Exploring the applicability of Seq2Seq architecture to Intraday Technical trading

1. The problem: Knowing the behavior of a stock price or portfolio in a window of 60 – 100 minutes, can we predict returns in 5 – 60 minute window?

2. We start with price data and develop minutely features: price, volume, volume change, returns, number of trades, maximum price

3. And create a dataset with 34 features using 7 stocks and an index

4. We use a seq2seq architecture with attention, like what is used for language modelling

5. Hyperparameters tested:
   - All Linear layers with Bias, no bias
   - Encode window: 60 – 120 minutes
   - Decode window: 5 – 60 minutes
   - Loss: Mean Squared Error
   - Hidden size: 128, 256, 512, and 1024 (256 was best)
   - Layers: 1 – 4 (2 -3 layer did best on loss)
   - Adam Optimizer
   - Dropout 0 – 0.3 (did not seem to affect results)

6. Future work:
   - more data, bigger dev set -> get loss curves to look better
   - Vary batch sizes to smooth performance
   - Error analysis: does system perform equally in all days of week? hours of day
   - Add 1d convolutions to develop additional features
   - Develop portfolio selection criteria

7. Experiments

   - Predict a sequence
     - Experiment 1: Predict a sequence
       - Encode data: sequence of 120, 100, or 60 minutes of feature set
       - Decode data (predict): sequence of 5, 10, 15, 30 minutes of TTD returns

   - System did not learn! Predicted flat line...

   - Predict cumulative return
     - Experiment 2: Predict a value – the cumulative return
       - Encode data: sequence of 120, 100, or 60 minutes of feature set
       - Decode data (predict): cumulative return 5, 10, 15, 30 minutes of TTD returns

   - System did not do well – 48% chance of predicting return sign correctly

   - Loss did not fall smoothly
   - Seemed to predict return sign correctly only 48% of time