Assignment 3: Time Series Data

By Jeremy Glasgow

Results

Model	Test MAE
Basic Dense Model	2.65
Single Layer LSTM	2.57
Stacked GRU with Dropout	2.46
Bidirectional LSTM	2.58
Stacked Bidirectional LSTM with Dropout	2.71
Stacked GRU with two Dropout	2.57

Summary:

I initially used a basic dense model with 16 units as my baseline comparison. The results from this first model showed the training MAE decreasing, but the validation MAE remained consistent over the 30 iterations. The test data from this first model achieved an MAE of 2.65. The next model I tried was a single LSTM model with 16 units. This model performed similarly to the basic dense model from before, ultimately achieving a 2.57 MAE on the test data. The third model I used was a stacked GRU with a dropout layer. This seemed to perform the best so far, achieving an MAE of 2.46 on the test data. I did attempt to use recurrent dropout but there was an error regarding cuDNN kernels not meeting the criteria. I looked into this a bit and the A100 GPU is significantly faster for neural networks compared to the other runtime offerings in Google Colab. I estimate the performance would have been much better, but the time to train was much longer. I found that removing the recurrent dropout eliminated the error, so I proceeded without it. Next, I tried a simple bidirectional LSTM that achieved a 2.58 MAE on the test data. This model seemed very underfit due to the validation MAE increasing each iteration. For the next model I attempted, it consisted of two bidirectional LSTM layers, each one was followed by a dropout layer. This model achieved a 2.71 MAE on the test data. For the last model I attempted, I went back to the stacked GRU with dropout. I added a dense layer after the first dropout layer, followed by an additional dropout layer. This model achieved an MAE of 2.57 on the test data. Overall, the best model was the stacked GRU with Dropout. The performance suffered due to the inability to use recurrent dropout within the layers, however, it still performed the best out of the attempted models.