Taisha Ferguson
Machine Learning II
Final Project

Individual Final Report

Introduction

The main objective of our project was to correctly classify the presence of brain hemorrhages and their sub-types in brain scans. Our dataset was obtained from the Kaggle Competition RSNA Intracranial Hemorrhage Detection.

Shared Worked

Both Cristina and I worked on researching the topic, downloading the data, and formatting the data.

Individual Work

Once we agreed on the project problem we decided to work on testing different models individually. Cristina tested pretrained models and I tested different CNN architectures from scratch. We also each worked on combining our 3 different models ensembling methods.

After we created our different model architectures we combined the code from one of my CNN models, two of Cristina's pretrained models, and the code from my ensembling method.

After modeling, I primarily worked on the final paper and Cristina worked on primarily on the presentation and organizing our code for submission.

Results and Summary

For our project we built 3 models to classify the intracranial hemorrhage subtypes: a custom Convolutional Neural Network, a pretrained model called Desnet, and another pretrained model called VGG16. We also did different variations of ensembling with these three models. In the end the combination of our custom CNN and Denset has the best performance with the weighted multilabel logarithmic loss of 0.1462. This result was expected but also surprising. We expected the combination of our custom CNN and Dense to outperform the individual models but we did not expect it to outperform the ensemble model with all three. We think the ensemble model with all three architectures did not perform as well due to the fact the the VGG model was trained on less epochs.

In the future I would like to implement different strategies for improving accuracy such as: creating a custom loss function, training on more samples in the dataset, assembling with different neural networks like Multi-layer Perceptron and Long Short-term Memory (LSTM).

Code Percentage

50% of the code used in our paper was copied from the internet. We used code from public Kaggle notebooks to assist mostly with downloaded and formatting the files and also formatting files for submission. The majority of our time was spent on researching different network architectures and applying it to our model. Also, we spent a lot of our time working out the code for ensembling.