



# CALIFORNIA SCIENCE & ENGINEERING FAIR 2019 PROJECT SUMMARY

<b>Name(s)</b> <b>Dennis Chan</b>	<b>Project Number</b> <b>S0806</b>
<b>Project Title</b> <b>Implementation and Validation of a Machine Learning Model for the Early Detection of Alzheimer's Disease</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives</b> Alzheimer's Disease (Alzheimer's or AD) is an irreversible progressive brain disorder that slowly impairs memory, degrades thinking capabilities. Eventually, it can destroy the ability to carry out daily tasks and lead to death.</p> <p>While there is currently no cure for Alzheimer's, early diagnosis can be crucial for victims to seek proper medical treatment and support services in the early stages of the disease.</p> <p>The objective of this study is to develop a machine learning model for the early detection of Alzheimer's Disease using various biomarkers.</p> <p><b>Methods</b> To implement the machine learning model, I have developed an Artificial Intelligence-based Alzheimer's early detection system which is made up of three encapsulated but interconnected components: data loading module, training modules, and evaluation module. By accessing publicly available ADNI (Alzheimer's Disease Neuroimaging Initiative) data, my data module extracts, merges, and prepares the data for the AI training module. I have used 250 brain MRI scan subject datasets, which includes 3 categories of data, from control normal, to mild cognitive impairment (MCI), to AD patients, to repeatedly train and evaluate the model. Lastly, 150 brain scan subjects datasets are independently tested through the validation module.</p> <p><b>Results</b> My result shows an accuracy of 86 percent to distinguish a healthy brain from those with MCI.</p> <p><b>Conclusions</b> My solution effectively identifies MCI, which can happen 6 to 10 years before onset of Alzheimer's. Therefore, it helps people to plan ahead while they are still able to make important decisions on their care and on financial and legal matters. It also helps their families and caregivers relieve from enormous stress as they face new challenges and alleviate the financial burden for our society.</p>	
<b>Summary Statement</b> I developed a machine learning model for the early detection of Alzheimer's Disease	
<b>Help Received</b> I got help from Dr. Tosun, a researcher at UCSF, on the ADNI database and which dataset can be potentially useful for my study.	