Project Title: Compare Hidden Markov Model and Deep Learning on Financial Market Prediction

Team members:
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Project Description: Goals/Motivation/Importance

The project is to compare the performance of financial market prediction with two different machine learning techniques: Hidden Markov Model and Deep Learning. Hassan et al. [2] showed the Hidden Markov Model can have better prediction result than ANN (Artificial Neural Network) on stock price. Recently, Jiang et al. [3] stated Cd-DLA (using deep learning approach) has better performance than RNN, Id-ANN, and Cd-ANN algorithms. We are going to find out which one has better performance on Financial Market Prediction.

Proposed Methodology and Techniques

According to the paper [2], we will apply Hidden Markov Model for predicting the next day's closing price for stock and currency and then classify the case into increasing trend or decreasing trend. On the other hand, we will use Cd-DLA to predict the classes (increasing trend or decreasing trend) based on paper [3]. Since paper [2] didn't consider currency, we will feed the currency data for Hidden Markov Model. From the prediction results, we will compare their performance based on in accuracy rate, F-measure and AUC measurement.

Data

Similar to paper [3], the data sets will be extracted from the International Monetary Fund (https://www.imf.org/external/np/fin/ert/GUI/Pages/CountryDataBase.aspx) and Yahoo Finance (https://finance.yahoo.com/quote/DATA/history/), covering the financial crisis period (2007-2009) and a non-crisis period (2010-2017). The nine features are date, stock opening price, stock closing price, stock highest price, stock lowest price, currency opening price, currency closing price, currency highest price and currency lowest price. There are two of class variable: increasing trend or decreasing trend, and 2520 cases.

Implementation Choice

Python will be our major analysis tool.

Presentation type (only if you are an online student specify):

We will both have in class presentation.

Reference:

[1] LeCun, Y., Bengio, Y. & Hinton, G. Deep learning. Nature 521, 436–444 (2015)
[2] M. R. Hassan, and B. Nath, "Stock Market Forecasting Using Hidden Markov Model: A New Approach," Proceedings of the 2005 5th International Conference on Intelligent Systems Design and Applications, ISDA'05, 2005.
[3] X. Jiang, S. Pan, J. Jiang and G. Long, "Cross-Domain Deep Learning Approach For Multiple Financial Market Prediction," 2018 International Joint Conference on Neural Networks (IJCNN), Rio de Janeiro, Brazil, 2018, pp. 1-8. doi: 10.1109/IJCNN.2018.8489360