**Mini Project Report on**



**Web app using flask brain Tumour detection**



**Submitted in partial fulfillment of the requirement for the award of the degree of**

**BACHELOR OF TECHNOLOGY**

**IN**

**COMPUTER SCIENCE & ENGINEERING**

**Submitted by~**

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**January 2023**



**CANDIDATE’S DECLARATION**

I hereby certify that the work which is being presented in the project report entitled **“Web app using flask brain Tumour detection”** in partial fulfillment of the requirements for the award of the Degree of Bachelor of Technology in Computer Science and Engineeringof the Graphic Era (Deemed to be University), Dehradun shall be carried out by the under the mentorship of **Dr. Guru Prasad M S**, Department of Computer Science and Engineering, Graphic Era (Deemed to be University), Dehradun.

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**Chapter 1**

**Introduction**

* The human body is composed of numerous types of cell. Each cell has a specific function. These cells in the body grow and divide in an arranged manner and form some new cells. These new cells help to keep the human body healthy and ensures proper Functioning. When some of the cells lose their ability to control their growth, they grow without any order. The extra cells formed form a mass of tissue which is called tumor.

A brain tumor is a collection of abnormal cells in the brain. Tumors can be benign or malignant.

Malignant tumors lead to cancer while benign tumors are not cancerous.

* The conventional method for tumor detection in magnetic resonance brain images is human inspection. The observation from human in predicting the tumor may mislead due to noise and distortion found in the images. This method is impractical for large amount of data and also very time consuming.
* So automated tumor detection methods are developed as it would save radiologist time. The MRI brain tumor detection is complex task due to complexity and variant of tumors.

Tumor is identified in brain MRI using Machine Learning algorithms. The proposed work is divided into three sections: Preprocessing steps are applied on the brain MRI images, then textures features are extracted using Gray Level Co-occurrence Matrix (GLCM) and finally Classification is performed using machine learning algorithm.

* 1. **Problem Statement**
* Brain tumor is the accumulation, or mass or growth of abnormal cells in the brain.
* There are basically two types of brain tumor malignant and benign.
* Malignant brain tumor are relatively rare, accounting for only 1-2% of all types of cancer in adults but having lower survival rate.
* If not treated at an initial phase, it may lead to death.
* According to research studies it is found that, the incidence of most malignant brain tumors is significantly lower in East Asia, Southeast Asia, and India.
* The highest incidences have been found in Europe, Canada, The United States, and Australia.



**MRI**

**Chapter 2**

**Literature Survey**

Using segmentation in medical images is a very important task for detecting the abnormalities, study and tracking progress of diseases and surgery planning. Segmentation must not allow regions of the image to overlap.

**Clustering Based Methods**

1. **K-Means Clustering**: K-Means Clustering partition the n observations into k clusters in which each pixel belongs to the clusters by minimizing an objective function in a way that the within cluster sum of squares is get minimized. It starts with initial K cluster centres and it reassigns the observations to clusters based on the similarity between the observations and cluster centre.

Automation of detection and segmentation of brain tumours in MRI images is a very challenging task due to occurrence of high degree of gray-level similarity in the image. T. U. Paul and S. K. Bandhyopadhyay have presented a fully automated two-step segmentation process of brain MRI images.

In the first step, skull stripping is performed by generating a skull mask from the MRI image and in the second step, an advanced K-means algorithm improvised by two-level granularity oriented grid based localization process based on standard local deviation is used to segment the image into gray matter, white matter and tumour region and then length and breadth of the tumours is assessed.

1. **Fuzzy C-Means Clustering:** Fuzzy C-means (FCM) clustering is a data clustering method in which each data point belongs to a cluster to a degree specified by a membership value. Fuzzy C-means divides a collection of n vectors into c fuzzy groups and finds a cluster centre in each group such that a cost function of dissimilarity measure is minimized.

**Edge Detection Based Methods**

Edge-based methods are focused on detecting contour. They fail when the image is blurry or too complex to identify a given border. The most important feature in an image is the contrast. Contrast may be described as discontinuities in the gray values of an image or variations in scene illumination.

In vision based analysis edge is considered as a very good descriptor of contrast. Different approaches of edge detection in an image includes gradient based edge (includes Sobel, Perwitt and Robert operators), Canny edge, Fuzzy edge, Laplacian of Gaussian (LOG), Laplacian edge etc.

**Thresholding based methods**

Thresholding is one of the most generally used and oldest methods for image segmentation. In thresholding approach, image segmentation is based on gray level intensity value of pixels. Histogram of image is consists of peaks and valleys, where each peak represents one region. The valley between the peaks represents a threshold value. Histogram thresholding method is based on a concept that divides the image into two equal halves and histograms are compared to detect the tumour and cropping method is used to find a proper physical dimension of brain tumour.

The threshold technique makes decision based on the local raw pixel information. It

Helps in extracting the basic shape of an image, overlooking the little unnecessary details. However, thresholding is often used as an initial step in a sequence of image segmentation process. Its main limitation is that only two classes are generated and it does not work when confronted with structures that lack clear borders.

Image segmentation through thresholding is considered to be a simple and powerful approach to segment the images that have light objects on dark background. On the basis of thresholding value, there are two types of threshold values such as global and local thresholding. The approach is called global thresholding when the T is fixed or constant. Otherwise, it is called local thresholding. If the background illumination is uneven, the global thresholding is likely to fail. In local thresholding, multiple thresholds are used to compensate the uneven illumination.

**Chapter 3**

**Methodology**

Modules:-

Methodology is a strictly defined combination of logically related practices methods processes that determine how best to plan develop control and deliver a project throughout the continuous implementation process until successful completion and termination.

* **MRI Image acquisition**
* **Preprocessing**
* **Segmentation**
* **Feature extraction**
* **Classification**

**Tool used**

* **Python**
* **Sklearn**
* **OpenCv**
* **Matplotlib**
* **Jupyter Notebook For Model Training and Testing**
* **Flask**
* **Dataset containing with/without brain tumour images.**

Here, we have taken dataset from (https://www.kaggle.com/) where we have testing and training data. The dataset consists of the with and without brain tumour images namely as Pituitary Tumor and No tumour.

First, we will import/load all the dependencies in the jupyter notebook. The dependencies include the numpy, pandas, OpenCV, matplotlib, scikit-learn. After this we will load and prepare the data by providing the path, followed by data analysis and visualisation and splitting the data (training and testing).

Thus, we will predict the model and evaluate the results through the given testing folder in the dataset.

**Load the data**

**Data Analysis**

**Data Visualization**

**Split Data**

**Model Training**

**Prediction**

**Chapter 4**

**Result and Discussion**

* Because many of the images are of different size, we have resized them to one size i.e. (200,200).
* Other major issue with the MRI images was they have lot of noise. So therefore, we have to cropped the images so that we can only focus image for training.

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**MRI scan of brain**

As it can be seen that the image is noisy, so different noise filters are needed to be applied for noise removal and then apply enhancement techniques. The result obtained after applying step 2 and step 3 was obtained as:



**Enhanced Image**

The output obtained after converting image to binary image using Otsu’s method is shown below:



**Binary to gray Image**

Now the result obtained after applying morphological operations and the last step is the detection of edges of this tumour. The detected edges of the tumour was obtained as: i.e. dilation and erosion is shown below:

** ,**

**Final output**

**Chapter 5**

**Conclusion and Future Work**

* In medical field, manual identification of brain tumour by doctors referring the MRI images is a very time consuming task and can be in appropriate for a large amount of data. Instead of manual identification, image processing and machine learning techniques can be used to identify the tumor from the images.
* Therefore, This model helps in understanding the creating of a system that will carry out image processing and identify the Brain Tumor using machine learning approach.
* Also proposed algorithm can be applied with some modification for the detection of lung cancer. The algorithm can be applied to the CT scan of the lungs and region suffering from cancerous cells can be identified.
* Due to the bad lifestyle, the Brain Tumour is now becoming common which is dangerous. Some of the Brain Tumours are noncancerous (benign) while some of them are cancerous (malignant). Thus it is very necessary to detect such abnormal cells in the brain with high accuracy.

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