

Identifying Parkinson's Disease Patients by Deep Learning of Brain Scans

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Parkinson's Disease (PD) is one of the most common and highly progressive neurodegenerative diseases, affecting millions of people worldwide. The disease is caused by lack of dopamine in the brain causing deficiency on muscle control and mobility in the patients.

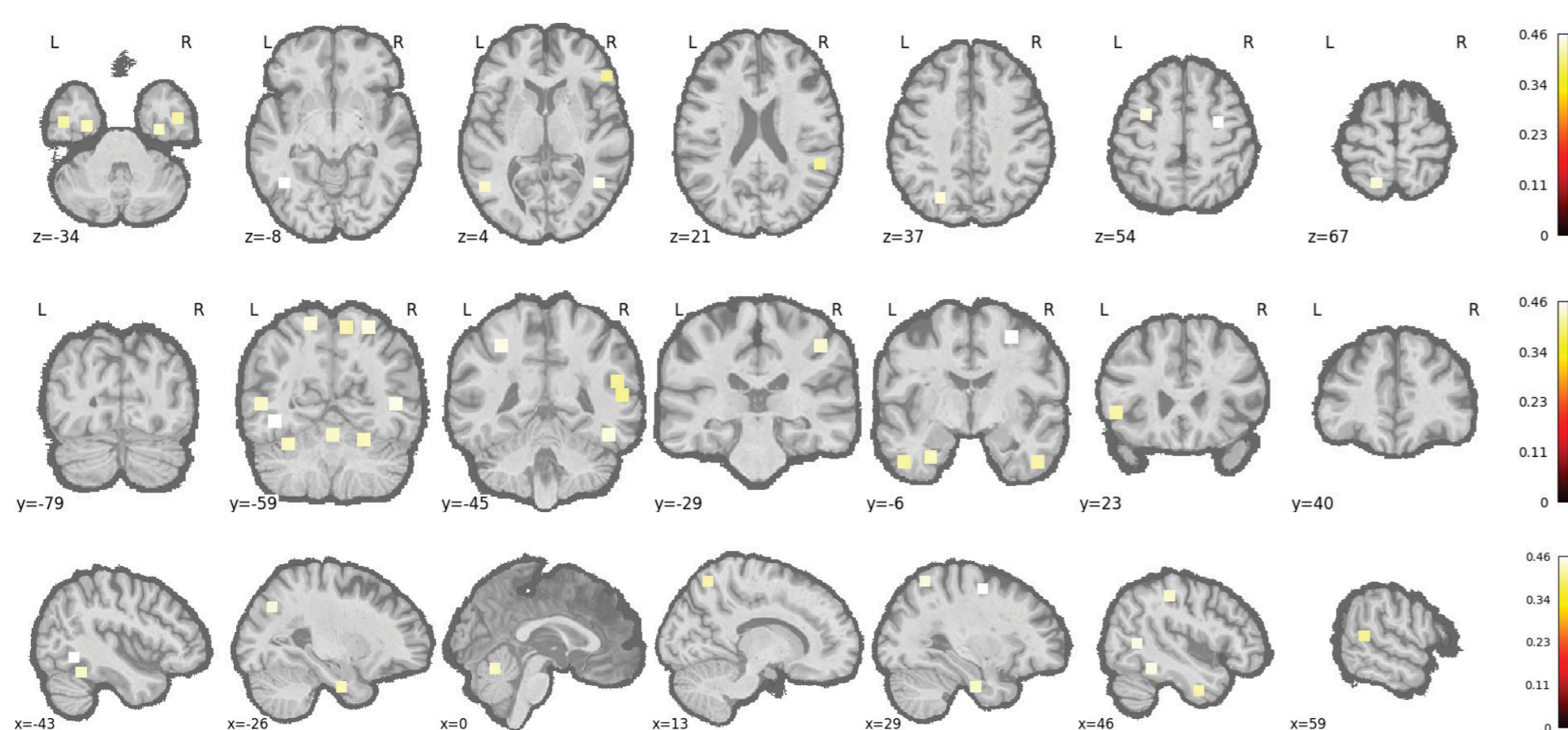
Project Objective

Functional Magnetic Resonance Imaging (fMRI) scans are used to effectively classify PD patients using four neural network models:

- Graph Convolution Neural Network
- Feedforward Neural Network
- Basic Recurrent Neural Network
- Long Short-Term Memory Unit

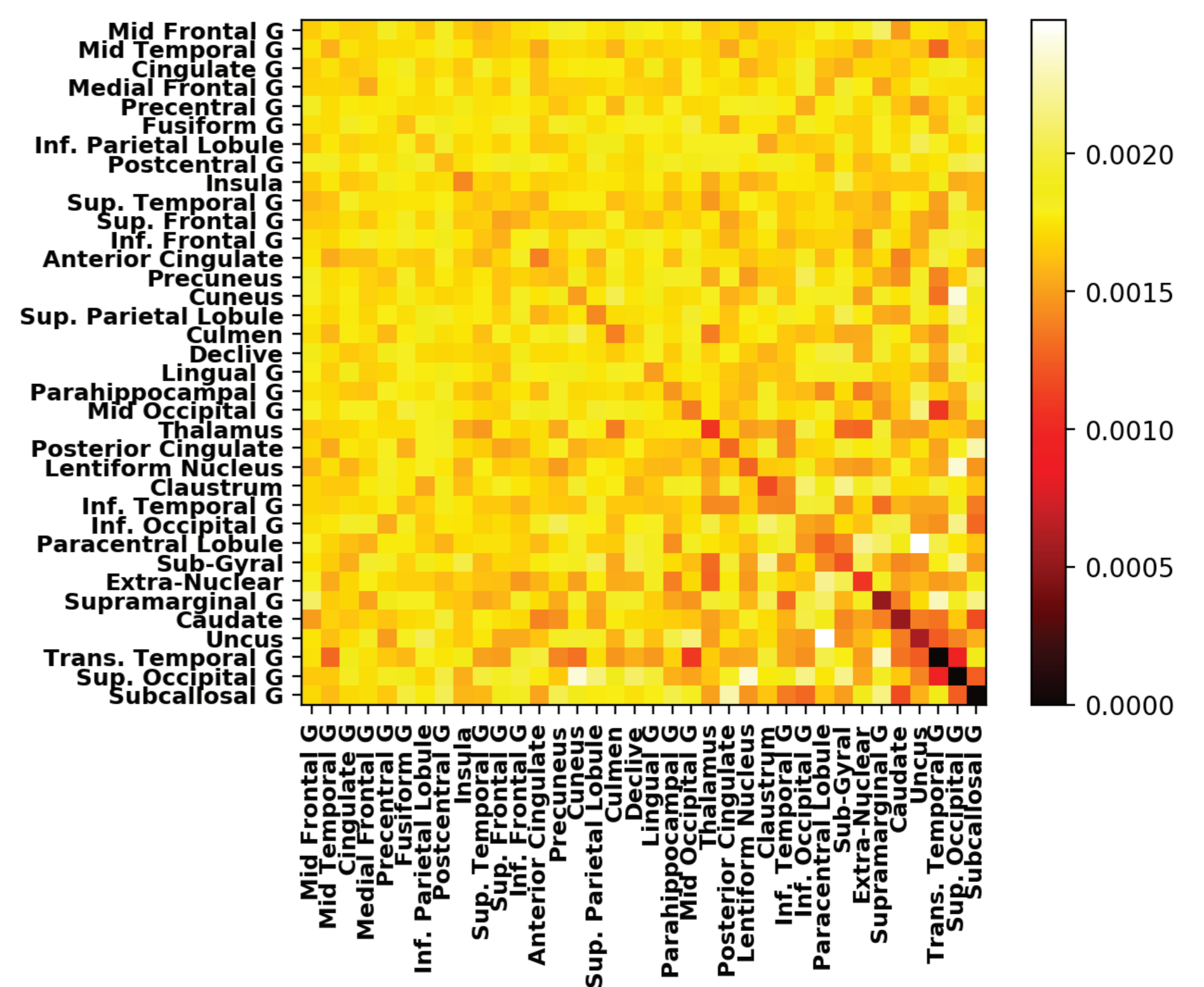
From the best model among all the networks, the important Regions of Interests (ROI) in the brain are predicted using several model interpretability algorithms:

- DeepLIFT (Deep Learning Important Features)
- Integrated Gradients
- Gradient SHAP (Shapley Additive Explanations)



Results

The highest average accuracy was achieved using feedforward neural network model with the accuracy of **75.90%**.



Postcentral G and **Paracentral Lobule** are the two most important ROIs which affects PD.

Future Work

Improvements to this project can be made by applying neural network models to the important feature subset obtained from the calculation of the importance scores using the model interpretability algorithm.