# Summary

Based on the CNNpred paper, 2d CNN version with the original data (DJI, NASDAQ, NYSE, RUSSELL, S&P) was implemented. Data is from Dec 31, 2009 to Nov 15, 2017. All the data is present in the personal github repo. The model is built keras library.

At first all the required modules have been imported. Then custom metric functions as recall, precision, f1, Macro f1 score were defined. The architecture of the model according to the CNNpred paper was built next. The model uses 82 features, last 60 days data, 3 Convolutional layers with filters (3\*1) and ReLU activation, Maxpooling layers (2\*1), output layer with sigmoid activation.

Then the functions to create datastream to feed the model training and testing was created as datagen and testgen. Last 5 months of data (after '2016-04-21') is used as test data. The rest is split into 75% training and 25% validation data.

The loss function was Maximum Absolute Error and the Optimization algorithm was AdamOptimizer

The model was trained varying the hyperparameter batch size (128, 64, 32, 16).

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| --- | --- | --- | --- | --- |
| Batch Size | 128 | 64 | 32 | 16 |
| Accuracy | 0.48 | 0.54 | 0.50 | 0.55 |
| MAE | 0.52 | 0.46 | 0.49 | 0.45 |
| Macro F1 | 0.55 | 0.66 | 0.60 | 0.65 |

Training time was approximately 24m using GPU.

Thus, we can clearly see reducing the batch size improves the performance of the models significantly for evaluating metrics.

In the original CNNpred paper best Macro F1 score for 2d CNN pred was average of 0.54, 0.56, 0.55, 0.55 and 0.55 which is 0.55 but here the average Macro F1 score is 0.65 which is statistically significant improvement.

Github Link to Notebook: <https://github.com/mandalnilabja/soc2022/blob/main/Week8Assignment.ipynb>

Reference: <https://machinelearningmastery.com/using-cnn-for-financial-time-series-prediction/>