

Classification of Brain MRI Images For Cancer Detection Using Deep Learning

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Abstract- Human system is made up of many organs; of all brain is the first and the leading controller of the human system. Overload cells growing in an uncontrolled manner in brain is called as brain tumor which further leads to brain cancer. MRI (Magnetic Resonance Imaging) is a medical test which uses strong magnets to produce magnetic field and radio waves to generate 2/3 Dimensional image of different body organs and uses computer to analyze the taken image. The brain is composed of 3 types of materials: white material (WM), grey matter (GM) and cerebral spinal fluid (CSF). Through the MRI scan we can view the brain in three different ways: 1]The Axial MRI 2]The Sagittal MRI 3]The Coronal MRI. These images help the Doctor to identify whether that patient is suffering from cancer. The proposed system takes Brain MRI images as an input and pre-processing is performed on it (resizing and renaming). The images will be analyzed using advance imaging technologies. These technologies use Convolution Neural Network and deep learning approach for analysis. After analysis, classifying of whether given MRI images are normal or show a benign or malignant cancer is done automatically, that saves the radiologist's time, increases accuracy and yield of diagnosis.

I. INTRODUCTION

MRI is taken using a scanner which has strong magnets built-in which produces magnetic field and radio waves that scan patient's brain to produce high quality images. MRI uses radio waves to redirect alignment of hydrogen atoms that naturally exist within the body while patient is in the scanner without causing any chemical changes in the tissues. As the hydrogen atoms return to their usual alignment, they emit energy that varies according to the type of body tissue from which they come. The MRI scanner captures this energy and creates a picture of the tissues scanned based on this information.

The proposed system takes Brain MRI images as an input and pre-processing is performed on it (resizing and renaming). The images will be analyzed using advance imaging technologies. System will perform the analysis using Deep learning technology on the MRI images and the result

will be classification of brain MRI to detect the image depicts brain cancer [benign /malignant /normal]. Our automated system will help the radiologist to analyze the brain MRI images within shorter span of time.

II. OBJECTIVES

Objectives of this system are:

- Training of the system.
- Pre-Processing of the Images.
- Implementation of the Deep Learning Techniques.
- Classification.

III. REQUIREMENTS

Software requirements:

- TensorFlow.
- Keras.
- Ubuntu OS.
- Amazon Web Server.

Hardware requirements:

- System with a GPU.

IV. SYSTEM ARCHITECTURE

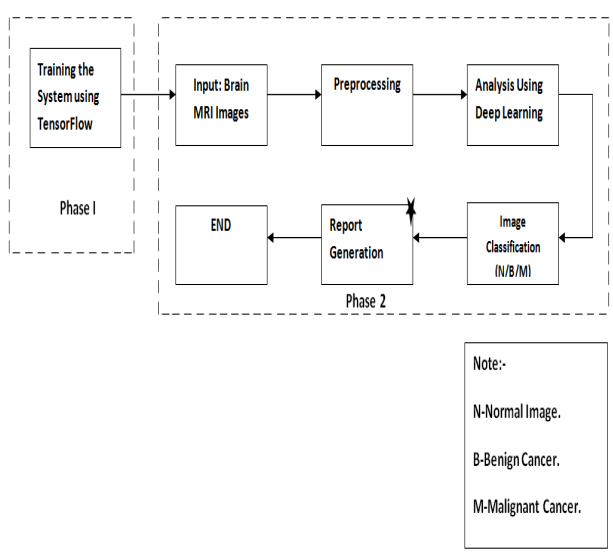


Figure 1.

V. MODULES

Modules of this system are:

- **MRI images into the system :** The patient MRI images are taken and are given to the system or further processing.
- **Pre-processing :** Resizing & Renaming.
- **Analysis using Deep Learning :** The processed images are analyzed using deep learning technology.
- **Classification and report generation :** After analyses the images are classified according to the presence of carcinogenic cells. [Normal/Benign/Malignant]

VI. DEEP LEARNING

Deep learning is a class of Machine Learning that :

- use a cascade of multiple layers of non linear units for the feature extraction and transformation. Each successive layer uses the output from the previous layer as input.
- learn in supervised (e.g., classification) and/or unsupervised (e.g., pattern analysis) manners.
- learn multiple levels of representations that correspond to different levels of abstraction; the levels form a hierarchy of concepts.
- use some form of gradient descent for training via backpropagation.

VII. CONVOLUTION NEURAL NETWORK

In machine learning, a convolutional neural network (CNN, or ConvNet) is a class of deep, feed-forward artificial neural networks that has successfully been applied to analyzing visual imagery. CNNs use a variation of multilayer perceptrons designed to require minimal preprocessing. They are also known as shift invariant or space invariant artificial neural networks (SIANN), based on their shared-weights architecture & translation invariance characteristics.

VIII. TECHNOLOGY USED

- **Deep Learning :**
 1. CNN:-Convolution Neural Network.
 2. Inception Model.
- **TensorFlow:-M/L Library.**

IX. CONCLUSION & FUTURE WORK

In this proposed work different medical images like, MRI brain cancer images are taken for detecting Tumor. The proposed approach for Brain Tumor Detection based on Convolution Neural Network categorises into Multi-layer Perceptron Neural Network. The proposed approach utilizes a combination of this neural network technique and is composed of several steps including:-Training the system, Pre-Processing, Implementation of the Deep Learning, Classification. In future we will take a large database and try to give more accuracy which will work on any type of MRI Brain Tumor.

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