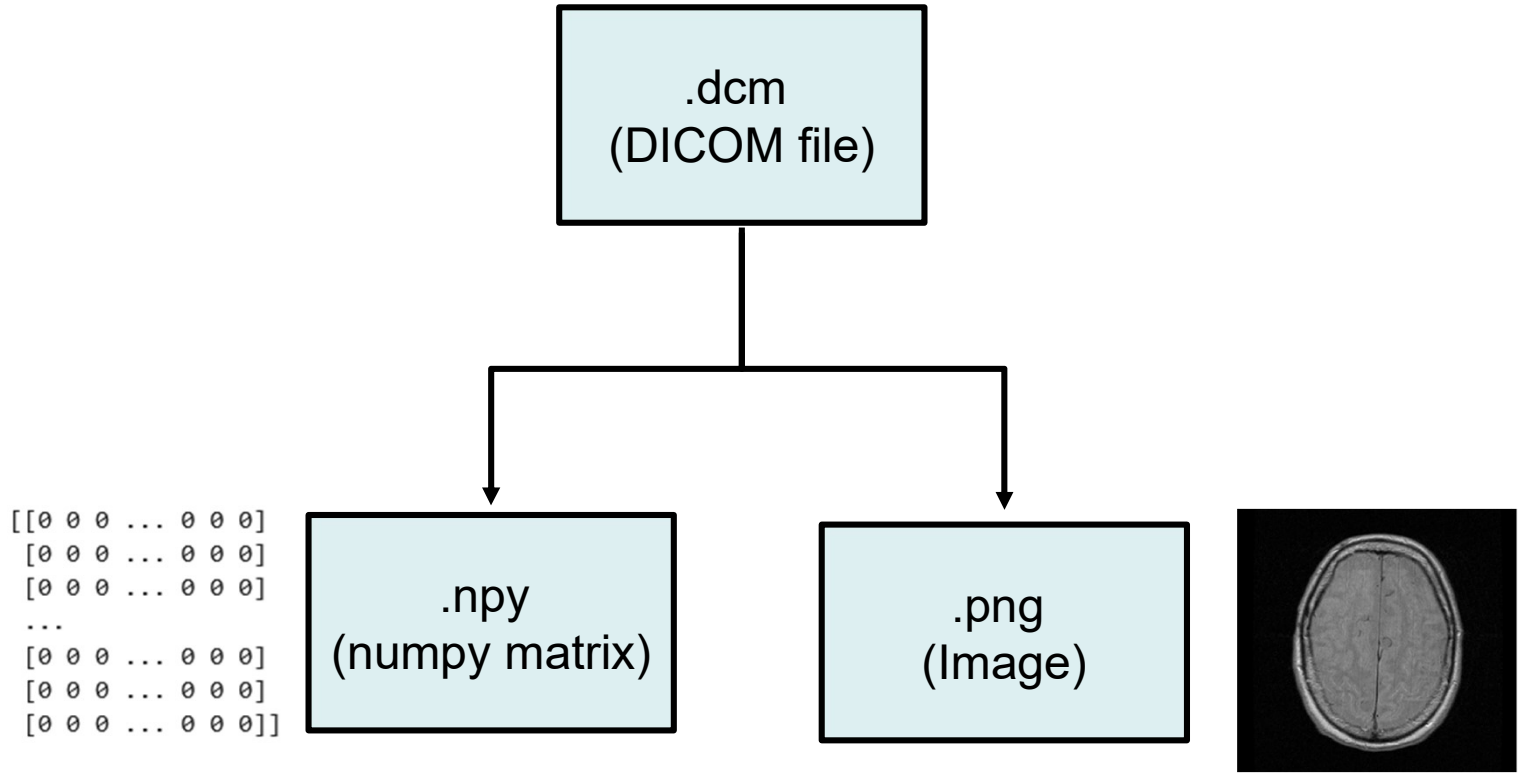
CNN for Alzheimer Disease and Mild Cognitive Impairment discrimination

Marc Rodríguez Salazar

Image treatment

- Data from ADNI in Image Data Archive

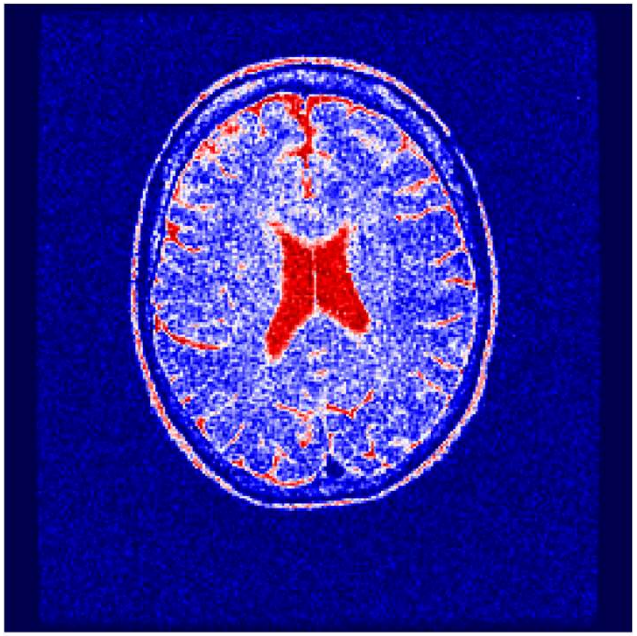
- Pydicom library in Python



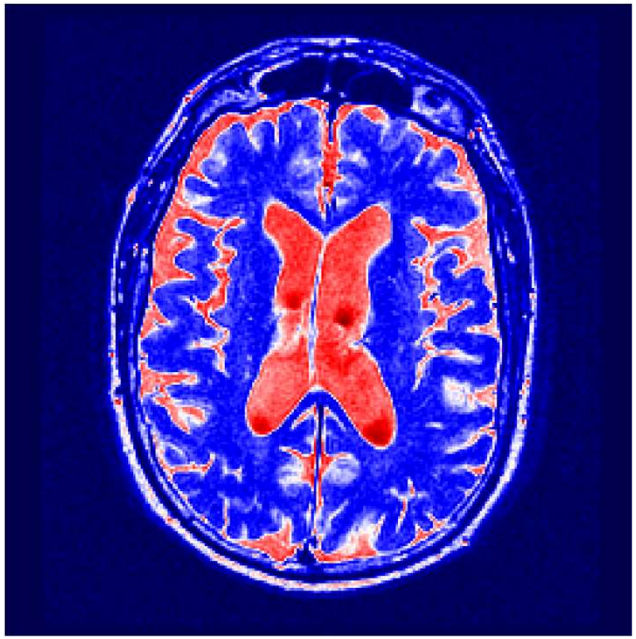
CNN to discriminate AD and MCI

- We built a Convolutional Neural Network (CNN) binary classifier to discriminate AD and MCI. These are the types of images we want to differentiate:

Mild Cognitive Impairment (MCI)



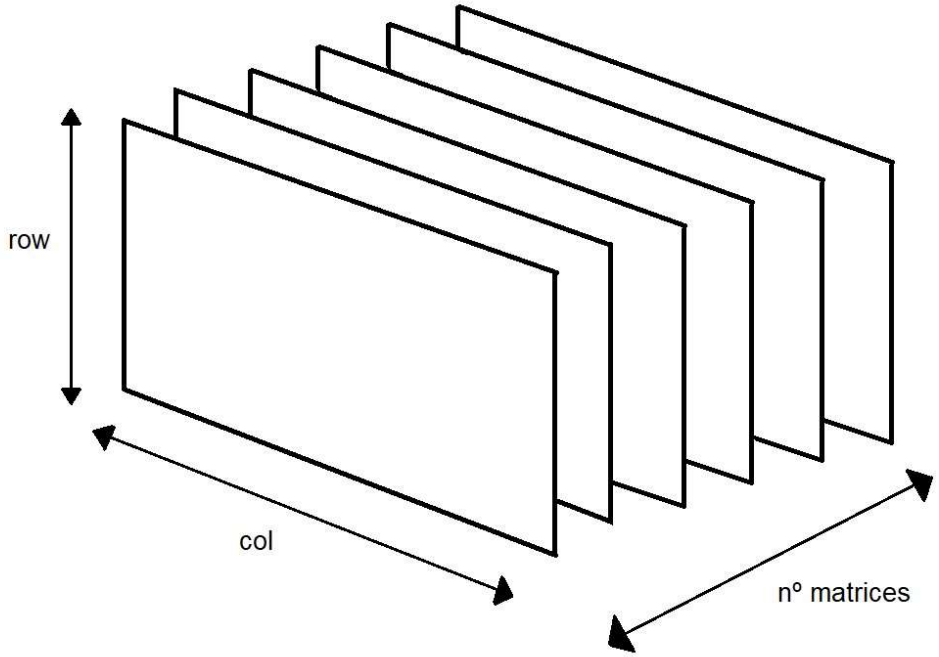
Alzheimer Disease (AD)



MCI is the transitional stage between age-related memory decline and the more severe dementia. Is important to differentiate between MCI and AD because the treatment is different.

CNN to discriminate AD and MCI

- Input (X): a tensor is built with the numpy matrices:



Dimensions:
$(nº\ matrices \times row \times col)$

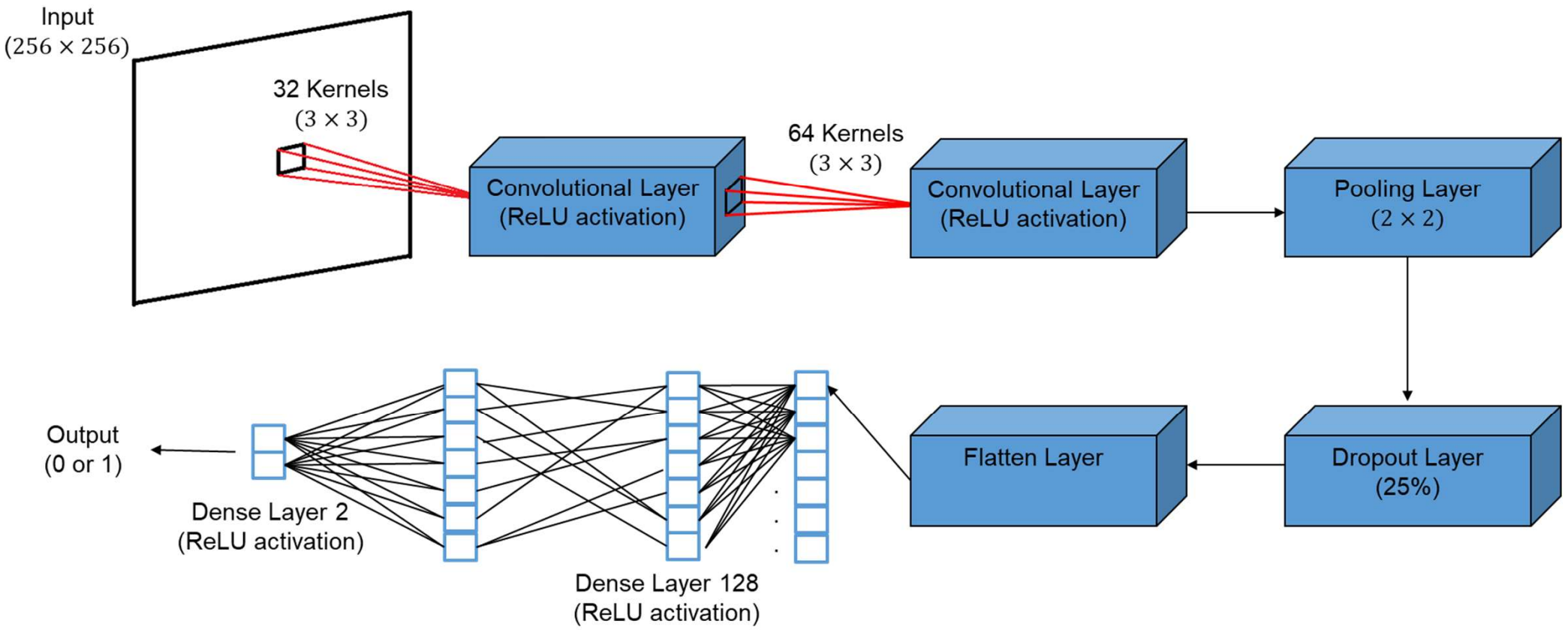
Image dimensions:
(256×256)

- Output (Y): 0 for AD, 1 for MCI

- Randomize X and Y and split it into training and test (80% training, 20% test)

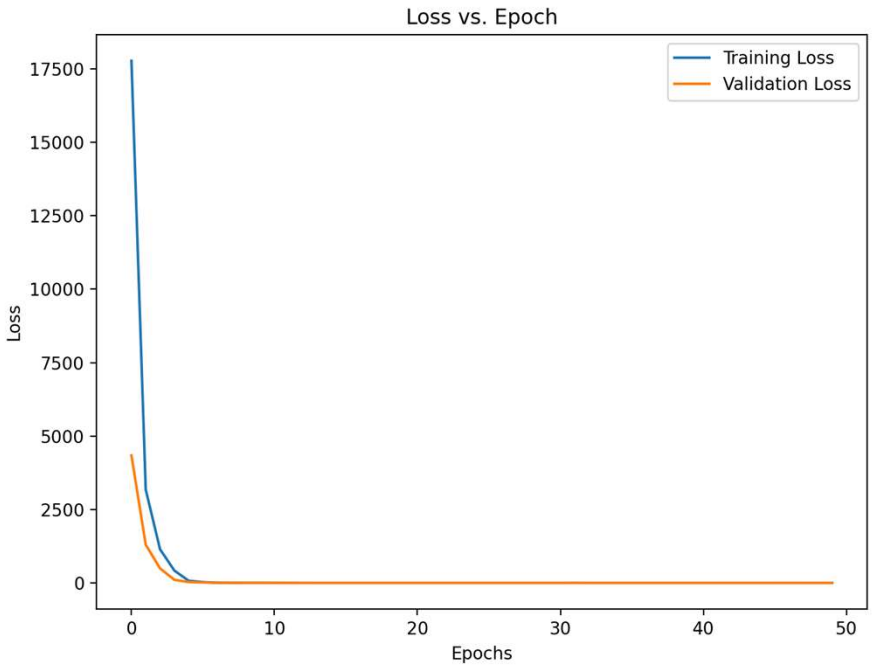
CNN to discriminate AD and MCI

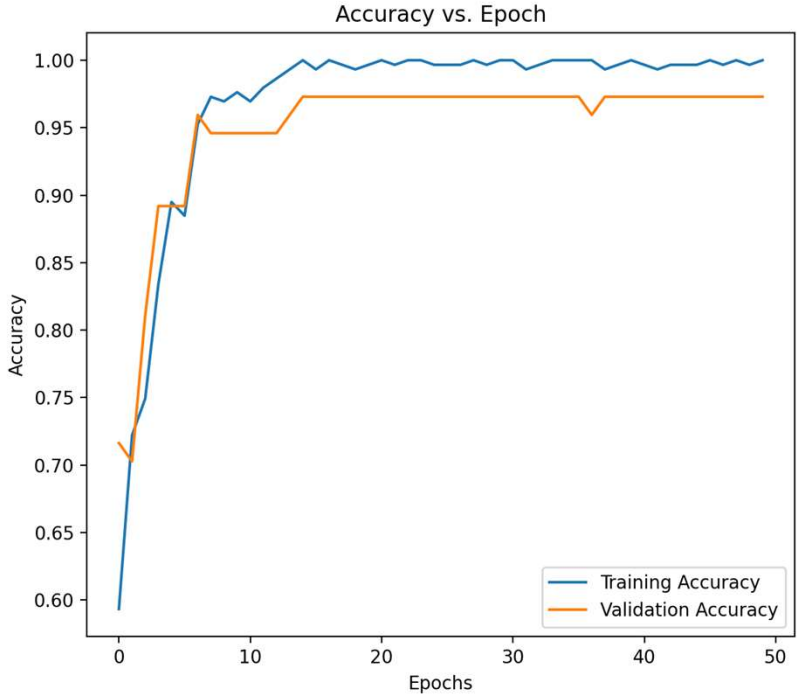
- CNN structure



CNN Results

- 50 epochs of training
- Loss and Accuracy graphs:





CNN Results

- Good discrimination between AD and MCI (98% and 96% respectively)