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1. Tutorial 2 CNN Introduction

Task 1: Classification Figure 1 shows a bar chart that presents the training and validation accuracy of several different design choices. The second test added an extra convolution layer compared to the first test and this increased both the validation and training accuracy indicating underfitting was still present. Increasing the number of dense layers with twice the number of nodes as opposed to the old first dense layer again increased both scores and didn't significantly change the generalisation error. The fourth test increased the size of the convolutions to 6x6 vs 3x3 and this again increased the scores. The 5th test tries adding more dense layers relative to the third test but this causes little change, which was interesting as it didn't result in worse validation error suggesting greater overfitting hadn't occurred. The final two tests add even more convolution layers with the last test giving a worse score suggesting at this point the model was getting too complex. Figure 2 shows the model used in the penultimate test which resulted in the highest validation score.
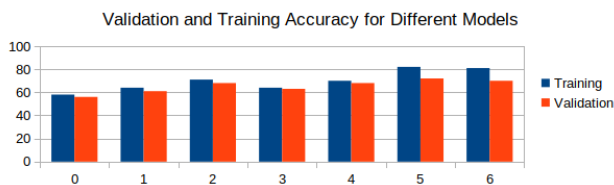

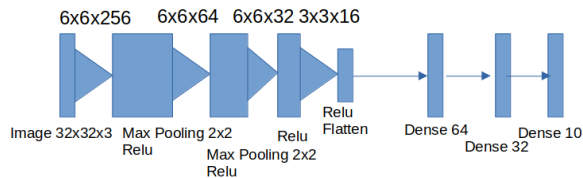Figure 1. T1.1.1 Comparison of Training vs Validation Accuracy for Several Models

Figure 2. T1.1.2 Architecture of Most Successful Model

Task 2: Regression The best model tried for this task is shown in Figure 3, and gave a minimum absolute percentage error of 52% on the validation set. Figure 4 shows the training and validation loss across different epochs for 3 models. Model 0 was the most successful on the validation set and decreasing the number of convolutions as in Model 1 resulted in a very similar training score but a worse validation score. Increasing the number of dense layers as in Model 2 gave a better training score but worse validation score suggesting that this increase resulted in overfitting. After about 25 epochs all three models had increasing validation loss which indicates that after this number of epochs they were begining to over-fit to the data set. Table 1 shows the minimum validation loss using the best model on the different faces of the house.
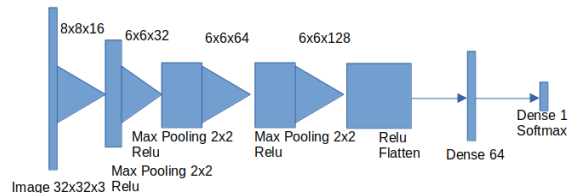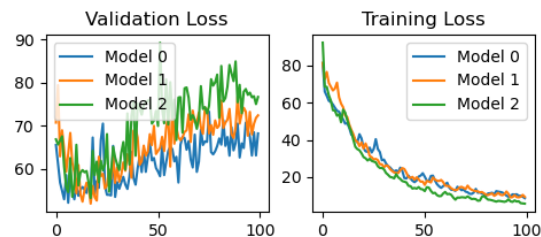

Figure 3. T1.2.1 Architecture of Most Successful Model

Figure 4. T1.2.1 Training and Validation loss, Front of the House

Face	Validation Loss
Kitchen	52.2
Bedroom	45.3
Bathroom	51.8

Table 1. T2.2 Validation loss for different house faces