Toronto Metropolitan University

Department of Aerospace Engineering
Faculty of Engineering & Architectural Science

AER850 *Project 1*

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The default model was created using three convoluted layers, each with the standard filter and kernel size, resulting in training accuracy upwards of 60%. Layer filters were adjusted, and it was discovered that 32 filters was one of the best configurations. The best performing configuration with three layers was with the first two at 32 filters and the last one at 16. 8 epochs were run until the validation and training accuracies converged, at which point data would have overfit.

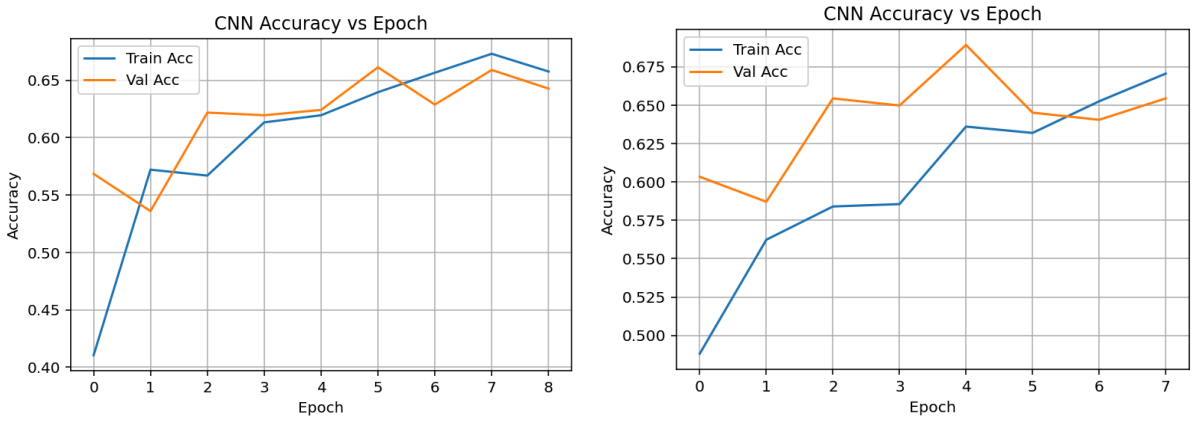

Figure 1: Iteration 0 (left) and 1 (right)

The second iteration of the model added another convoluted layer, again with the default filter and kernel size. This improved accuracy again, with a very high training accuracy and validation accuracy, though the fit could still be improved upon.

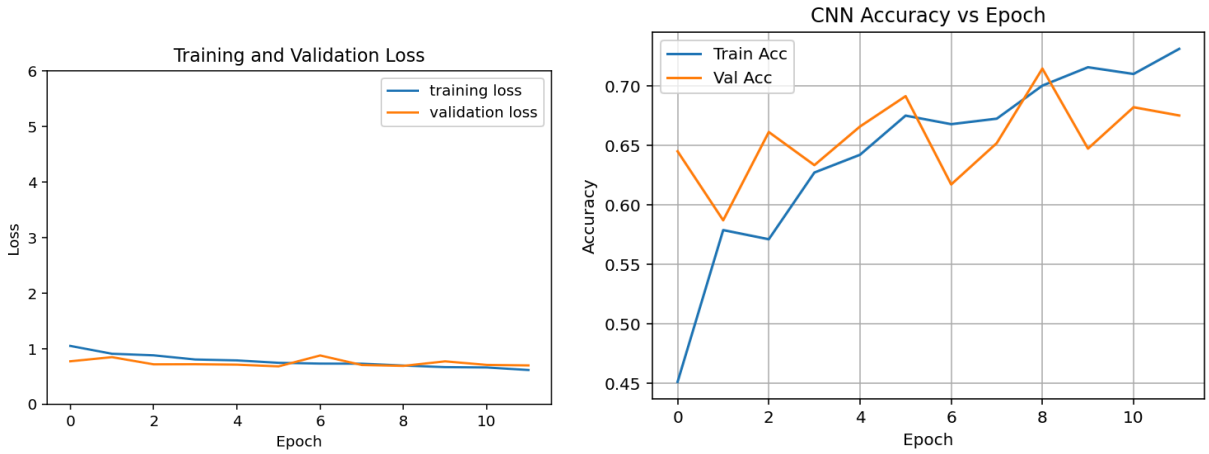

Figure 2: Loss and accuracy data of iteration 2.

Iteration 3 increased the dropout from 30% to 40%, resulting in better loss fitting but slightly decreased accuracy. However, it took less epochs to train this model as compared to previous iterations.

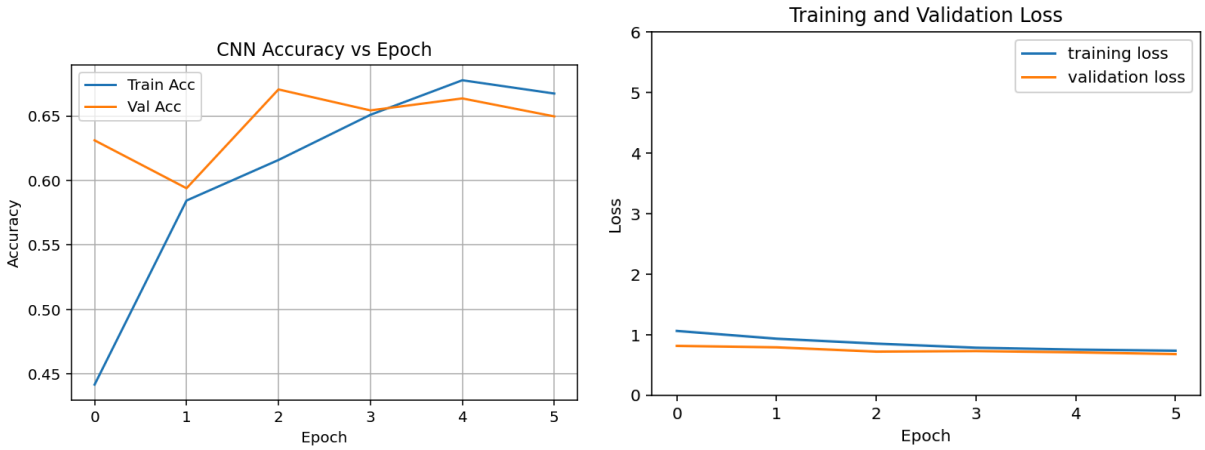

Figure 3: Accuracy and loss plots of iteration 3.

The final iteration added more data augmentation to see if the model could learn better. This succeeded and produced both high accuracy and relatively low loss, as well as fitting the data an appropriate amount.

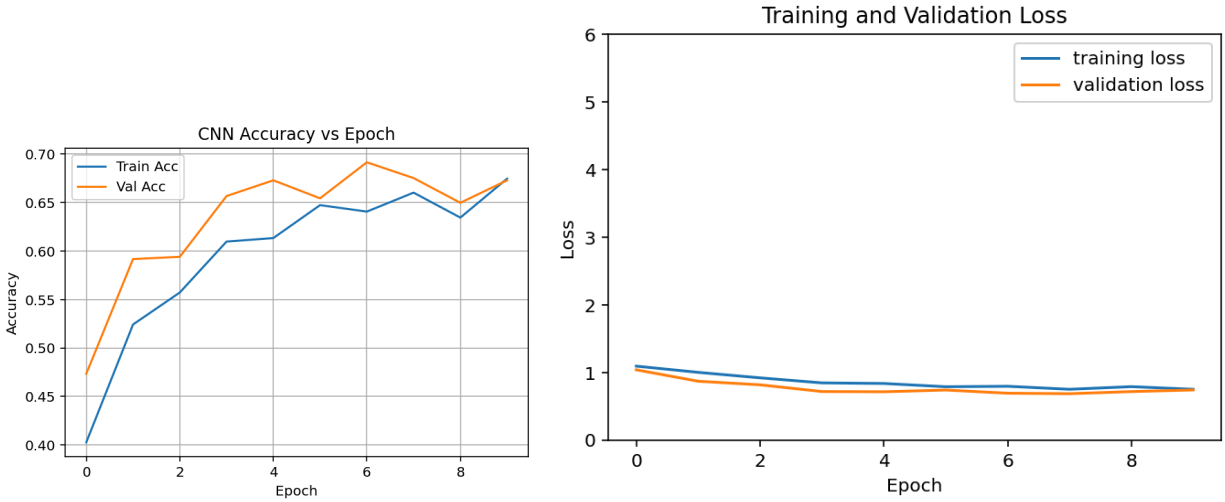

Figure 4: Iteration 4 accuracy and loss plots.

Other hyperparameters which were adjusted were the activation functions, learning rate, and density layer value. Slight alterations were made to these variables, both increases and decreases where necessary, but returned poor results. There would often be no trend in the data and would tremendously underfit. Leaky ReLU was applied to each convoluted layer but returned similar results. The learning rate was changed from the initial value of 0.001 to 0.05 and

0.005, both returning disappointing results. The dense layer value was doubled and halved to keep powers of 2, changing from 128 to 64 and 256. This resulted in small changes to compilation times, but also loss in data fitting. However, changes were not as drastic as the previous two metrics, and trends were still seen in the data when adjusted.