Project Report (August 30, 2021)

Ankita Ghosh[1] **and Sahil Khose**[2]

[1]Research Assistant, ghoshankita0907@gmail.com , CSE, MIT Manipal
[2]Research Assistant, sahilkhose18@gmail.com, ICT, MIT Manipal

ABSTRACT

We discuss the classification pipeline we have set up for measuring severity of age related macular degeneration as normal, mild or severe.

Data Collection

- The data collected consist of coloured retina images paired with a label based on the severity of macular degeneration.
- Label 0 indicates normal, label 1 denotes mild degeneration and label 2 denotes severe degeneration
- We collect data from three different datasets: IDRiD dataset (training and testing), drive dataset and messidor dataset. The data statistics are shown in Figure 1.

```
----------------Dataset----------------
IDRiD Testing Set  : 103
IDRiD Training Set  : 413
drive  : 31
messidor2  : 80
Total datapoints:  627


-----------------Labels-----------------
Label  0 :       295
Label  1 :       58
Label  2 :       274
Total datapoints:  627
```

Figure 1. Data Statistics

Architecture

- ResNet-18 architecture is implemented to be trained for this 3-class classification problem.
- ResNet-18 has 11M trainable parameters.
- ResNet architecture had introduced residual blocks which elevate the problem of vanishing gradients which allowed to build and train very deep neural networks (100-1000 number of layers). Architecture is shown in Figure 2.

Sampling

- As we can clearly see in Figure 1 there is a massive class imbalance in the dataset.
- Class 1 is just 20% of the other class labels
- In other words, Class 1 constitutes just 10% of the entire dataset (which is way lesser than the expected 33% in a balanced dataset).
- To counter this problem we have implemented the method of undersampling and oversampling during batch generation.
- During batch generation the number of datapoints sampled from a class is inversely proportional to the number of datapoints of the corresponding class.

Discussion

- We have our pipeline ready for classification, moving forward we are planning to perform logarithmic hyperparameter grid search to set a classification benchmark.
- Further we plan to implement semi-supervised methods for enhancing the baseline results.
- We have also planned to do a thorough literature review for the problem to compare with our baseline.

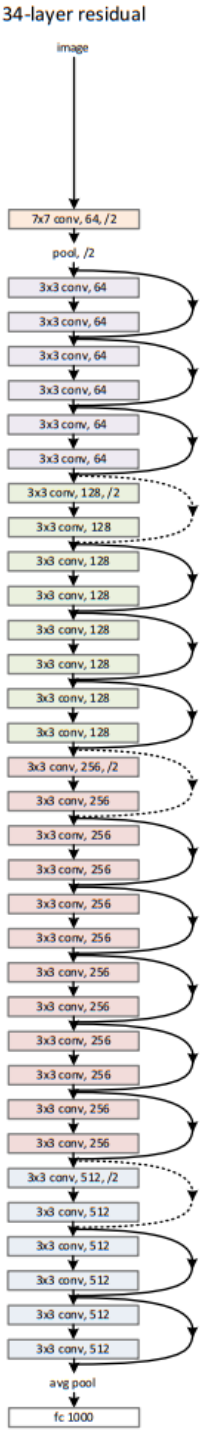

Figure 2. ResNet Architecture