

# Correlation Analysis of Financial Indicator and Stock Price Fluctuation using AI System

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**Abstract** - Using an artificial intelligence system, this paper correlate changes in stock prices with financial variables. There must be enough GAN artificial neurons in the intermediate layer of a GAN artificial neural network. Each GAN's artificial neuron, known as a direct memory artificial neuron, saves one training sample, with the number of training samples being determined to be equal to this number. For the most accurate short-term stock market price prediction, connection weights must be adjusted so that they more closely resemble the nonlinear mapping relationship that is reflected in stock market price swings. In this study, a brand-new neural network model was developed to build the predictions model's concepts. Performance is acceptable when measured against cutting-edge techniques[1].

**Keywords:** Stock Price Fluctuations, Artificial Intelligence, Financial Indicators

## I. INTRODUCTION

The financial market is a hazy place with lots of unknowable variables. People who invest in securities encounter a variety of risks as a result of the existence of these uncertain factors. Basic analysis, technical analysis, and time series analysis are some of the analysis techniques that have been suggested over time. The stock market is a very intricate system that is impacted by political, market, and economic variables. Many academics use neural networks to forecast stock prices for such an intricate, dynamic, nonlinear system. as evidenced. The study of nonlinear forecast techniques is progressing, and the neural network approach has garnered more interest. Neural networks with nonlinear hidden neurons have promising future applications in stock market predictions. This is due to the ability of neural networks with nonlinear hidden neurons to approximatively represent any continuous nonlinear function [5]. To produce the most accurate short-term prediction of the stock market price, connection weights are adjusted to more closely approximate the nonlinear mapping relationship mirrored in price fluctuations. The stock data is then imported into the eight database systems. The database data is then extracted, cleaned, and aggregated in accordance with various requirements during data mining, and imported into the data warehouse to finish data warehouse preparation. The neural network method is employed to fully predict short-term trends for indexes, industries, and specific stocks [6]. To conduct a cluster analysis on stocks and produce various clusters, the data mining clustering engine uses a variety of user-provided

strategies. The analysis results are output in a graphical interface or document that can directly use historical data to make short-term predictions for index and individual stock trends in the neural network.

## II. AIMS AND OBJECTIVE

### a) Aim

In order to determine the scope of the financial analysis and the significance of this analysis in predicting the stock price of the industries traded on the Palestine Exchange, the conceptualization of the intellectual elements of financial analysis and their application to the creation of standards and ideas for adjusting and predicting stock prices on the Palestine Exchange sectors. constructing a quantitative model that can be used to predict the stock price of each segment of the Palestine Exchange.

### b) Objective

Determine the components of financial research and their significance in forecasting stock prices in Palestine Exchange sectors. the conceptualization of the intellectual aspects of financial analysis and its application to create the standards and alter the stock prices of the sectors listed on the Palestine Exchange constructing a quantitative model that can be used to predict the stock price of each segment of the Palestine Exchange.

## III. LITERATURE SURVEY

**Paper 1: A computer-aided stock market data analysis and forecast of the short-term direction of the stock**

### market, more specifically the forecast of the returns given by the Stock Market daily

The All-Share Index and number of traded shares decreased steadily on the stock market. The banking sector experienced a credit contraction as the majority of foreign banks cut back on credit lines and exchange rate exposure, while the ongoing NSE fall eroded their profitability. The fiscal sector has shrunk as a result of the decrease in income received by the three tiers of government. The real sector was impacted by the financial sector's contraction because private sector lending was crowded out. Consequently, the Nigerian economy has experienced a great deal of financial misadjustments. First off, the value of the naira declined significantly and was more uncertain than it had been in almost a decade. The stock market indices have changed significantly from where they were last year, and markets and banks have abruptly become unstable or overextended to the point where they may collapse. They worried that the stock market and their loan clients were in danger of collapsing due to their exposure to foreign credit lines. In order to prevent the crisis' feared effects, the Central Bank of the Government did everything it could to provide institutions with liquidity.[4]

### Paper 2: The issue of uncertainty caused by stock market price and index fluctuations affects all stock markets. Accurately predicting both the short- and long-term future condition of the stock price is a challenge presented by market uncertainties.

There was no way to justify the stock market fall between 1929 and 1932 in terms of dividends to come! Additionally, since earnings are only significant in this model as predictors of future dividends, it could not be justified in terms of ensuing earnings. Naturally,  $p$  does not equal  $p^*$  in the efficient market's paradigm. Is it still possible to believe that this kind of stock market collapse was caused by a forecast error made by rational people? The idea that  $p$ 's inherent volatility—specifically, its propensity for large movements to recur repeatedly—implies that the response is false will be investigated in this essay. In order to address some potential theoretical concerns regarding inequality (1), this paper will develop the efficient markets model in Section II below. In addition, some analogous inequalities will be derived that set upper bounds on the standard deviation of price innovation and the standard deviation of price change. An improved grasp of the limits on stock price volatility imposed by the model is made possible by restating the model in innovation form. This will allow us to demonstrate in Section III that the deviation from the mean of  $f.P_t$  is highest when data on dividends is disclosed smoothly, and that the price sequence could display higher kurtosis (fatter tails) but lower variance if the information is occasionally revealed in large lumps. The idea put forth by some that earnings data rather than dividend data should be used is addressed, and a method of

determining the significance of time variation in real discount rates is demonstrated. The data is contrasted with the disparities.[5]

### Paper 3: Post-Stock Fluctuation Prediction Using an Artificial Muscle Intelligence System with Deep Learning. AUTHORS: Varun G. Menon and Sunil Jacob

Stock swaps have most likely existed since the beginning of time. Since humans have been trading with one another, stock derivatives have most likely existed. Forward contracting began at least in the 12th century, though it may have existed earlier. During this time, traders made agreements with one another for the future supply of specific quantities of goods at a specific price. contracts with each other for the future supply of certain quantities of goods at certain prices. Pre-arranging a buyer or vendor for a stock of materials in early futures agreements was primarily done to reduce the likelihood that big swings would make it difficult to market the stock after a harvest. As the term implies, OTC contracts are privately negotiated derivative contracts, whereas exchange-traded derivatives (ETDs) are those that trade on an exchange. Over the past few years, the OTC derivatives markets have experienced relatively rapid development, which has coincided with the modernization of commercial and investment banking and the globalisation of financial activities. The proposed method also beats current state-of-the-art artificial intelligence ensemble models in terms of performance [6].

## IV. EXISTING SYSTEM

The market for stocks is a hazy place with a lot of ambiguous elements. When buying securities, people run the risk of a variety of outcomes due to the presence of these ambiguous variables. Market, economic, and policy variables all have an impact on the stock market, which is a very complicated system. To forecast stock prices in the current system, in this way project employ a linear regression algorithm[3]. The stock market is the fuzzy environment full of many uncertain factors. The existence of these uncertain factors makes people face various risks when investing in securities. The stock market is a very complex system, which is affected by economic, policy and market factors. In existing system linear regression algorithm is used for stock price prediction. The market for stocks is a hazy place with a lot of ambiguous elements. When buying securities, people run the risk of a variety of outcomes due to the presence of these ambiguous variables. Market, economic, and policy variables all have an impact on the stock market, which is a very complicated system. The stock market is a very complex system.[7]

## V. COMPARATIVE STUDY

Sr. No.	Author	Project Title	Publication	Technology	Purpose
1.	Vincent O. R. and Bamiro K.	The short-term future of the stock market, particularly the forecast of the returns offered by the stock market on a daily basis, is predicted using computer-aided stock market data..	IEEE,2019	Support Vector Machine	A computers to assist market data and forecast that looks ahead to the short-term performance of the stock market, more particularly the forecast of the returns offered by the market for stocks on a daily basis. The volume of traded securities and the All-Share Index both continued to decline on the stock market. The banking sub-sector had a credit contraction as the majority of international banks cut their credit limits, took on more exchange rate risk, and saw their income eroded by the ongoing slide in the NSE.
2.	Stephen J. Roberts	Uncertainty is an issue that affects all stock markets due to fluctuations in stock prices and stock indices. The market's uncertainty stems from the difficulty of correctly predicting the stock price's short- and long-term future states.	IEEE,2019	Random Search Algorithm	The model has been rewritten in an innovative form that makes it easier to comprehend the restrictions on stock price volatility that the model imposes. In particular, this will help us understand (in Section III) that the standard deviation of $f.Pt$ is highest when information about dividends is revealed smoothly. It is possible to better grasp the restrictions on stock price volatility imposed by the model by restating it in an innovative manner.
3.	Varun G. Menon and Sunil Jacob	Deep Learning for Artificial Muscle Intelligence System for Post-Stock Fluctuation Prediction.	IEEE,2020	Machine Learning & End-to-End Deep Learning	Pre-arranging a buyer or vendor for a stock of commodities in early forward contracts was primarily done to reduce the likelihood that big swings would make it difficult to market the stock after a harvest. Since individuals have been dealing with one another, stock derivatives have most likely existed. At least as early as the 12th century, forward contracting may have existed earlier.

Table 1: Comparative Study

## VI. PROBLEM STATEMENT

Some investors can use historical stock prices to generate abnormal returns when stock prices do not change arbitrarily. To monitor the changing circumstances of receiving abnormal returns in the stock market, it is essential to conduct routine tests. Furthermore, it's critical to understand whether the market is efficient or not because it's one of the cornerstones of the capitalist economy and helps with capital allocation and market trust. Many people have criticized the efficient market theory, particularly during the recent financial crisis. (Nocera, 2009, p. 1). This paper can evaluate whether the market was efficient during the financial crisis by using correlation analysis, which under certain assumptions can demonstrate the efficiency of the financial market at a low level. Serial correlations are a simple and logical way to evaluate the random walk. (Borges M. , 2008, p. 4). According to one interpretation of the efficient market hypothesis, information that is known to the market before week  $t$  should not be used to forecast the return during week  $t$ . It assuming that people are rational and risk-neutral.

## VII. PROPOSED SYSTEM

In order to create a logical model of the market and to use it to forecast stock price fluctuations, this paper employs a neural network. The prediction findings are found to be

consistent with the actual data through comparison. The stock market is a very intricate system that is influenced by market, economic, and policy variables. Many academics use neural networks to forecast stock prices for a system that is so complicated, dynamic, and nonlinear[2].

## VIII. ALGORITHM

The general idea of working of proposed system algorithm as follow:

### STEP 1 – START

### STEP 2 – Load Financial Data and Stock Data

```
df = pd.read_csv(path)
df = df[['Open', 'High', 'Low', 'Close']]
x = df.iloc[:, :-1].values
y = df.iloc[:, -1].values
x_train, x_test, y_train, y_test = train_test_split(x, y, train_size=0.80, random_state=0)
```

### STEP 3 – Train the Model

```
model = randomforestregressor()
model.fit(x_train,y_train)
```

### STEP 4 – Make Predictions

```
y_pred = model.predict(x_test)
```

### STEP 5 – Evaluate the Model

```

r2 = r2_score(y_pred,y_test)
mse=mean_squared_error
(y_pred,y_test)
print('Test Score:
%.2f MSE
(%.2f RMSE)'
% (testScore[0],
math.sqrt(testScore[0])))

```

#### STEP 6 – Visualize the Result

```

ax.set_xlabel('date')
ax.set_ylabel('price')
plt.legend()
plt.show()

```

#### STEP 7 – END

## IX. MATHEMATICAL MODEL

### A. The Financial Indicators for Prediction

The "spontaneous power" of the investors is an explanation for stock price variations proposed by recently discovered behavioral finance. When it comes to solving the mystery of stock price variations in the securities markets of sophisticated Western nations, behavioral finance theory has had remarkable success.

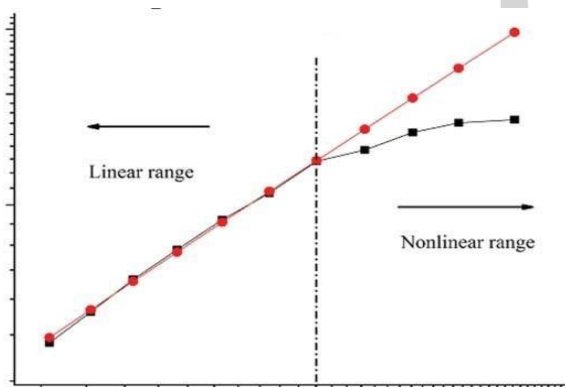


Fig.1: The Financial Indicators for Prediction

### B. The Data Mining Models Considered

The current approaches to stock prediction research using deep learning can be roughly categorized as follows: use the CNN's strong feature extraction and recognition capabilities to assess rise and fall and build timing strategies; incorporate rich data features into RNN for learning; and use data mining technology to examine network information resources to find relevant signals that have an impact on the stock market.

### C. The Finalized Prediction Model

Modern nonlinear system identification, time series forecasting, and other domains have made extensive use of ESN. It is the greatest option for time series forecasting due to its strong short-term memory capabilities. The method is described by Formula

$$|u \ y^{\dagger}$$

We take the first portion of the data volume and partition the

stock market data sequence into three time-ordered parts: training set, test set, and prediction set. The second section of the data volume begins at time 4. The test set and the training set are both sets.

## X. SYSTEM ARCHITECTURE

The stock market is a hazy world with lots of unknowable variables. People who invest in securities suffer a variety of risks as a result of the existence of these unknown circumstances. The stock market is an extremely intricate system that is impacted by market, economic, and policy variables. To predict stock prices in the current system, we employ the linear regression algorithm.

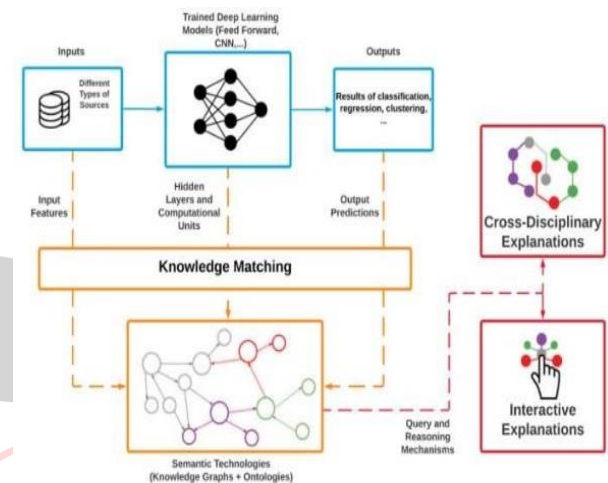


Fig. 1. The Neural Network Summary

Fig.2: System Architecture

## XI. ADVANTAGES

- 1) Recurrent neural networks could offer more accurate predictions than the neural networks used in this research, such as LSTM (long short-term memory).
- 2) A generative adversarial network (GAN) is a machine learning (ML) model in which two neural networks fight with one another to improve their prediction accuracy.

## XII. DESIGN DETAILS

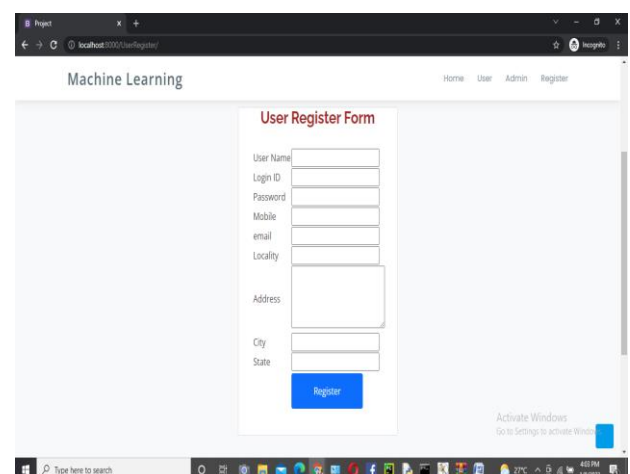


Fig 3: Result



Classification Algorithm	Accuracy	Precision	Recall	F1 - measure
Linear Regression	83.00%	81.27%	77.46%	79.32%
Decision Tree	93.32%	92.32%	92.34%	92.22%
Random Forest	95.67%	95.69%	94.10%	94.88%
Deep Learning	86.46%	84.72%	83.04%	83.86%
SVM	85.67%	85.03%	80.39%	82.64%

**Table 2: Resultant Analysis**

### XIII. CONCLUSION

Thus we have tried to implement the paper “Correlational analysis of financial indicators and stock price fluctuation based on AI System”. Shu Chen published on 12, April 2021, doi: 10.1109/ICAIS50930.2021.9395944, inspec accession number: 20633543 and the conclusion is as follows: Using an artificial intelligence system, analyze the relationships between financial data and stock price fluctuations. Future study will focus on experimenting with various clustering algorithms in combination with echo state networks, integrating the findings, and upgrading the echo state network algorithm from supervised to unsupervised learning. In order to create a mathematical model of stock prices and to use it to forecast stock price fluctuations, this paper employs a neural network. The prediction findings are found to be consistent with the actual data through comparison. A comparison between the exercise and the most recent models is made. This project will eventually expand the simulation data sets to verify efficiency. In order to create a mathematical model of stock prices and to use it to forecast stock price fluctuations, this paper employs a neural network.

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