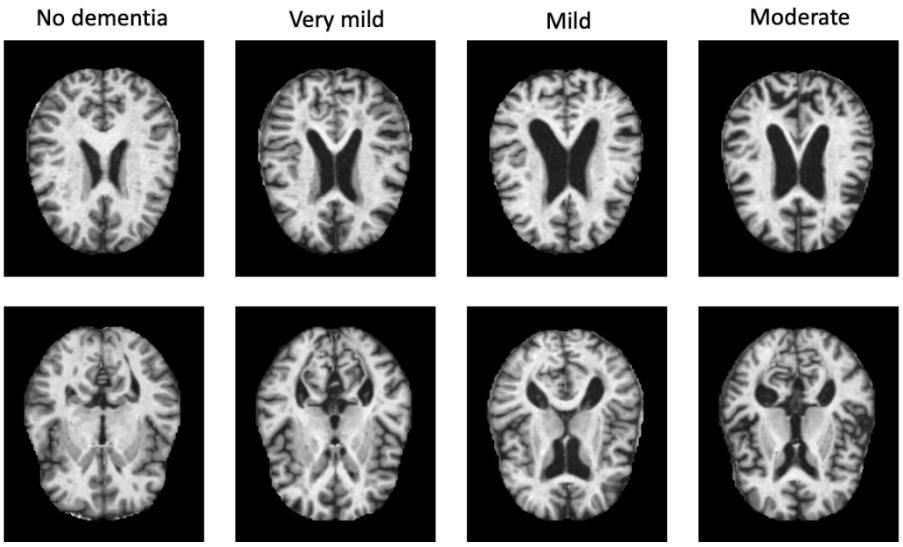
Alzheimer’s Image Classification Case Study

A DS 4002 Case Study by Ashley Kim



Alzheimer’s is a neurodegenerative condition and the most common form of dementia in the United States, impacting over 6 million Americans as of today. Memory loss is obviously the most notable symptom of Alzheimer’s, but it also causes impaired thinking and judgment, changes in personality, and an inability to perform daily tasks. [1]

This chronic nature of dementia development suggests that the patient’s brain experiences gradual change over time, and studies have shown that these changes can take place more than a decade before the onset of symptoms. [2] Current medical literature cites tissue atrophy, or shrinkage, as one of the biggest indicators of neuronal death. This atrophy can be seen in medical imaging, and by the use machine learning and data science models, there is hope for early identification and intervention for patients suffering from dementia.

A convolutional neural network (CNN) is a class of artificial neural network that is most commonly used in visual image analysis. As a new data scientist working to help individuals suffering from Alzheimer’s, you’re tasked with generating an image classification model utilizing a convolutional neural network algorithm that classifies a set of MRI scan images into the correct stage of Alzheimer’s with at least an 80% accuracy. With the provided dataset, there are four stages of dementia that each scan can be classified into: no dementia, very mild dementia, mild dementia, and moderate dementia.

[1] “Alzheimer's disease,” *Mayo Clinic*, 02-Feb-2023. [Online]. Available: https://www.mayoclinic.org/diseases-conditions/alzheimers-disease/symptoms-causes/syc-20350447. [Accessed: 25-Apr-2023].

[2] “Alzheimer's disease fact sheet,” *National Institute on Aging*, 08-Jul-2021. [Online]. Available: https://www.nia.nih.gov/health/alzheimers-disease-fact-sheet#:~:text=Changes%20in%20the%20brain%20may,amyloid%20plaques%20and%20tau%20tangles. [Accessed: 14-Mar-2023].