Diagnosing Progressive Supranuclear Palsy(PSP) Through Image-Recognition of the Hummingbird Sign Using Convolutional Neural Networks(CNN)

Chellamuthu, Vaani (School: Plano East Senior High School)

Progressive Supranuclear Palsy(PSP) is a neurodegenerative disease that affects many individuals over the age of 60. Unfortunately, more than 30% of patients with PSP are misdiagnosed as having Parkinson's Disease or Alzeihmers. One aspect of PSP that is unique however, is the buildup of tau protein, which causes neuron death in the brain-this results in what is known as the “hummingbird sign”, where neuron death specifically in the midbrain results in the shape of the brain to look like a hummingbird/butterfly. This project aims to eliminate misdiagnosis of PSP by using image-recognition software in convolutional neural networks(CNN) to identify the hummingbird sign in the MRIs of patients with PSP. Upon building a convolutional neural network, the model’s accuracy was evaluated by using an example dataset. The model proved to be reliable, and after several rounds of testing/validation cycles the model was trained to have an accuracy of about 96%. This proves that using deep learning and CNN models can be used to help diagnose neurodegenerative diseases such as PSP, and that his project is also very significant as in the future it could help with avoiding misdiagnosis in patients suffering from this disease. Not to mention, some future applications of this project could be using the CNN model and training it with MRIs of other neurodegenerative diseases, one day making it able to diagnose pathologies like Multiple System Atrophy(MSA) or Parkinson's Disease.

Awards Won: