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Efficient MRI Segmentation and Detection of Brain Tumour using CNN

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Abstract: *In many fields, including medical imaging, aerial surveillance, the best manipulation and analysis, surgical microscopes, etc., object detection is crucial. The goal of this system is to create a standard for the detection and classification of brain tumors, specifically to identify whether a tumour is cancerous or not using the SVM algorithm. Many people have already used ANNs that employ empirical risk minimization to detect things. To categorize the photos, we are utilizing the Support Vector Machine technique, which relies on structural risk minimization. Medical images are subjected to the SVM algorithm for tumour extraction, and a system using Python is constructed for the tumour classification function as well. CNN techniques were employed for the training dataset. This system exhibits a CNN and SVM-based object detection prototype.*

Keywords: CNN, SVM, Brain, Tumor

I. INTRODUCTION

The process of evaluating and modifying an image in order to carry out an operation and extract information from it is known as image processing. Medical imaging aims to identify and cure disease as well as reveal internal structures that are covered by skin and bones. Additionally, it creates a database of typical anatomy and physiology to help spot irregularities. Brain tumors are one of the factors contributing to the rise in mortality rates today. Brain tumors are the result of abnormal or uncontrolled cell proliferation that has established within the human body. This category of tumors develops inside the skull, disrupting normal brain function. A brain tumour is a dangerous and terrifying condition. Therefore, which is not recognized at an early stage can endanger life. The three main types of brain tumors are benign, malignant, and pre-malignant. The cancer is caused by the malignant tumor.

Treatment of mind growth relies upon many factors, for example, appropriate conclusion and the different variable like the sort of cancer, area, size, and condition of improvement. Already phase of growth is utilized to be distinguished physically with the assistance of perception of picture by specialists and now and again it requires greater investment and results might be mistaken. There are many kinds of mind growth and just master specialist can ready to give the precise outcome. Today numerous PCs added device is utilized in a clinical field. These devices have a property of speedy and precise outcome. X-ray is the most regularly involved imaging procedure for examining inner design of human body. Appropriate identification of growth is the answer for the legitimate treatment. Additionally require precise determination apparatus for appropriate treatment. Recognition includes tracking down the presence of cancer. Recognizing mind cancer utilizing picture handling strategies includes four phases. Picture pre-handling, division, include extraction, and grouping. The essential undertaking of pre-processing is to work on the nature of the Attractive Reverberation (MR) pictures, eliminating the unessential commotion and undesired parts behind the scenes and safeguarding its edges. In division the pre-handled mind MR pictures is changed over into paired pictures. Include extraction is the method involved with gathering more elevated level data of a picture like tone, shape, surface, and differentiation. What is more, the order interaction, the classifier is utilized to arrange the ordinary prepared picture tests and the information picture sample

With the expansion in the total populace, disease is the developing medical condition. According to the study, in every year, the number of inhabitants in dangerous individuals is around 12.7 million among them 7.6 million people groups bite the dust on account of disease. Cerebrum cancer is the uncontrolled development of the mind tissue, which causes

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anomalies in the working of the mind. Cerebrum growths are of two kinds initial one is the cancer that is begun at mind tissue itself and another is begun one more piece of the body and move towards the cerebrum.

Automated brain tumour identification and categorization are the focus of our investigation. MRI and CT scans are frequently used to examine the brain's anatomical structure. The suggested system's goal is tumour identification via egde detection following tumour detection and labelling of that egde for identification. The primary goal of brain tumour detection is to aid in clinical diagnosis. The methods utilized are filtering, erosion, dilation, threshold, and outlining of the tumor such as edge detection.

II. RELATED WORK

D. Suresha and N. Jagadisha, "**Detection of Brain Tumor using Image Processing**" Fourth International Conference on Computing Methodologies and communication, 2020

Proposed a system to decide whether the brain has tumor or is it tumor-free from the MR image using combined technique of K-Means and support vector machine. In the first stage the input image is converted to grey scale using binary thresholding and the spots are detected. The recognized spots are represented in terms of their intensities to distinguish between the normal and tumor brain. The set of feature extracted are later characterized by using K-Means algorithm, then the tumor recognition is done using support vector machine.

Ashfaq Hussain and Ajay Khunteta, "**Semantic segmentation of brain tumor from MRI images and SVM Classification using GLCM features.**", Second International Conference on Inventive Research in Computing Applications (ICIRCA),2020

Some MRI pictures have been used as input data for the proposed system. For the purpose of separating brain-tumor tissues from brain MRI images, the brain-tumor segmentation process is carried out. The MRI images should be filtered using techniques like median filtering and skull stripping during pre-processing. The thresholding process is then carried out on the provided MRI images using the watershed segmentation method. Finally, a segmented tumour area is discovered. Then, using MATLAB software, in another step, features were retrieved using GLCM techniques. Then, using a support vector machine (SVM), certain photos were categorized. The average accuracy of this system was 93.05 percent. it is far superior to other traditional models.

S. Suhas and C. R. Venugopal, **"MRI image preprocessing and noise removal technique using linear and nonlinear filters**", International Conference on Electrical, Electronics, Communication, Computer and Optimization Techniques, 2017.

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N. Varuna Shree and T. N. R Kumar, "**Identification and classification of brain tumor MRI images with feature extraction using DWT and Probabilistic neural network**", Springer , 2018

The internal anatomy of the human brain can be scanned and captured using a variety of imaging technologies, including MRI. To reduce complexity and enhance performance, we focused on noise removal techniques, gray-level co-occurrence matrix (GLCM) feature extraction, and DWT-based brain tumour region growing segmentation in this study. The noise that can result from segmentation was then removed by morphological filtering. The performance accuracy in locating tumors in brain MRI images was trained and tested using the probabilistic neural network classifier. The efficiency of the suggested technique was demonstrated by the experimental findings, which were nearly 100% accurate in detecting normal and pathological tissues from brain MR images.

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III. SYSTEM ARCHITECTURE

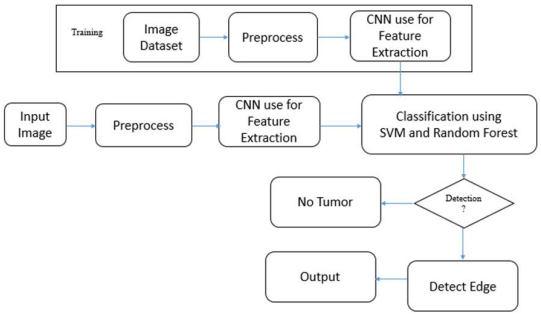

Fig: System Architecture

The proposed approach involves processing MRI brain images for tumour and non-tumor identification and classification using a classifier. For the purpose of tumour identification, image processing techniques such as histogram equalization, image enhancement, picture segmentation, and feature extraction have been applied. The knowledge base contains the extracted features. By choosing different features, a proper classifier is created to identify brain tumors. The system is designed to be user friendly.

Step 1: Obtain MRI brain scanned image of patients and respective medical diagnosis from medical practitioner.

Step 2: Perform pre-processing and extract features. Store the features and respective diagnostic in a database. Divide the database into training and testing part

Step 3: Train CNN classifier with training data.

Step 4: Classify testing data using SVM techniques, If tumor is detected, detect the edge of the tumor.

IV. METHODOLOGY

The proposed approach involves processing MRI brain images for tumour and non-tumor identification and classification using a classifier. For the purpose of tumour identification, image processing techniques such as histogram equalization, image enhancement, picture segmentation, and feature extraction have been applied. The knowledge base contains the extracted features. By choosing different features, a proper classifier is created to identify brain tumors. The system is designed to be user friendly.

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We build a web based application using php and html, User first log's in the system and later on upload the image of brain and after clicking on predict button the image is further passed to backend and depending on that prediction occurs after machine applying machine learning techniques on it. The final prediction is displayed on webpage.

V. CONCLUSION

The proposed system uses a variety of medical imaging, such as MRI brain cancer scans, to find tumors. The suggested method for detecting brain tumors using a convolutional neural network and a support vector machine classifies. The suggested method combines this neural network technique and is made up of the following steps: training the system, pre-processing, tensor flow implementation, and classification. In the future, we'll use a sizable database to try to provide information that is more accurate and applicable to all MRI brain tumour types.

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REFERENCES

[1]. D. Suresha and N. Jagadisha , " Detection of Brain Tumor using Image Processing", Fourth International Conference on Computing Methodologies and communication, 2020

[2]. Ashfaq Hussain and Ajay Khunteta," Semantic segmentation of brain tumor from MRI images and SVM Classification using GLCM features", Second International Conference on Inventive Research in Computing Application, 2020

[3]. S. Suhas and C. R. Venugopal, "MRI image preprocessing and noise removal technique using linear and nonlinear filters", 2017 International Conference on Electrical , Electronics , Communication ,Computer and Optimization Techniques

[4]. N. Varuna Shree and T. N. R Kumar, "Identification and classification of brain tumor MRI images with feature extraction using DWT and Probabilistic neural network", Springer , 2018

[5]. F. P. Polly and S.K . Shil, " Detection and classification of HGG and LGG brain tumor using machine learning ", International Conference on Information Networking , 2018

[6]. Nilesh Bhaskarrao Bahadure, Arun Kumar Ray and Har Pal Thethi," Image Analysis for MRI Based Brain Tumor Detection and Feature Extraction Using Biologically Inspired BWT and SVM", Hindawi International Journal of Biomedical Imaging volume 2017.

[7]. Zeynettin Akkus, Alfiia Galimzianova, Assaf Hoogi , Daniel L. Rubin and Bradley J. Erickson, "Deep Learning for Brain MRI Segmentation: State of the Art and Future Directions" J Digit Imaging DOI 10.1007/s10278-017- 9983-4, 2017

[8]. Israel D. Gebru, Xavier Alameda-Pineda, Florence Forbes and Radu Horaud, "EM Algorithms for Weighted-Data Clustering with Application to Audio-Visual Scene Analysis " IEEE Transactions on Pattern Analysis and Machine Intelligence, vol. xx, no. y, 2016.

[9]. D. Suresha and N. Jagadisha , " Detection of Brain Tumor using Image Processing", Fourth International Conference on Computing Methodologies and communication, 2020

[10]. Ashfaq Hussain and Ajay Khunteta," Semantic segmentation of brain tumor from MRI images and SVM Classification using GLCM features", Second International Conference on Inventive Research in Computing Application, 2020

[11]. S. Suhas and C. R. Venugopal, "MRI image preprocessing and noise removal technique using linear and nonlinear filters", 2017 International Conference on Electrical , Electronics , Communication ,Computer and Optimization Techniques

[12]. N. Varuna Shree and T. N. R Kumar, "Identification and classification of brain tumor MRI images with feature extraction using DWT and Probabilistic neural network", Springer , 2018

[13]. F. P. Polly and S.K . Shil, " Detection and classification of HGG and LGG brain tumor using machine learning ", International Conference on Information Networking , 2018

[14]. Nilesh Bhaskarrao Bahadure, Arun Kumar Ray and Har Pal Thethi," Image Analysis for MRI Based Brain Tumor Detection and Feature Extraction Using Biologically Inspired BWT and SVM", Hindawi International Journal of Biomedical Imaging volume 2017.