

PROJECT REPORT BASED ON RESEARCH PAPER

INTRODUCTION:

Alzheimer's disease is a chronic neuro degenerative disease that usually starts slowly and worsens over time. It is the main cause of 60% - 70% of the cases of dementia. There are different stages of the disease like mild stage, moderate stage and crucial stage. Advanced medical imaging techniques like MRI, CT, PET etc. shows significant role in the diagnosis of the disease.

AD typically destroys neurons in the brain areas involved in memory, including the entorhinal cortex and the hippocampus. Early symptom is difficulty in remembering recent events. Amyloid plaques, neurofibrillary tangles, synaptic loss and cell death are the striking features of Alzheimer's brain.

More than 90% of the disease occur in people above age 60. Some people with memory problem may have MCI, a condition that may lead to AD. Major tools of the disease diagnosis includes analyzing medical history of the patient, a physical exam, and tests which measure memory, language skills and other abilities related to brain functioning. Neuro psychological tests such as Mini Mental State Examination (MMSE) are used for diagnosis as the screening test. Low MMSE score needs further evaluation such as brain imaging techniques.

Current diagnosis of AD is made by clinical, mental and neuro-physiological tests. Therefore, developing new approaches for early and specific recognition of Alzheimer's disease is of crucial importance.

DETAILS:

Classification is performed using three classifiers, viz. SVM, ANN and k-NN.

1. *SVM classifier:* SVM is a supervised learning model which analyses the given data for classification or regression. In the case of classification, SVM finds an optimal decision plane which separates data into different classes. Basically SVM is a binary classifier which classifies given data into two classes. Marginal hyper plane is the plane through which support vectors pass through. By supervised learning, SVM tries to maximize the margin of separation between the marginal planes.
2. *k-NN classifier:*
k-NN is a classifier where each pixel is classified in the same class as the training data with the closest intensity. Here the Euclidean distance, the difference d between the M descriptions of a sample, s and the description of a known texture, k is calculated. For M measurements of N known samples of textures and for O samples of each, will get an M -dimensional feature space that contains the $N \times O$ points. If we select the point in the feature space that is closest to the current sample, then we can select the sample's nearest neighbour.
3. *ANN classifier:* ANN is a kind of classifier based on supervised learning strategy, which is inspired by biological neural network. It is based on a collection of units called artificial neurons. These neurons are arranged in layers. The input, hidden,

and output layers are different layers of the network that perform certain transformations on the input. The number of nodes or the number of neurons in the input layer is equal to the input dimension. The number of nodes in the output layer depends on the number of output classes. The number of hidden layers may be one or more, and the number of neurons in the hidden layer is usually chosen to be higher than the number of nodes in the input layer. Since ANN is a supervised learning model, it has some learning rules that modify connection weights based on the input patterns provided. More simply, when a neural network is initially presented with a pattern, it would be a random guess on it. Then it will see how far the actual output is, and make the appropriate adjustments to its connection weights.

CONCLUSION:

Here, a method is explained to compare the performance of SVM, ANN and k-NN classifiers for detecting AD.

Performance comparison of classifiers with reduced features was found to be 96.29% for KKN classifier, while 92.8% for ANN and 88.51% for SVM classification.

REFERENCE:

Neha Surendran¹, Ahammed Muneer K (2017), Multistage Classification of Alzheimer's Disease