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Google Stock Price Prediction Using Just Neural Network

Mohammed Mkhaimar AbuSada, Ahmed Mohammed Ulian, Samy S. Abu-Naser

Department of Information Technology, Faculty
of Engineering and Information Technology,
Al-Azhar University, Gaza, Palestine

Abstract: *The aim behind analyzing Google Stock Prices dataset is to get a fair idea about the relationships between the multiple attributes a day might have, such as: the opening price for each day, the volume of trading for each day. With over a hundred thousand days of trading data, there are some patterns that can help in predicting the future prices. We proposed an Artificial Neural Network (ANN) model for predicting the closing prices for future days. The prediction is basedon these features (date, opening price, highest price, lowest price, volume), which were used as input variables and (closing price) as output variable for our ANN model. Our model was created, trained, and validated using data set in JNN environment, which its title is "Google-Stock-Prices". The model evaluation showed that the ANN model is able to predict correctly 99.48% of the validation samples.*

Keywords: *Predictive Analysis, Artificial Neural Networks, Stock Price prediction.*

Introduction

In this study, we will analyze the dataset which contains various information of Google company stock prices over the years. This dataset also includes information on the date of stock changes, open price and close prices, as well as the lowest and highest prices and the trading volume for each day. Artificial neural networks (ANNs) will be used for the analysis. Artificial neural networks are like biological neural networks and offer a technique, which solves the problem of prediction [3]. Neural networks contain input, hidden and output layers. Hidden layers convert the input into usable thing to the output layer [5]. The ANN Model goes through training and validation on a dataset. Training in which that the network is trained is done on a dataset. Then a configuration is done to the weights of the connections between neurons. Validationin which that the network is validated to determine the prediction of a new dataset [6]. In this study, we used about 38% of the dataset instances for network validation, the remaining 62% for training. ANN Architecture is shown in figure 1.

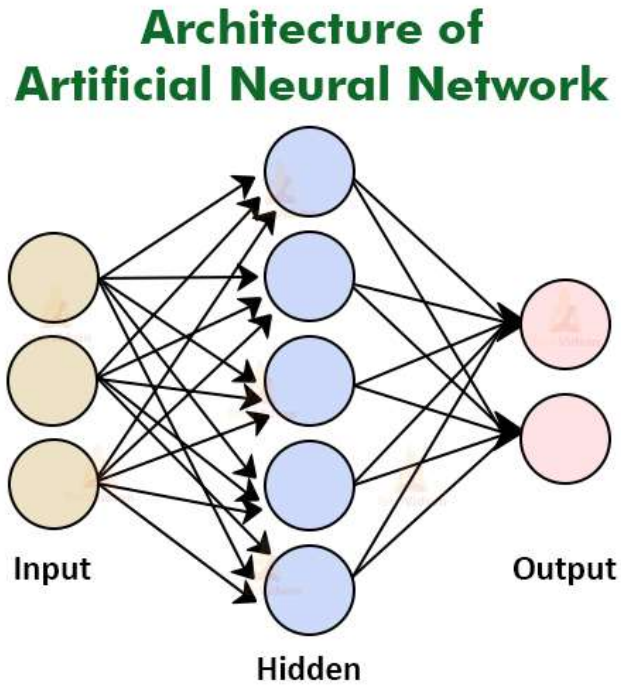

Figure 1: ANN Architecture

1. Literature Review

Artificial Neural Networks have been used many fields. In Education such as: Predicting Student Performance in the Facultyof Engineering and Information Technology using ANN[5], Prediction of the Academic Warning of Students in the Faculty of Engineering and Information Technology in Al-Azhar University-Gaza using ANN[5], Arabic Text Summarization Using AraBERT Model Using Extractive Text Summarization Approach[6].

In the field of Health such as: Parkinson's Disease Prediction [7], Classification Prediction of SBRCTs Cancers Using ANN [7], Predicting Medical Expenses Using ANN[8], Predicting Antibiotic Susceptibility Using Artificial Neural Network[8], Predicting Liver Patients using Artificial Neural Network[7], Blood Donation Prediction using Artificial Neural Network[9], Predicting DNA Lung Cancer using Artificial Neural Network[10], Diagnosis of Hepatitis Virus Using Artificial Neural Network[10], COVID-19 Detection using Artificial Intelligence[11].

In the field of Agriculture: Plant Seedlings Classification Using Deep Learning [12], Prediction of Whether Mushroom is Edible or Poisonous Using Back-propagation Neural Network[15], Analyzing Types of Cherry Using Deep Learning[21], Banana Classification Using Deep Learning[13], Mango Classification Using Deep Learning[14], Type of Grapefruit Classification Using Deep Learning[7], Grape Type Classification Using Deep Learning[3], Classifying Nuts Types Using Convolutional Neural Network[2], Potato Classification Using Deep Learning[3], Age and Gender Prediction and Validation Through Single User Images Using CNN[5].

In other fields such as : Predicting Software Analysis Process Risks Using Linear Stepwise Discriminant Analysis: Statistical Methods [14], Predicting Overall Car Performance Using Artificial Neural Network [8], Glass Classification Using Artificial Neural Network [9], Tic-Tac-Toe Learning Using Artificial Neural Networks[14], Energy Efficiency Predicting using Artificial Neural Network[15], Predicting Titanic Survivors using Artificial Neural Network[14], Classification of Software Risks with Discriminant Analysis Techniques in Software planning Development Process[13], Handwritten Signature Verification using DeepLearning[12], Email Classification Using Artificial Neural Network[14], Predicting Temperature and Humidity in the Surrounding Environment Using Artificial Neural Network[12], English Alphabet Prediction Using Artificial Neural Networks[9].

2. Methodology

We downloaded a data set from *kaggle* that contains stock price information from *google*. This dataset created by the user. We did some preprocessing on the data, and then we trained our ANN model and validated it.

3. Original Dataset Description

Table 1: Original Dataset Description

#	Attribute	Description	Type
1.	Date	The date this data was captured	Date
2.	Open Price (Open)	The opening price of the stock or asset on a given trading day. It is the price at which the first trade of the day occurred	Real
3.	High Price (High)	The highest price at which the stock or asset traded during the trading day. It represents the maximum price reached during the day.	Real
4.	Low Price (Low)	The lowest price at which the stock or asset traded during the trading day. It represents the minimum price reached during the day.	Real
5.	Closing Price (Close)	The closing price of the stock or asset on the same trading day. It is the price at which the last trade of the day occurred.	Real
6.	Volume	The total number of shares or units of the stock or asset traded during the trading day. Volume indicates the level of trading activity for the asset on that particular day. High volume can suggest strong interest or activity in the stock.	Integer

3.1 Dataset Preprocessing

We wanted to use this dataset to build an ANN model to predict the stock price (closing price) for google (attribute number 5).

The first thing we had to do, is choose a suitable factor for this prediction, and delete the unnecessary ones, we chose these factorsto be our input to the predictive model: open, high, low, volume, date.

Moreover, the dataset contains 4000 instances. which is a large a number to a neural network to deal with, so, we divided these samples to 2500 training instances, and 1500 validation instances.

In addition, because of the integer numbers of the inputs are too large comparing with the real rate values, we did a normalizationto them so all the data are real.

Normalization formula was:

$$\text{Normalized value (xi)} = \frac{Xi - Xmin}{(Xmax - Xmin)}.$$

While checking the instances, it has been noticed that there were validation instances that are out of range, we converted them to training. Now, the dataset is ready for training and validation.

3.2 Our ANN Model

The resulted predictive ANN model is shown in Figure 2 and Figure 6.

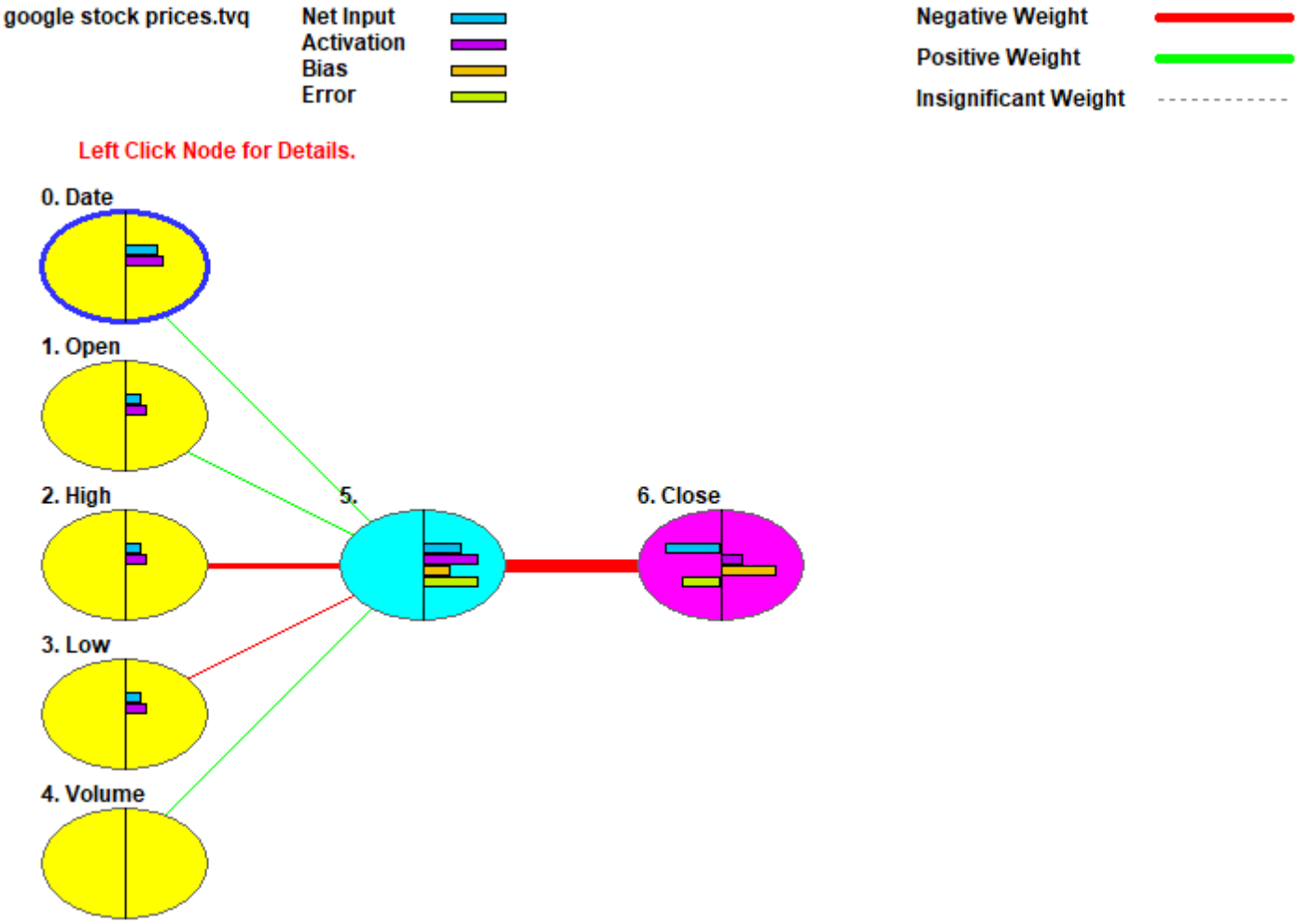

Figure 2: Our ANN Model

3.3 Validation

Our ANN model was able to predict google stock prices overall rate with 99.48% accuracy, with about 0.005 errors as seen in figure (3). Furthermore, The Model showed that the most effective factor in a stock rate is the closing price. More details are shown in figure (4).

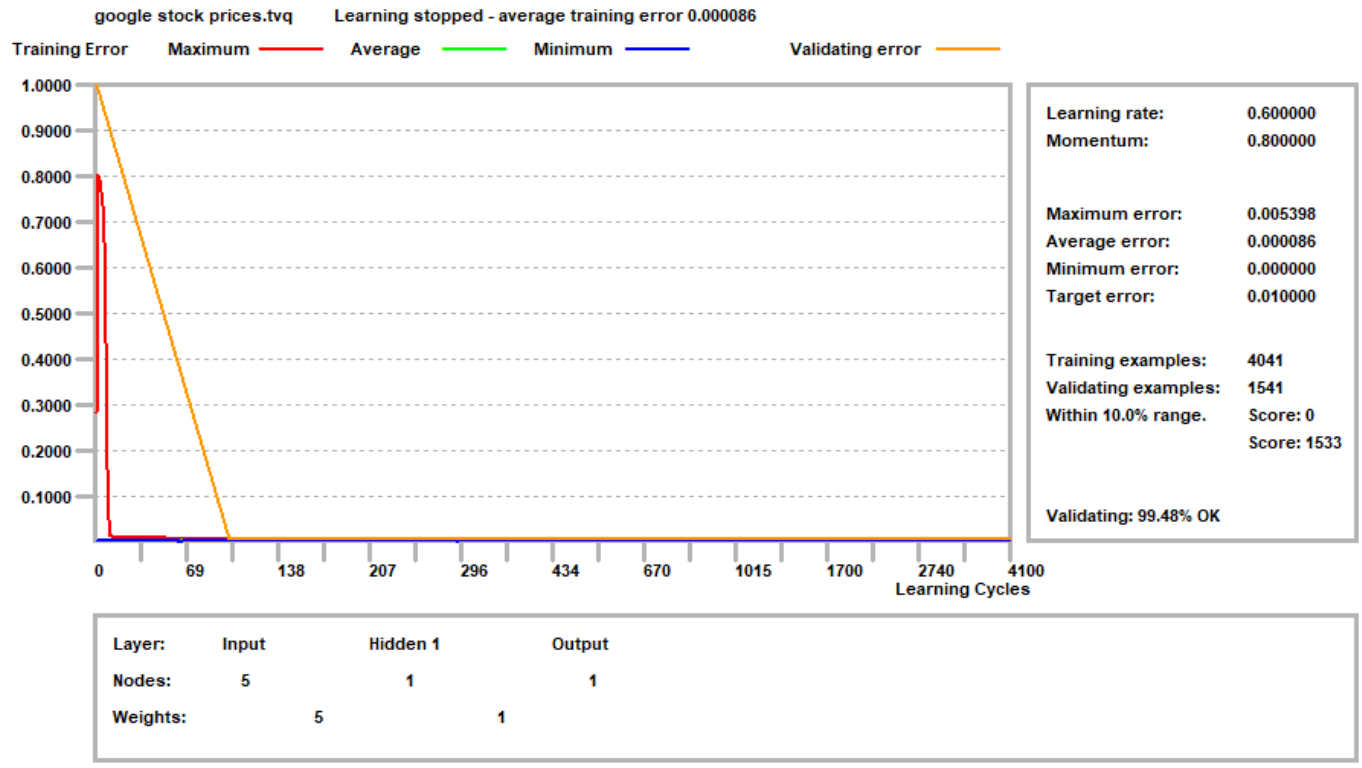

Figure 3: Validation and Errors

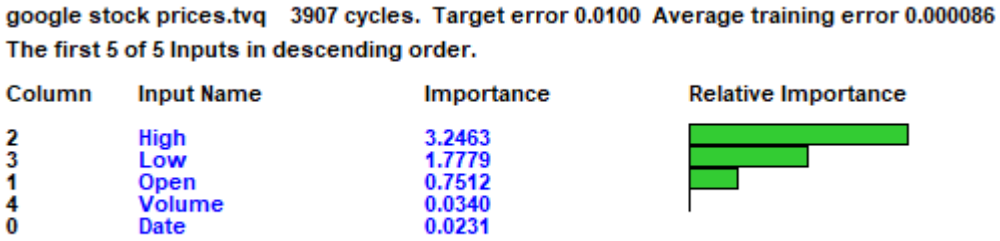

Figure 4: Attributes Importance

	Date	Open	High	Low	Volume	Close
#0	8/19/2004	0.1002	0.1006	0.1000	0.5326	0.1001
#1	8/20/2004	0.1004	0.1018	0.1011	0.3187	0.1020
#2	8/23/2004	0.1028	0.1028	0.1033	0.2738	0.1023
#3	8/24/2004	0.1029	0.1024	0.1019	0.2443	0.1012
#4	8/25/2004	0.1014	0.1015	0.1020	0.1849	0.1014
#5	8/26/2004	0.1014	0.1015	0.1022	0.1644	0.1019
#6	8/27/2004	0.1022	0.1016	0.1024	0.1558	0.1015
#7	8/30/2004	0.1015	0.1009	0.1015	0.1458	0.1005
#8	8/31/2004	0.1008	0.1005	0.1015	0.1431	0.1006
#9	9/1/2004	0.1009	0.1003	0.1009	0.1845	0.1001
#10	9/2/2004	0.1000	0.1002	0.1007	0.2431	0.1004
#11	9/3/2004	0.1004	0.1000	0.1008	0.1454	0.1000
#12	9/7/2004	0.1004	0.1001	0.1009	0.1522	0.1004
#13	9/8/2004	0.1004	0.1003	0.1011	0.1438	0.1005
#14	9/9/2004	0.1008	0.1002	0.1013	0.1347	0.1006
#15	9/10/2004	0.1006	0.1012	0.1013	0.1801	0.1013
#16	9/13/2004	0.1018	0.1016	0.1026	0.1718	0.1018
#17	9/14/2004	0.1020	0.1025	0.1027	0.2010	0.1028
#18	9/15/2004	0.1028	0.1030	0.1035	0.1999	0.1029
#19	9/16/2004	0.1032	0.1034	0.1039	0.1857	0.1034
#20	9/17/2004	0.1037	0.1038	0.1044	0.1877	0.1042
#21	9/20/2004	0.1043	0.1047	0.1052	0.1991	0.1046
#22	9/21/2004	0.1050	0.1045	0.1054	0.1657	0.1043
#23	9/22/2004	0.1044	0.1043	0.1052	0.1692	0.1044
#24	9/23/2004	0.1048	0.1050	0.1052	0.1785	0.1050
#25	9/24/2004	0.1053	0.1053	0.1059	0.1843	0.1048
#26	9/27/2004	0.1049	0.1046	0.1054	0.1641	0.1044
#27	9/28/2004	0.1054	0.1061	0.1060	0.2608	0.1064
#28	9/29/2004	0.1067	0.1080	0.1075	0.3940	0.1075
#29	9/30/2004	0.1075	0.1073	0.1082	0.2297	0.1071
#30	10/1/2004	0.1077	0.1078	0.1082	0.2431	0.1078
#31	10/4/2004	0.1088	0.1084	0.1095	0.2225	0.1084
#32	10/5/2004	0.1086	0.1088	0.1090	0.2416	0.1092
#33	10/6/2004	0.1093	0.1088	0.1099	0.2260	0.1089

Figure 5: imported pre-processed Dataset

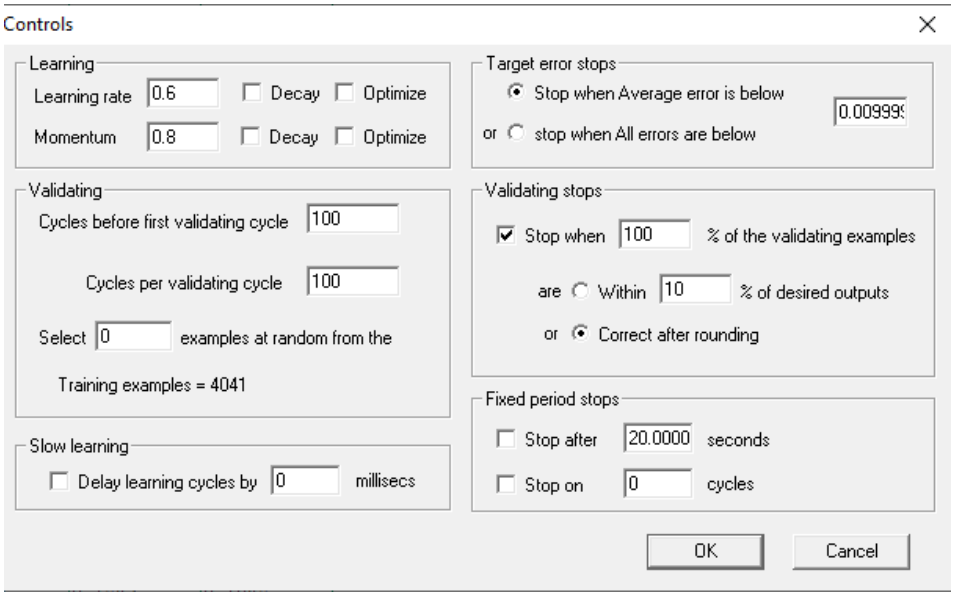

Figure 6: Parameter values of the ANN Model

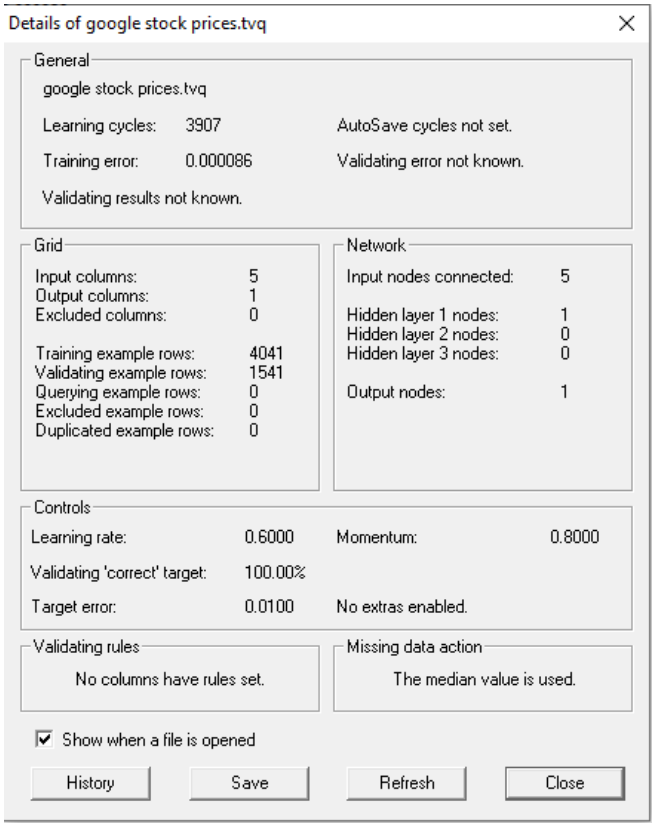

Figure 7: Details of our ANN Model

4. Conclusion

A predictive Artificial Neural Network Model for predicting google stock prices was developed. The Model trained and validated using a dataset from Kaggle. We did some preprocessing on the dataset to make it suitable as input to our ANN model. Validation showed that the model is 99.48% accurate.

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