

# Predictive Analytics on Alzheimer's Disease

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**Abstract:** Clinical studies in the past have shown that the pathology of Alzheimer's disease (AD) initiates, 10 to 15 years before the visible clinical symptoms of cognitive impairment starts to appear in AD diagnosed patients. But the onset of Alzheimer's disease is difficult to detect in the early stages. As a result, proper care is not available for the majority of the AD patients across the globe. If the onset of Alzheimer's can be predicted earlier, then it will be valuable in designing a clinical trial and in giving proper care for the patients. Various approaches have been discussed through the years to find a possible solution for the problem. The aim of this paper is to study the various algorithms and methods suitable for the prediction of Alzheimer's disease.

**Keywords:** Alzheimer's date, Dementia, MCI, CN

## 1. Introduction

Alzheimer's disease (AD) is a type of dementia that usually affects elderly persons leading to progressive cognitive impairment disorder such as memory loss and a decline in functional abilities of the brain. As per world Alzheimer report, 2016 around 46.8 million people are affected by Alzheimer and related dementia. It is estimated the incidence of Alzheimer will double in every 20 years and by 2050 the prevalence of Alzheimer will be around 131.5 million across the globe. With the current diagnostic technology, only one out of four individuals with the AD is diagnosed. Currently, no permanent cures for AD exist, but there are many treatments which can delay the advancing trait of this disorder. In this regard, it is important to early identify an individual with mild cognitive impairment (MCI) who are most likely of progressing to late stages of the AD. Alzheimer's is the most common cause of dementia, a general term for memory loss and other cognitive abilities serious enough to interfere with daily life. Alzheimer's disease accounts for 60 percent to 80 percent of dementia cases. Alzheimer's is not a normal part of aging. The greatest known risk factor is increasing age, and the majority of people with Alzheimer's are 65 and older. But Alzheimer's is not just a disease of old age. Approximately 200,000 Americans under the age of 65 have younger-onset Alzheimer's disease (also known as early-onset Alzheimer's). Alzheimer's worsens over time. Alzheimer's is a progressive disease, where dementia symptoms gradually worsen over a number of years. In its early stages, memory loss is mild, but with late-stage Alzheimer's, individuals lose the ability to carry on a conversation and respond to their environment. Alzheimer's is the sixth leading cause of death in the United States. On average, a person with

Alzheimer's lives four to eight years after diagnosis, but can live as long as 20 years, depending on other factors. Alzheimer's has no current cure, but treatments for symptoms are available and research continues. Although current Alzheimer's treatments cannot stop Alzheimer's from progressing, they can temporarily slow the worsening of dementia symptoms and improve quality of life for those with Alzheimer's and their caregivers. Today, there is a worldwide effort under way to find better ways to treat the disease, delay its onset, and prevent it from developing.

## 2. Related works

In [1] Colin Green proposed: A multidomain health policy model, Data from the US National Alzheimer's Coordinating Center were used to examine change in symptom status. Multidomain model was used to predict progression and to assess a hypothetical treatment scenario that slows mild to moderate AD progression. The analysis results in a simple multidomain approach which enhance the evaluative framework for the assessment of interventions for AD.

In [2] Saman Sarraf proposed the Classification of Alzheimer's Disease Using fMRI Data and Deep Learning Convolutional Neural Networks, using convolutional neural network to classify Alzheimer's brain from normal healthy brain. Using Convolutional Neural Network (CNN) and the famous architecture LeNet-5, they successfully classified functional MRI data of Alzheimer's subjects from normal controls. However, the method was not suited for more complex dementia types.

In [3] Ruben Armananzas, et al, proposed Voxel-Based Diagnosis of Alzheimer's Disease Using Classifier Ensembles, they explored the application of different machine learning techniques to the classification of fMRI data for the purpose of identifying the presence of Alzheimer's. Results repeatedly pointed out Brodmann regions with distinct activation patterns between demented and nondemented profiles. MRI is a powerful method that provides information on brain activity, and thus, may detect changes related to AD.

In [4] Sylvester O. Orimaye, et al proposed Predicting probable Alzheimer's disease using linguistic deficits and biomarkers They used several machine learning algorithms and low-level linguistic features to build automated diagnostic models. These models were then used to distinguish the controls that had an onset of Alzheimer's. Their models learned several syntactic, lexical, and n-gram linguistic biomarkers to

distinguish the probable AD group from the healthy group.

In [5] Syed Asif Hassan and Tabrej Khan proposed a Machine Learning Model to Predict the Onset of Alzheimer Disease using Potential Cerebrospinal Fluid (CSF) Biomarkers. The goal of the study was to generate a classification model to predict earlier stages of the AD using specific early-stage CSF biomarkers obtained from a clinical Alzheimer dataset. The dataset was segmented into variable sizes and classification models based on three machine learning (ML) algorithms, such as Sequential Minimal Optimization (SMO), Naive Bayes (NB), and J48 were generated. The efficiency of these models were evaluated and was concluded that J48 is the best.

### 3. Conclusion

This paper presented an overview on predictive analytics on Alzheimer's disease.

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