and attitude regarding cervical cancer has a pivotal role in reducing risks and bad prognosis of cervical cancer. Women should be equipped with sufficient knowledge regarding early detection and prevention of cervical cancer. **Aim** of this study was to evaluate the effect of an educational intervention on women's knowledge and attitude regarding cervical cancer. **Design:** A quasi- experimental design was adopted in the current study. **Sample: -** A purposive of (65) women' were included in the current study. **Setting: -** The current study was conducted at outpatient clinic affiliated at obstetric department at Benha University Hospital. **Tools of collection: -** Two tools were used for data collection, first tool interviewing questionnaire to collect data about the women's socio demographic data and women's knowledge regarding cervical cancer as definition, risk factors, complication. Two tools was cervical cancer related attitude. **Results**: The result of the present study should that the total knowledge mean score was improved from (11.33±7.28) at pre intervention to (21.20±47) at post intervention phase. In addition there was 0.0% of the studied woman have positive attitude to pre intervention meanwhile,

after intervention 30.8% of them have positive attitude. **Conclusion:** Educational intervention was effective in improving the women's knowledge and attitude regarding cervical cancer. **Recommendations**:-Cervical cancer education program should be provided for all women's in all different ages in Egypt.

MATERIALS AND METHODS

PROBLEM DESCRIPTION

Many strategies were proposed to cope with label noise type for herbal pics. Ren et al., advise a method of featuring weights for training samples using a further natural validation set. His approach is to apply smaller weights for click on patterns and boom the weight of mundane education strategies to improve tilt healthy. The development and application of strategies for studying click on labels in scientific image records is tremendously limited. Degani et al. – Sampling of label noise as part of a deep studying community to achieve actual label noise-free fashions for the project of reading breast micro calcifications in multiview mammograms.

Not plenty paintings has been performed to discover brain tumors. From a overview of the literature, mind tumors are identified primarily based on ailment signs and the affected person's scientific history, however without the usage of imaging processes. Here the disorder cannot be expected earlier and it turns into more hard because the condition progresses. Diagnosis is very gradual. He does now not use any imaging techniques to diagnose the ailment in its early stages**.**

PROPOSED FRAMEWORK

This application tries to stumble on brain tumors from CT test pictures. These pictures are pre-processed using trendy picture processing techniques, after which a texture model framework is used to perceive the tumor region in the photo. The dataset turned into taken from the Tumor Image Repository. These CT experiment photographs of the brain tumor are fed into the computer. Since these photos are in different codecs, we need to convert them to jpg and the picture length is very massive, so we have used only some of them. Classification is carried out the usage of the sequential version framework. In this example, the shape is constructed according to the sections defined in the diagram. When the laptop learns category primarily based on the functions supplied to it, it could suit the check statistics into this type of categories. We have set up a chain using assessment-stronger CT photos of patients to distinguish mind most tumors from wholesome pancreas. RONCAS validated high accuracy and fantastic sensitivity compared to radiologists' independent assessments of visual interpretation, with perfect performance in check units of a selection of patients. These effects provide the first proof of concept that CT can seize elusive capabilities of mind tumor to aid and supplement radiologists within the prognosis and analysis of mind most tumors.

Deep studying the use of Convolutional Neural Networks (CN) has shown awesome ability in clinical picture evaluation. Building a neural network on a hard and fast of neurons with activation features and parameters to extract and combine strains of images and create a model that reflects the complex relationship among photographs and diagnosis. Ronkus stated more correct diagnoses were received on imaging. RONGS can appropriately distinguish brain most tumors from non-tumorous pancreas, and accounting for variations in affected person gender and ethnicity and imaging parameters, is essential in actual-world clinical practice. Roncus guarantees to broaden laptop-based totally tools for brain most tumors detection and diagnosis that complement radiologists' interpretation.

ALGORITHM

In deep studying, Convolutional Neural Network (CNN/ConvNet) is a normally used deep neural community for visible photograph evaluation. Now whilst we consider a neutral community, we consider matrix multiplication, however that isn't always the case with ConvNets. He makes use of a unique approach known as convolution. In arithmetic, convolution is a mathematical operation that includes two operations that bring about a third operation that expresses how the shape of 1 is converted by way of the other. Convolutional neural networks encompass numerous layers of artificial neurons. Artificial neurons, a replica in their organic opposite numbers, are mathematical features that calculate the sum of a couple of inputs and output an energetic cost. When you positioned an photo right into a ConvNet, each layer creates a couple of activation features which can be passed to the following layer.The first layer usually selects fundamental features which includes horizontal or diagonal edges. This output is sent to the

subsequent table, which detects extra complex factors consisting of corners or linked edges. As we cross deeper into the community, it is able to apprehend more complex functions like objects, faces, etc. Based on the activation graph of the very last convolution graph, the category layer outputs a hard and fast of self-belief ratings (values among zero and 1) that determine whether the photograph belongs to a "class". For example, if you have a ConvNet that detects lumpy pictures, the output of the remaining layer may additionally comprise any of these lumps.

IMPLEMENTATION

1. Set the Date
2. Import Required Libraries
3. Photo Acquisition
4. Information Set Partitioning
5. Pattern Making
6. Use Accuracy And Damage Of Version And Machine.
7. Be Careful With the Take A Look at Set
8. Save Organization Model

1. Set the Date

In the first module we created a gadget some data to examine Try extra functions. We took Using a dataset from a examine on brain tumor diagnosis photograph processing. https://www.tumorimagingarchive.net/coll ections/ . The dataset consists of 1411 brain tumour images

2. Import Required Libraries

For this we are able to use Python language. Main libraries should be found They have been eager to construct a start-up Learn to model, layout and examine Photo PIL to exchange figures, numbers; And diverse libraries with pandas; numpy, matplotlib and tensor flush.

3. Photo Acquisition

Let's ship their images and labels. Then resize the pics (224224). This need to be equal to the length of the picture. Then rearrange the pics primarily based on the order. The statistics set is split; View column partition statistics Five. Eighty% transition education and 20% examination Information

4. Information Set Partitioning

Let's use this case to make it From the Keras library. Let's add layers Building an lively neural community. In' We used the primary two Conv2D filter layers 32 and center length (five.5). We saved MaxPool2D inside the pool tank length (2.2), which is a lot Price is ready for every 2x2 region the rate placed us to sleep Retained dropout component = zero.25, which It is 25% of neurons Destroyed at will. And use these 3 commands reporting inside limits. So we View 2D Warp Transform Layer Information is virtually a one-dimensional vector. Its miles The layer should be very thick Layer, leaf layer and repeat A thick layer closure indicates a dense layer The two ends of the mind are swollen or absent. Its far layer uses softmax implementation A function that provides capacity at a fee and

He guesses it is certainly one of alternatives fat chance Use patterns and designs correctly loss.

5. Pattern Making

We will assemble a version and comply with up using version functions. Criteria we can set the mass equal to 2 Accuracy and loss of plot. We were with average retrieval accuracy 100% and common education accuracy ninety eight. Seven%

7. Be Careful With the Take A Look at Set

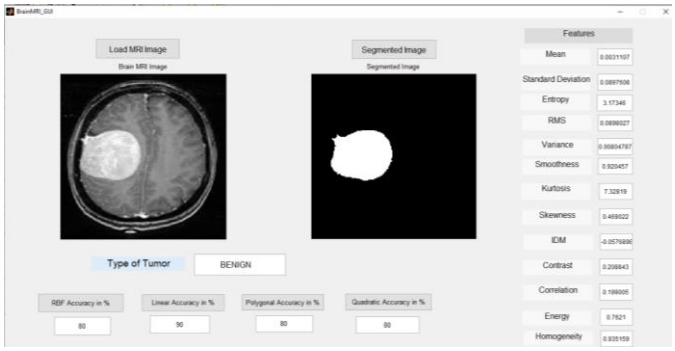
We are given 100% accuracy check in body

8. Save Organization Model

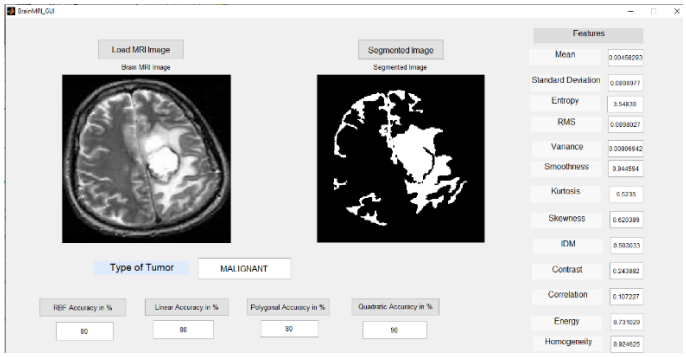
You simply should be confident Version taught and tested Production Environment, First Steps Save using .H5 or .Pkl file Library like Muria in the input picture. Identify brain tumors by using feature extraction using convolutional neural networks (CNN). Deep learning to wake up an affected person or pick out a tumor at an early stage.

RESULT AND DISCUSSION

i) For Benign Tumor Detection



ii) For Malignant Tumor



CONCLUSION

Brain tumors especially the malignant ones are considered almost incurable and fatal. The need for early detection arises from the fact that brain tumors can have symptoms that do not seem to be alarming at first. The most common symptom of brain ailments is a headache which worsens over time in the case of brain tumors. Hence there are lots of cases where the fatality from brain tumor increased due to the diagnosis not being done early. Brain tumor diagnosis begins with an MRI scan which is followed by studying a tissue sample for determining the type of tumor. MRI scan can also reveal additional details such as the size of the brain tumor. This paper presents a novel method involving image processing techniques for image manipulation which would aid our CNN model to classify tumor and non-tumor images better. Image processing techniques helped us solve the illumination issues and brought the tumor into focus. Data augmentation was used to reduce the chances of overfitting, as it artificially expands the size of a training dataset, thus bringing out an improvement in the performance and the ability of the model to generalize. Transfer learning is also used as a pre-trained model, ResNet101v2 was used as the base model, upon which further training was applied to tune our task. The system recorded an adequate accuracy of 97.94% with an excellent training recall of 98.55 % and validation recall of 99.73%.

FUTURE WORK

In 2023, it is estimated that 24,810 adults in the U.S. will be diagnosed with a primary malignant tumor of the brain and spinal cord. There is currently no cure for brain tumors and current treatment options are mostly limited to surgery, radiation therapy and chemotherapy. However, there is a lot of research being conducted around brain tumors that could lead to the development of new treatments, and in this article, we have listed five recent advancements in brain tumor research**.** Successfully treating brain tumors using current standard-of-care treatment options, which – as mentioned previously – include surgery, radiation therapy and chemotherapy, can be challenging. This is due to several factors, such as the body's blood-brain barrier keeping out some types of chemotherapy, and surgery not being an option due to the placement of the tumor; for example, if it is near a vital structure or unreachable part of the brain.

Additionally, certain primary brain tumors can rapidly spread to other areas of the body, resulting in these treatments becoming ineffective.

This means there is an unmet need for new approaches to treating brain tumors, and here we take a look at some of the promising advancements in brain tumor research over the past year.

In more brain tumor research specifically looking at pediatric tumors, physician-scientists from the University of Pittsburgh School of Medicine Department of Neurological Surgery and UPMC Children's Hospital of Pittsburgh have discovered that medulloblastomas – the most common malignant pediatric brain tumors – hijack a skill that normal brain cells use during their early development and then manipulate it to help tumors spread.

Medulloblastomas most commonly form in the cerebellum – the bottom part of the brain located at the back of the skull – and are usually treated with surgery followed by radiation and chemotherapy. However, some types of medulloblastomas often metastasize, or spread, to tissues and organs beyond where the tumor originated, meaning these treatments no longer work. n order to learn how medulloblastoma cells metastasize, researchers leveraged

medulloblastoma patient data and experimental mouse data to identify a gene, SMARCD3, whose levels were significantly higher in metastatic tumors compared to tumors that had not spread. They also showed that SMARCD3 hijacks neurodevelopmental signalling – used by healthy brain cells during early cerebellar development before being shut off once the cerebellum matures – to promote tumor cell spreading. We've been thinking of medulloblastoma metastasis from the perspective of neuroscience and understanding how abnormal brain development causes and influences brain tumors. This cancer neuroscience approach helped us to pinpoint the fundamental mechanisms, which allow us to develop safe, effective, and personalized medical treatments for children with this devastating brain cancer," said Baoli Hu, assistant professor of neurological surgery at the University of Pittsburgh.

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