

# Diagnosing Alzheimer's Disease from Brain MRIs using Deep Learning

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## 1. Introduction

The current standard for diagnosing Alzheimer's Disease requires significant time and resources. According to (Staff, 2022, Mayo Clinic), doctors perform a physical exam, neurological exam, and cognitive tests to "judge functional abilities and identify behavioral changes." Included in this process is magnetic resonance imaging (MRI) of the brain which produces a detailed view of the brain's structure in the form of images. Our goal is to train a deep neural network to identify underlying structures in the brain from MRI images and use this information to diagnose Alzheimer's Disease in a wide-variety of patients. If successful, we would develop a highly-competent model that would significantly reduce the time and cost of diagnosing Alzheimer's Disease. Using our model, we will build a web application that allows medical professionals to upload MRI images and receive an output classification which they can use to make a better informed decision on a patient's diagnosis.

## 2. Approach

The first major hurdle with any machine learning problem is finding a suitable dataset. Fortunately, we found a dataset with approximately 5,000 images of brain MRIs with annotations indicating the severity of a patient's Alzheimer's Disease (Dubey, 2019). Although we feel that this dataset will be sufficient for our purposes, we have also applied for access to some larger datasets that may help us develop a more robust model.

Given that we already have an annotated dataset, the next step is analyzing the data and building an appropriate model architecture. **JACOB THIS IS WHERE YOU WRITE STUFF. I need you to write paragraphs for bullets 5 and 6 on the instructions**

Once we have a working model, we will build a web application using TypeScript and React which will allow medical professionals to upload MRI images and receive a diagnosis. Upon upload, these images will be sent to a Python backend which will perform inference using the model. The backend will then return the classification to the frontend which will display it to the user.

### 3. Timeline

We will be meeting at least once a week until the final presentation to discuss our progress, plan for the next week, and work on any upcoming deadlines. Our tentative timeline is as follows:

Date	Goal
Sep 30	Turn in project proposal.
Oct 7	Finish data analysis and model architecture.
Oct 14	Finish model training and testing.
Oct 25	Build the web frontend using TypeScript and React. This will include the upload form and the display of the classification.
Nov 4	Build the web backend using Python. This will include the model inference and the API.
Nov 14	Start working on the final presentation power-point.
Nov 22	Finish final presentation.

**Table 1. Timeline for the Completion of our Project**

### References

- Dubey, S. (2019). [https://www.kaggle.com/datasets/tourist55/alzheimers-dataset-4-class-of-images?select=Alzheimer\\_s+Dataset](https://www.kaggle.com/datasets/tourist55/alzheimers-dataset-4-class-of-images?select=Alzheimer_s+Dataset).
- Staff, M. C. (2022). <https://www.mayoclinic.org/diseases-conditions/alzheimers-disease/in-depth/alzheimers/art-20048075#:~:text=To%20diagnose%20Alzheimer's%20dementia%2C%20doctors,other%20possible%20causes%20of%20impairment>.