**Synopsis**

**Project group ID: -**02

**Project Title: -** Smart Detection of **Brain Tumor** using convolutional neural network(CNN)

**Project Domain: -**Machine Learning

**Team Members: -**

|  |  |  |  |
| --- | --- | --- | --- |
| **Sr. No.** | **Name** | **Roll No.** | **Sign** |
| 1 | Archana Karlekar | B11043 |  |
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**Internal Guide: -**Dr. Prasad Halgaonkar

**Keyword: -** Machine Learning, Deep Neural Network, Fuzzy C-Means, Convolutional Neural Network

**Problem Definition: -**

To build a smart system to detect & classify brain tumor for doctors using Convolutional Neural Network to reduce time and complexity of existing system. This system will also be a helping hand for doctors.

**Modules: -**

1. Data Preprocessing:-
2. Data acquisition
3. Clustering and/or Classification of data

2.Training and testing of classifier :-

1. Implementation of CNN
2. Try to increase accuracy of Prediction

3.GUI module :-

1. Making user friendly interface for end users

4.System Testing :-

1. Verifying Functionality of system

**Research papers: -**

1. **Classification using deep learning Neural network for brain tumor:-**

Methodology:-

* Brain MRIs Dataset acquisition
* Image segmentation using Fuzzy C-means
* Feature extraction using DWT and reduction using PCA
* Classification using DNN

Limitations :-

* Require more hardware specification and take more time for processing for large sixe images like(256\*256)
* Less accurate result
* We need complex methods to formulate input as well as output

1. **Understanding deep neural network :-**

Methodology :-

* In this basics of DNN is explained along with its implementation method
* Entry point to problem of interpreting a DNN model and explaning its prediction
* Gives overview of techniques for interpreting complex machine learning model, with focus on DNN

1. **Visualizing Higher- Features of a Deep Network Layer:-**

Methodology :-

* find good qualitative interpretations of high level features represented by such models
* contrast and compare several techniques applied on Stacked Denoising Autoencoders and Deep Belief Networks, trained on several vision datasets
* to understand more of how and why deep architectures work

1. **Brain Tumor Detection based on Multi-parameter MRI Image Analysis** :-

Methodology :-

* simple supervised block-based and image-based (shape, texture, and content) technique has been used to analyse MRI brain images with relatively lower computational requirements
* Pre-processing is used for loading the Input MR images to the MATLAB Environment and also it removes any kind of noise present
* Classifying regions using their multi parameter values like edge, gray, contrast etc. makes the study of the regions of physiological and pathological interest easier and more definable Segmentation of brain tumor by using watershed in MATLAB Environment.
* Designing of GUI for Tumor Detection &Visualization

Limitations :-

* Require lot of manual complex calculations
* Require more time
* Less efficient

**Literature Survey: -**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sr.No.** | **Paper Name** | **Publication& Year** | **Methodology**  **Used** | **Limitations** |
| 1 | Classification using DNN | 2017  IEEE.org | Brain tumor detection using DNN | Complex system and require more time |
| 2. | Understanding deep neural network | 2017  IEEE.org | Basic understanding of DNN | NA |
| 3. | Visualizing Higher- Features of a Deep Network | 2013  Science Direct | Understanding loss functions | NA |
| 4 | Brain Tumor Detection based on Multi-parameter MRI Image Analysis | 2009  Science Direct | Brain tumor segmentation method has been developed & validated segmentation on 2D & 3D MRI Data. | Manual Calculation of dimension of segmented tumor is difficult process |

**Web links:-**

**1.Dataset-**

* + 1. <http://www.imm.dtu.dk/projects/BRATS2018>

**2.Learning**

1. [**https://www.youtube.com/watch?v=cKxRvEZd3Mw&list=PLOU2XLYxmsIIuiBfYad6rFYQU\_jL2ryal**](https://www.youtube.com/watch?v=cKxRvEZd3Mw&list=PLOU2XLYxmsIIuiBfYad6rFYQU_jL2ryal)
2. [**https://developers.google.com/machine-learning/crash-course/ml-intro**](https://developers.google.com/machine-learning/crash-course/ml-intro)
3. Udemy course on Machine Learning A-Z

**Software and hardware requirements of the project:-**

* **Software**
  + Any OS is suitable containing python
  + Anaconda
  + Pycharm
  + Itk-snap
  + Matlab (if allowed)
* **Hardware**
  + GPU for training process
  + Good processor ex: i5 and more
  + Ram 4 GB

**Outcomes:-**

A better system for the classification and detection of brain tumor which will provide a helping hand to doctors.

**Probable date of Completion :-**  1/04/2019