



GAN base 7- minute prediction in stock market

Deahan Han [dahanh@stanford.com / daedhan.han78@gamil.com]

Department of Computer science, Stanford University

A. Introduction

- Motivation : Long term prediction is difficult.
 - It requires a lot of information for analysis.
 - The surrounding environment influences it.
- Target : Short term of stock price prediction
Based on GAN, to apply the trader's propensity.
- Data : Price and basic indicators
 - Price, Trading volume, Bollinger bands, Directional movement index, etc.

B. Approach (Data + Preprocessing)

- Stock data pair
 - 94 different day data(47 stocks)
 - 6.5 hours 1 minute data, stride(2) total 16560 example

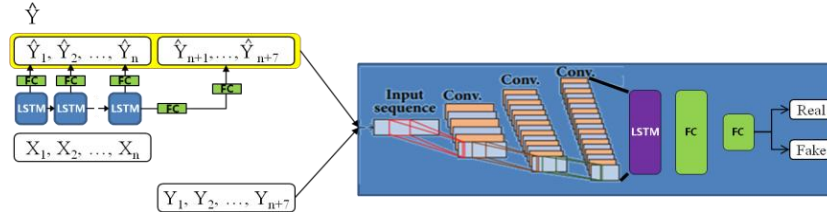
2. Challenges

- Collect the data based on time frame
- Make indicators
 - Some value have 0-denominator

[Data Shape]

		11	12	...	299 (n-7)	300 (n-7+1)	...	399
1	Y	Final Price						
	X	Opening price						
	X	Maximum price						
	X	Minimum price						
	X	Trading volume						
	X	Bollinger bands						
	X	Directional movement index						
	X	Exponential moving averages						
	X	Stochastic index						
	X	Moving averages						
		MACD						
2	Y	Final Price						
	X	Opening price						
	X	Moving averages						
		MACD						
...	Y	Final Price						
	X	Opening price						
	X	...						
		Moving averages						
		MACD						

C. Methods (Model /Loss/Evaluation)



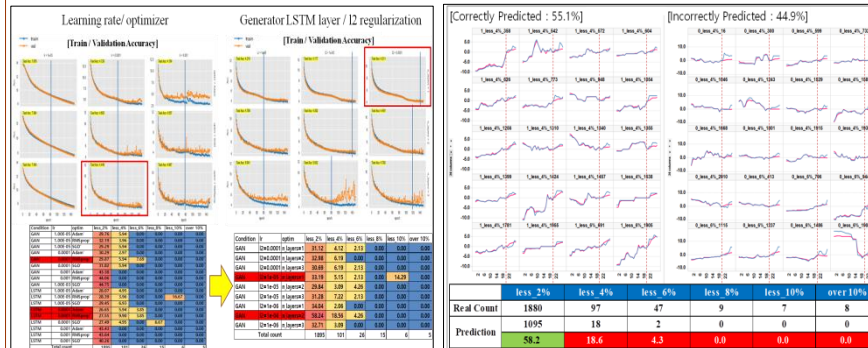
$$DiscriminatorLoss = \nabla_{\theta_d} \frac{1}{m} \sum_{i=1}^m [\log D(y^{(i)}) + \log(1 - D(G(x^{(i)})) = \hat{y}^{(i)})]$$

$$GeneratorLoss = \nabla_{\theta_g} \frac{1}{m} \sum_{i=1}^m [\log(1 - D(G(x^{(i)})) = \hat{y}^{(i)}) + W_1 * |y^{(i)} - \hat{y}^{(i)}| + W_2 * |y_{T^{(i)}} - \hat{y}_{T^{(i)}}|]$$

D. Evaluation Metric

$$TimeWeightedMeanAbsoluteError = \sum_{i=1}^T \left[\frac{i}{T} |y^{(i)} - \hat{y}^{(i)}| \right] \& Lastpredictionvaluecompare = |y^{(T+7)} - \hat{y}^{(T+7)}|$$

E. Result and Discussion



1. Result

- Same level of prediction as LSTM
- Based on hyper parameter tuning get better result.
- Accuracy : Can not predict the rapid increase of stock price change

2. Issues

- Lack of training data set → Because of Training time limitation

F. Future Work

- Make more data set
Current : 16560
Future work : 2 million
- Split hyper parameter
- Split time interval
Current : previous 20
Future work : 10,15,25
[unit : minutes]

References

- [1] Xingyu Zhou, Zhisong Pan, Guyu Hu et al., (2018) Stock Market Prediction on High-Frequency Data Using Generative Adversarial Nets., Mathematical Problems in Engineering Volume 2018, Article ID 4907423, 11 pages.
- [2] I. J. Goodfellow, J. Pouget-Abadie, M. Mirza et al., "Generative adversarial nets," in Proceedings of the 28th Annual Conference on Neural Information Processing Systems 2014, NIPS 2014, pp. 2672–2680, can, December 2014..
- [3] <https://github.com/borisbanushke/stockpredictionai/thediscriminatior>