

Chapter 26

A Review of Prediction on Alzheimer's Disease Using Machine Learning Techniques

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ABSTRACT

Alzheimer's disease is the most typical neurological disorder. There are about 45 million people who have this illness. Alzheimer's disease (AD) is a neurodegenerative disorder that impacts neurons, brain cells, and neurotransmitters and affects perception, memory, and behavior. Even though the symptoms are mild at first, they always worsen. There is currently no cure for AD. However, taking recommended medications can slow the spread of the illness. Early Alzheimer's diagnosis is, therefore, crucial for both therapy and future research. The main challenges in early AD identification using various classification algorithms are the extremely low numbers of trained samples and greater feature descriptions. The disease rendered sufferers' incapable of thinking, reading, and doing a wide range of other tasks. By anticipating the disease, a machine learning system may be able to lessen this issue. Finding dementia in a range of persons is the main objective.

INTRODUCTION

Alzheimer's disease (AD), a degenerative brain ailment with symptoms including short-term memory loss, psychosis, and delusional ideas, is frequently misdiagnosed as stress or aging-related symptoms. This condition affects over 5 million people in the United States. AD doesn't get adequate medical attention. AD must be constantly treated with medication. AD is a chronic illness; thus, it might last for a very long period or your entire life. Therefore, it is essential to provide medication at the proper

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moment to avoid serious brain damage. The majority of people can still function independently when Alzheimer's disease is still in its early stages. In certain cases, the person may still be able to drive, work, and participate in social activities. Even in this situation, the person may still suffer anxiety or memory loss, such as having problems remembering familiar places and words. Close associates have observed that they have problems remembering names. A comprehensive medical interview might help a doctor identify memory and attention problems in a patient. In the early stages of AD, typical obstacles include:

- The proper word or name is challenging to recall.
- Having trouble remembering the names of persons you meet for the first time.
- Working in a social or professional setting could be challenging every day.
- Forgetting a recent paragraph from a book or other source that you read.
- Having trouble finding or misplacing an expensive item.

Task and activity planning and organization are becoming more and more difficult. Before further exploring machine learning technology, it is essential to understand machine learning and the typical approaches utilized in AD diagnosis. Several methods for producing statistical and probabilistic assessments based on information are available in the artificial intelligence discipline of machine learning. To categorize new experiences and recognize novel patterns, prior learning (training) is required. Machine learning is a considerably more effective statistical technique than traditional statistical approaches. Understanding the problem and the limitations of the algorithms is crucial for machine learning to succeed. Therefore, if experimentation is conducted correctly, training is utilized properly, and results are carefully evaluated, it has a decent probability of success. The neurologic degenerative disorder known as AD causes the brain to shrink and lose cells. AD is the primary contributor to dementia. A steady loss in thinking, acting, and social abilities diminishes one's capacity for initiative. AD affects 5.8 million Americans who are 65 years of age or older. They are 75 or older eighty percent of the time. There are about 50 million dementia sufferers worldwide, and 60 to 70 percent of them are believed to have Alzheimer's disease.

Review of Literature

The research of computer programs that use machine learning discover patterns and make inferences based on algorithms and statistical models without explicitly coding anything (Simon et al., 2016). Machine learning algorithms always become better with usage (Alzubi et al., 2018). Systems that use machine learning can also change with the environment.

An algorithm in a machine learning system is used to train a model, which is a machine learning system, to recognize specific patterns (Çelik, 2018). In other words, it explores the data to look for hidden patterns in a dataset (Attaran & Deb, 2018). The extraction of features and known responses of a dataset dictate the formula used to apply the routines for fresh data input and output to anticipate the answer (Schmidt et al., 2019). As a result, the model algorithm takes a set of training data, produces a technique for predicting the outcome, and then saves that approach for use in the future.

To fix the problems with two-group categorization, the SVM supervised machine learning model applies classification techniques. When dealing with sparse data, support vector machines (SVMs) shine as a quick and reliable classification approach (Masud et al., 2022). Classification and regression issues can be better addressed with the help of SVMs, a family of supervised learning methods (Hsu &

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