

Forecasting daily Opening Prices of Equity symbols using ANNs



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Abstract

Properly pricing options is a challenging task. The traditional method of the Black-Scholes model makes a number of critical assumptions that do not hold up to reality and do not deliver results with as much desired accuracy. This paper proposes the use of Generative Adversarial Networks (GANs) in pricing European options. GANs can quickly learn to generate data distributions with realistic properties in a data-driven approach. In this paper we (i) explore methods of tuning the model's parameters, (ii) test the architecture on a curated dataset of European instruments and (iii) evaluate the performance of the networks, comparing the results to already established pricing methods, like the Black-Scholes model, as well as real derivative data.

Keywords: Deep Learning, Generative Adversarial Networks, Options pricing, Neural Networks

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1 Introduction

The ability to predict changes in stock prices is extremely important to the financial world as it influences trading strategies and reduces risks in the market. The prices of stocks can be modelled as non-linear time series, which have been at the centre of attention in the finance world since the 1970s with George Box and Gwilym Jenkins popularised their Box-Jenkins method for finding the best-fit of a time series model[2].

2 Related Work

This section will introduce work related to stock market prediction, namely traditional asset pricing models and work related to the development of generative adversarial networks.

2.1 Stock Market Prediction models

ARIMA(1,1,1) data mining can predict stock prices [3]

2.2 Testing some math

Here are two equations:

$$a = b + 1 \tag{2.1}$$

$$\frac{\hbar^2}{2m}\nabla^2\Psi + V(\mathbf{r})\Psi = -i\hbar\frac{\partial\Psi}{\partial t} \tag{2.2}$$

And here is some text with some nice inline math, (x, y) wow γ so cool ρ .

2.3 Testing citations

This is Fama[1] and this is Goodfellow. This is another GAN citation.

3 Predicting stock prices with GAN

The following section provides details in the construction of the model for predicting stock prices, as well as a breakdown of the data used in the training of the network.

3.1 Defining the problem statement

3.2 Prediction Model

Here is a sentence, and you can see a nice picture in Figure 3.1.



Figure 3.1: A picture of the Brayford from Google Images.

Also, a table can be found in Table 3.1. You should use a \LaTeX table generator like <https://www.tablesgenerator.com/> if you want to make your life easier.

Table 3.1: Here is a table. The caption goes above like this.

First name	Last name	Age
Bob	Bobbington	24
Joe	Bloggs	37
Billy	Bob	10

4 Results

4.1 Data set

4.2 Evaluation Metrics

4.3 Results

5 Conclusions

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References

- [1] E. Fama, ‘Efficient capital markets: A review of theory and empirical work,’ *Journal of Finance*, vol. 25, no. 2, pp. 383–417, 1970 (cit. on p. 2).
- [2] G. J. George Box, ‘Time series analysis, Forecasting and control,’ 1970 (cit. on p. 1).
- [3] M. M. Sasan Barak, ‘Developing an approach to evaluate stocks by forecasting effective features with data mining methods,’ *Expert Systems with Applications*, vol. 42, pp. 1325–1339, 3 2015 (cit. on p. 2).

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