Attention LSTM in Stock Price Prediction Application

Introduction

LSTM

Attention LSTM

Input
Dummy
Output

$$H = \sum_{k=1}^{m'} W^k \sigma_C(X\theta^k), \text{ with}$$

$$W^k = S^k \oslash (S^k 11^T) \text{ and}$$

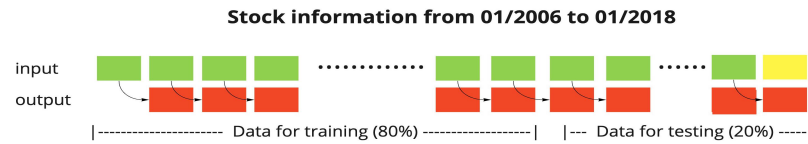$$S^k = exp(\frac{1}{\sqrt{d}} X Q^k K^k X^T) \odot L$$
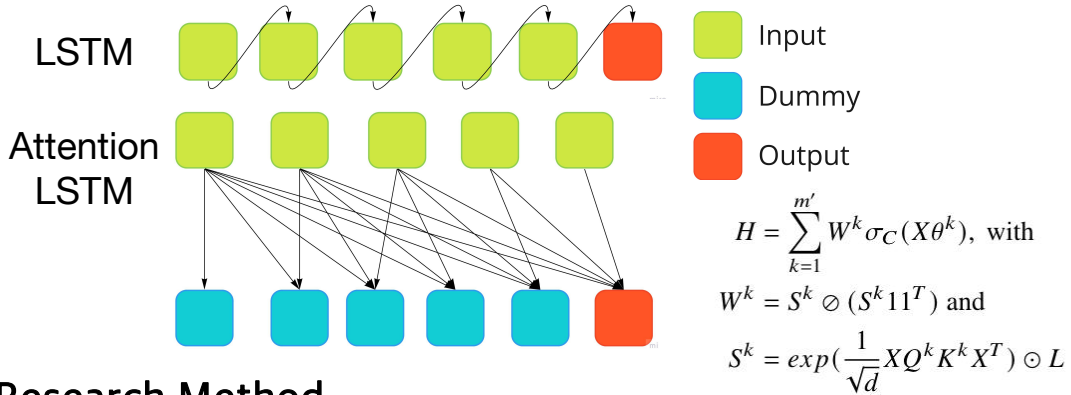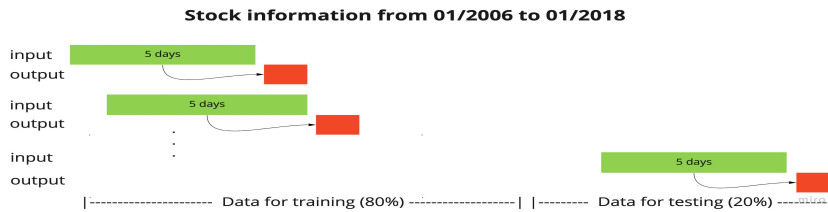
Research Method

Dataset stock price of companies from 2006 to 2018 with features : open price, high price, low price, close price and volume

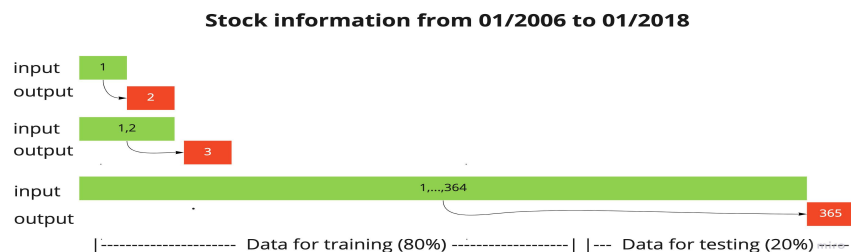**Data Split:** Sliding window vs Feedforward input

Sliding Window
input time length : 1

Stock information from 01/2006 to 01/2018

input
output

|-------------------- Data for training (80%) --------------------| |--- Data for testing (20%) -----|

Sliding Window
input time length : 5

Stock information from 01/2006 to 01/2018

input
output
5 days

input
output
5 days

input
output
5 days

|-------------------- Data for training (80%) --------------------| |-------- Data for testing (20%) ------|

Feedforward Input

Stock information from 01/2006 to 01/2018

input 1
output 2

input 1,2
output 3

input 1,...,364
output 365

|-------------------- Data for training (80%) --------------------| |--- Data for testing (20%) -----|

Main question

To test the new network architecture: Attention LSTM(ALSTM) on stock price prediction, the research questions were listed below to be more specific.

☐ Given the price series of a specific stock with all features(including open, high, low, traded volume), can the network predict the close price of this stock with a chosen input time length?

☐ How does the prediction quality change due to the adjustment of the chosen input time length?

Result

1 vs 10 days   5 vs 10 days   sliding winow 10 days vs feedforward input

MSE

TEST
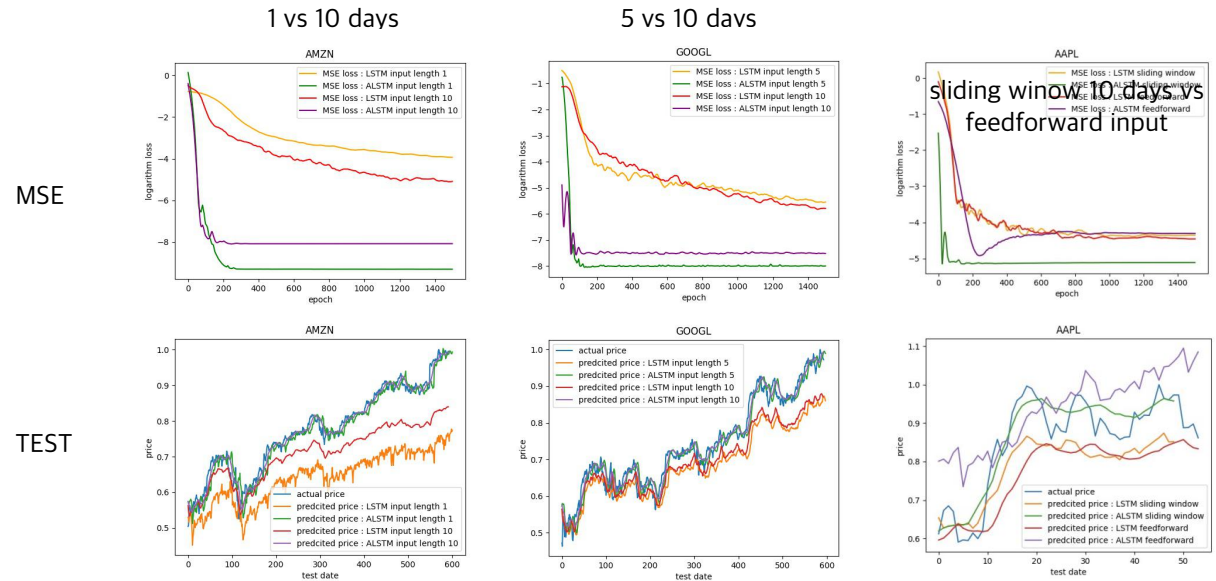
Conclusion

Attention LSTM has better performance than original LSTM in sliding window approach which stands for small sequence length. ignored dummy output. However, facing feedforward input approach LSTM could do better with large sequence length. But Attention LSTM could still run more faster than LSTM in this situation, which might help in missions required high speed.

Contact

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