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BRAIN NERVES SYSTEM

1st Tanya Ramwani
Dept.Information Technology
MIT ADT- School Of Computing
Pune, India
ramwanitanya29@gmail.com

2nd Zayna Sheikh
Dept.Information Technology
MIT ADT- School Of Computing
Pune, India

3rd Akif Nagthan
Dept.Information Technology
MIT ADT- School Of Computing
Pune, India

UNDER THE GUIDANCE OF
Rahul Bhole

ABSTRACT

In various industries such as medical imaging, aerial surveillance, surgical microscopes, and more, image/object identification plays a vital role. The primary objective of the system is to establish a method to detect and classify brain tumor, with a particular emphasis on determining their malignancy using the Support Vector Machine (SVM) algorithm. While empirical risk minimization Artificial Neural Networks (ANNs) are commonly employed for object recognition, the SVM technique is specifically utilized in this case for its ability to reduce structural risks and effectively categorize tumor images.

By employing the SVM algorithm, tumors can be accurately extracted from medical images. The implementation of a Python-based system allows for the creation of a cancer classification function.

Additionally, the training dataset was utilized to evaluate various CNN (Convolutional Neural Network) techniques.

The SVM method divides the data into several classes by locating an ideal hyperplane. The SVM may be trained to recognise tumour and non-tumor areas in medical pictures for the purpose of detecting brain tumours.

Using SVMs for tumor extraction from medical images is a good approach. SVMs are renowned for being able to generalise well to fresh, untried data and for being able to handle high-dimensional data successfully. They are capable of capturing intricate connections between tumour categorization and picture attributes.

Keywords: - CNN , SVM , Brain , Tumor

1.INTRODUCTION

Image processing is the process of examining and modifying photographs in order to extract pertinent data or carry out certain tasks. In the context of medical imaging, the primary objective is to detect and treat diseases while visualizing internal systems that are otherwise obscured by skin and bones. Furthermore, Medical imaging aids in creating a collection of references for typical anatomy and physiology, enabling the identification of any abnormalities or deviations.

Brain tumors are a significant contributor to the rising mortality rates observed today. These tumors originate from the abnormal and uncontrolled growth of cells within the human body. They develop within the skull and disrupt the normal functioning of the brain. Brain tumors are a serious and alarming condition that, if not detected early, can pose a threat to life. They can be categorized into three main types: benign, malignant, and pre-malignant. Malignant tumors are the ones associated with cancer.

The treatment of brain tumors depends on various factors, including the precise location, size, type of malignancy, and overall condition of the patient. Accurate diagnosis and determination of the stage of tumor development are crucial. This is typically achieved through the analysis of medical images by trained professionals. However, in some cases, the interpretation may require additional time and expertise, which can lead to potential misinterpretations of results.

There are numerous types of medical imaging techniques available today that play a crucial role in the field of mental health. These advanced tools and equipment provide accurate and precise results. Among them, X-ray The most popular technique for examining the internal organs of the human body is imaging. Accurate identification of tumors is essential for effective treatment. Proper identification ensures that the appropriate treatment is administered. In order to ensure proper

treatment, precise confirmation tools are necessary, particularly when it comes to detecting the presence of brain cancer. Image pre-processing, segmentation, feature extraction, and classification are the typical four processes involved in the process of finding brain tumours using image processing techniques.

Pre-processing's main goal is to improve the quality of Magnetic Resonance (MR) pictures by removing extra noise and undesired background material while keeping the image's edges intact. Segmentation involves converting the pre-processed brain MR images into meaningful regions of interest. The process of extracting features, such as colour, shape, texture, and spatial distribution, from a picture is known as feature extraction. These features play a crucial role in subsequent analysis and classification tasks.

In the classification process, a classifier is employed to categorize the standard training images and the input test images.

With the increase in global population, diseases have become more prevalent. According to studies, each year, approximately 12.7 million people are diagnosed with a life-threatening illness, and among them, 7.6 million individuals succumb to the disease. Brain cancer refers to the uncontrolled growth of brain tissue, leading to abnormalities in brain function. Two varieties of brain tumours exist: primary tumours with a brain origin tissue itself, and secondary tumors that originate elsewhere in the body and spread to the brain.

Our research focuses on the detection and identification of brain tumors using digital brain imaging techniques. X-ray and CT scans are commonly utilized to examine the structural composition of the brain. The proposed system aims to achieve cancer detection by utilizing edge detection, motion tracking, and edge verification techniques. Finding brain tumours is mostly done to help with medical diagnosis. Techniques involved in this process include scanning, segmentation, enhancement, thresholding, and contouring for identifying tumor-like edges.

1. RELATED WORK

1. Suresha and Jagadisha, "**Detection of Brain Tumor using Image Processing**" In 2020, the fourth international conference on computing methodologies.

   We offer a unique approach for detecting the presence of a brain tumour or other abnormal growth in an MR picture that combines the K-Means algorithm with support vector machine (SVM). The input image is transformed to grayscale using a parallel thresholding approach in the first phase of the process, and regions of interest are located. To differentiate between

healthy and cancerous brain tissue, these areas are further examined depending on their intensities. We can successfully extract pertinent characteristics by using K-Means analysis to characterise the distinctive patterns of the detected components. The support vector machine is then used to categorise and determine the existence of malignant tissue.

2. Ashfak Hussain and Ajay Khuntetaa, "**Semantic segmentation of brain tumor from MRI images and SVM Classification using GLCM features.**", The 2020 ICIRCA, the Second International Conference on Inventive Research in Computing Applications

   The proposed system utilizes a dataset consisting of X-ray images for the purpose of brain tumor detection. To distinguish brain tumor tissues from the X-ray images, a segmentation process specifically tailored for brain tumor segmentation is applied. Pre-processing techniques such as median filtering and skull stripping are employed to enhance the quality of the images. The thresholding method, utilizing the watershed segmentation technique, is then applied to segment the provided X-ray images. This results in the identification of the tumor region.

   Then, using GLCM (Gray-Level Co-occurrence Matrix) approaches, features are retrieved from the segmented areas using MATLAB software. A Support Vector Machine (SVM) classifier uses these attributes as input to categorise the pictures appropriately. The suggested approach outperforms conventional models with an average accuracy of 93.05 percent.

3. Suhas and Venugopal, **"MRI image preprocessing and noise removal technique using linear and nonlinear filters**", International Conference on 2017 techniques in electrical, electronic, communication, computer, and optimisation.

   The proposed framework utilizes a dataset comprising X-ray images for the development of the system. Brain X-ray images are subjected to a process known as "brain cancer segmentation" in order to get rid of tumour cells. Pre-processing techniques, such as median filtering and skull stripping, are employed to isolate the X-ray images. The watershed segmentation method is then utilized to perform the thresholding process on the provided X-ray images. Consequently, a distinct region containing the tumor is identified.

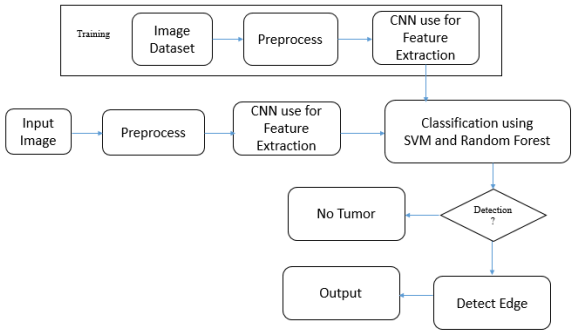
   Additionally, the features are extracted using MATLAB software and the GLCM (Gray-Level Co-occurrence Matrix) techniques. The Support Vector Machine (SVM) is then used in combination with these characteristics for classification purposes. The framework greatly outperforms other traditional models, averaging an astonishing 93.05 percent accuracy

4. Varuna Shree and T. Kumar, "**Identification and classification of brain tumor MRI images with feature extraction using DWT and Probabilistic neural network**", Springer , 2019

For the evaluation and detection of internal activities within the human brain, a variety of imaging modalities, including X-ray, are used. In order to improve performance and lower complexity, we concentrated on applying noise reduction approaches, gray-level co-occurrence matrix (GLCM) feature extraction, and region expanding segmentation based on discrete wavelet transform (DWT). Following segmentation, morphological filtering was used to reduce artefacts that were introduced.

A probabilistic brain network classifier was created and used to assess how well it could spot tumours on brain X-ray pictures. The efficiency of the suggested method was proved by experimental findings, which distinguished between normal and diseased brain tissues in MR images with about 100% accuracy.

2. SYSTEM ARCHITECTURE



Methodology: -

This approach entails utilizing a classifier to analyze MRI images and classify them into cancerous or non-tumor. Techniques of Image such as feature extraction, image enhancement, histogram equalization and picture segmentation are employed to identify tumors. Extracted features are stored in a knowledge base. By leveraging various features, an efficient classifier is developed for accurate brain tumor detection. The system is designed with a user-friendly interface, prioritizing ease of use.

Step 1: Acquire MRI brain scan images of patients along with their corresponding medical diagnoses from healthcare professionals.

Step 2: Pre-processing is performed on the images and relevant features are extracted. Extracted features are then stored in the database with their

corresponding database. Then create 2 datasets: The training and testing.

Step 3: Training a Convolutional Neural Network (CNN) classifier using the training dataset.

Step 4: Utilize Support Vector Machine (SVM) techniques to classify the testing dataset. If a tumor is detected, proceed to identify the tumor's edges.

A web based application is developed using HTML and PHP for users to log in, upload a brain image, and click the "predict" button. The uploaded image is then sent to the backend where machine learning techniques are employed to make predictions based on the image. The final prediction is displayed on the webpage.

3. RESULT

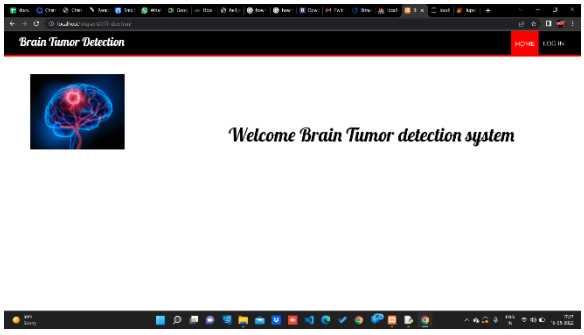


Fig:- Welcome Home Page

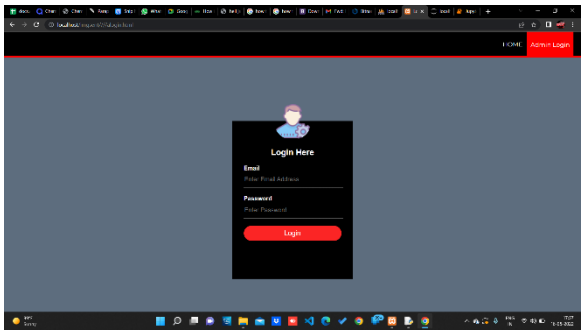


Fig:- Login Page

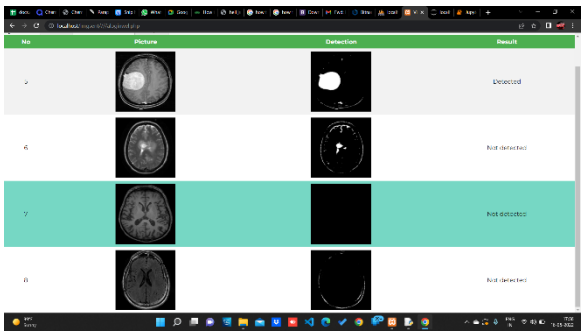


Fig:- Prediction Page

4. CONCLUSION

The proposed approach aims to detect brain tumors utilizing various medical imaging techniques, including MRI brain scans. The classification of brain tumors is accomplished by using CNN and SVM. The suggested approach encompasses several steps, including system training, pre-processing, tensor flow implementation, and classification. By utilizing a large database, we strive to provide more precise and comprehensive

information for various types of MRI brain tumors in the future.

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