

Image Classification with Neural Networks

Sequential Networks:

The sequential model was by far the fastest in terms of the amount of time spent per epoch. However, after the model was fit to the data it was only able to achieve an accuracy of about 54%. While this accuracy is not as high as the CNN I used next, it must be mentioned that the dataset I used had 6 classes. This means that the network was classifying each item as one of six possible categories instead of simple binary classification. With this in mind, if the network were to guess randomly we would expect an accuracy of around 16%. Therefore, this model is considerably better than guessing randomly, though it obviously pales in comparison to a human.

Convolutional Neural Networks:

This model took almost twice as long per epoch to fit the data than the sequential model. However, once it was finished it was able to much more accurately classify images than the previous model, reaching accuracies as high as 97%. While the training time is longer the added accuracy is considerable.

Pretrained Models:

This model did not perform nearly as well as the others. As a side note, I implemented the first two models on Kaggle but I ran into a problem importing Mobile Net V2 which led to me implementing this model on Google Collab. The training for this model took almost two hours all to achieve an accuracy of about 16%, no better than guessing. I am unsure whether this is due to the hardware limitations of my computer or a mistake I made in the implementation. Curiously, when I reached the fine tuning stage the model saw its first increase in accuracy by about 0.3% followed by a jump in accuracy of an additional 1.6% in the remaining epochs. I do not know why the accuracy was stagnant for the first 10 epochs or what caused the increase. Out

of curiosity I fine tuned the model for an additional five epochs and was able to reach an accuracy of 19%. This implies that it would be possible for me to continue to fine tune the pretrained model until it reached a desired level of accuracy, but considering each epoch took almost ten minutes I think one of the previous two models discussed would serve much better.