**A Predictive Model for Dementia Risk**

**Problem Description**

Development of healthcare technologies, the elderly population has grown and therefore populating ageing has emerged as a social issue. It is a cause of rise in patients with geriatric disorders, among which dementia is very fatal to the elderly’s activities of daily living. Detecting dementia in its early stage is far more important than treating the disease. People misunderstood dementia as old age problems. Timely diagnosis of dementia is for decelerating its progression as well as allowing maximized benefits of pharmaceutical interventions that can mitigate the side effects in certain types of dementia. Need to develop an machine learning based algorithm to predict dementia risk that aids in early detection of the disease to prevent significant brain cell damage, stops dementia from progressing, and avoids expensive testing and its adverse effects.

**Literature Survey**

1. **A Novel AI-Based System for Detection and Severity Prediction of Dementia Using MRI**

* Novel DCGAN-based Augmentation and Classification model
* Comparison of three different datasets original dataset, geometrically transformed images, and a GAN-augmented dataset
* Classify dementia into four categories depending upon its prominence in the MRI scan
* Addresses the problem of improper augmentation of medical images using conventional augmentation techniques.
* GradCAM to visually represent the internal working of the model

**2**. **Stacked Deep Dense Neural Network Model to Predict Alzheimer’s Dementia Using Audio Transcript Data**

* Designed hybrid model with CNN & Bidirectional Long-Short Term Memory and proposed a Stacked Deep Dense Neural Network
* Models was trained end-to-end using DementiaBank clinical transcript dataset
* Investigated under two settings: Randomly initialized and Glove embedding.
* Hyperparameter optimization is performed using Grid Search

**3. DEMNET: A Deep Learning Model for Early Diagnosis of Alzheimer Diseases and Dementia From MR Images**

* CNN is utilized to create a framework that can be used to detect specific dementia disease characteristics from MRI images
* CNN architecture is proposed with relatively small parameters to detect the types of dementia which is suitable for training a smaller dataset and named DEMNET
* Generates high-resolution disease probability maps from the local brain structure to a multilayer perceptron
* SMOTE technique is used to address the class imbalance problem
* Occlusion sensitivity map

**4. A Deep Convolutional Neural Networks Based Approach for Alzheimer’s Disease and Mild Cognitive Impairment Classification Using Brain Images**

* Novel DNN based model for distinguishing AD and MCI patients from Cognitively Normal individuals.
* VGG-19 architecture is used.
* In back Propagation, deeper models suffer from the problem of vanishing gradient and information loss are solved by Dense-Block notion from the original DenseNet architecture
* To minimize the computational time required in the network, we have replaced all the convolutional operations by depth-wise convolutional operations.

**5. Studying the Manifold Structure of Alzheimer’s Disease: A Deep Learning Approach Using Convolutional Autoencoders**

* Exploratory data analysis of AD based on deep convolutional autoencoders.
* Finding links between cognitive symptoms and underlying neurodegeneration process by fusing the information of neuropsychological test outcomes with the imaging features
* CAE architecture tool perform an automatic non-linear decomposition of a very large dataset

**Framework**

Tensorflow

Algorithm -XGboost and Tabnet

**Dataset**