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Research Article

Analysis of Encoding Candlesticks Stock Pattern Recognition Using Machine Learning

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Abstract

Finding patterns in high dimensional data can be difficult because it cannot be easily visualized. Many different machine learning methods are able to fit this high dimensional data in order to predict and classify future data but there is typically a large expense on having the machine learn the fit for a certain part of the dataset. This research artical proposes a deep learning way of defining different patterns in stock market prices. Using a CNN, the pattern is found within stock market data and predictions are made from it. The stock pattern is divided in five parts decline in value of stock (Abrupt decline, smooth decline), incline in stock value (abrupt increase, smooth increase) and stable price.

Introduction

In recent times stock market predictions is gaining more attention, maybe due to the fact that if the trend of the market is successfully predicted the investors may be better guided. The profit gained by investing and trading in the stock market greatly depends on the predictability. If there is a system that can consistently predict the direction of the dynamic stock market will enable the Users of the system to make informed decisions. More over the predicted trends of the market will help the regulators of the market in taking corrective measures. Patterns are recurring sequences found in OHLC (1Open High Low Close) candlestick charts which traders have historically used as buy and sell signals. Several studies have found some correlation between patterns and future trends, although to a limited extent. Pattern recognition is the study within machine learning that is dedicated to finding different numerical methods to find patterns within a dataset. The ability to find patterns within data can also be used to classify data into different categories or predict behaviours on future datasets. Automation would simplify the process of finding sequences which vary in scale and length. It would also help provide valuable information for stock market price prediction as these signals do offer small correlation with prices. Alone, the patterns are not enough to predict trends, according to other studies, but may yield different results when coupled with other indicators.

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The CNN, as a deep learning technique, is a model that imitates the visual processing of living organisms that recognize patterns or images. The CNN has a structure in which one or more convolutional layers and pooling layers are added to a fully connected layer, which results in an ANN structure. A five-layer CNN was established. LeNet-5 is composed of two convolutional layers for the first two layers and three fully connected layers for the remaining three layers. First, the image of the input layer is filtered through the convolutional layer to extract appropriate features. Convolutional neural network (CNN) is used as a classification algorithm.

Many researchers are conducted studies within the area of stock chart pattern recognition by using machine learning techniques to extract knowledge from available stock data. as an example , The study, "Stock Chart Pattern recognition with Deep Learning" evaluated the performances of CNN and LSTM for recognizing common charts patterns during a stock historical data. It presents two common patterns, the tactic wont to build the training set, the neural networks architectures and therefore the accuracies obtained [1].

A "window" of varied durations is run, breaking it into frames that scale in duration to one size and to 1 in amplitude. The received frames are converted into 2D matrices and fed for analysis to a 2D convolutional NN, which determines the probability of frames belonging to the classes of patterns. The accuracy of the detector is about 98.6 % with a convolutional NN response speed of about 0.65 seconds per 1000 data samples, which corresponds to an analysis of the closing prices of trades on the exchange for quite 2.5 years [2].

Sachin Sampat Patil et al presented a theoretical and empirical framework to use the Support Vector Machines strategy to predict the stock exchange. Firstly, four company-specific and 6 macroeconomic factors which will influence the stock trend are selected for further stock statistical method . Secondly, Support Vector Machine is employed in analyzing the connection of those factors and predicting the stock performance [3].

Hyejung Chung and Kyung-shik Shin constructed a stock price prediction model supported RNN using LSTM units, which is one among the standard methodologies of deep learning. We integrated GA and LSTM network to think about the temporal properties of the stock exchange , and utilized the customized architectural factors of a model. The LSTM network utilized in this study consists with two hidden layers, which may be a deep architecture for expressing nonlinear and sophisticated features of the stock exchange more effectively. [4].

A novel approach is meant to extract people's opinions on specific topics by counting on social media content. 70% of dataset is employed for training whereas remaining dataset is employed during testing. it's been determined that the proposed classifier, classifies the positive, negative and neutral sentiments with an accuracy of 98.32% From the experiment, it's been analyzed that the detection accuracy of sentiments has been increased by 8.99 to stand proud of the prevailing work. the most advantage of this work is that a stop word panel is added in to the GUI, in order that a user can add or remove the stop words as per the necessity [5].

A system is named offline when system takes images as inputs and tries to predict characters from given images by applying machine learning methods. we've worked on offline character recognition problem during this project. Many machine learning methods are proposed over the years for solving this problem. during this paper, 6 hottest machine learning methods to unravel offline handwriting character recognition problem are implemented and compare the performance results to make a decision which method gives best accuracy results under pre-defined conditions [6].

For the proposed methodology DTR is identified because the best model. It uses the knowledge given at a specific instant for prediction. albeit the opposite two models are utilized in many other time dependent data analysis, it's not outperforming the DTR model during this case. this is often thanks

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to the sudden changes that occur available markets. The changes occurring within the stock exchange might not always be during a regular pattern or might not always follow an equivalent cycle. supported the businesses and therefore the sectors, the existence of the trends and therefore the period of their existence will differ. The analysis of those sort of trends and cycles will give more profit for the investors. to research such information we must use networks like DTR as they believe the present information [7].

The stock value change doesn't depend upon the stock market index. it's hooked in to the emotions of social media. The prediction using machine learning algorithms don't give accurate results since the correlation between them is a smaller amount . Results aren't accurate because the dependency is a smaller amount than 50% for all variables. But the graph trends between TCS and Infosys show similar variation except at some points where it had been opposite. Combination of tongue processing techniques for analysis and summarization of text can help in handling such cases. aside from the parameters which are considered during this paper there are often other parameters which may affect the stock shares like Inflation, Deflation, International currency and gold rates and International economic policies, etc. [8].

A survey of various techniques like machine learning techniques, hidden Markov model, ARIMA model and also deep learning techniques is presented. it's observed that selection of the proper parameters for the dataset used for prediction plays important role good prediction accuracy. Various machine learning models also as hybrid and ensemble model give higher rate of accuracy. to urge even better accuracy fundamental analysis are often used which uses sentiment analysis and have selection along side machine learning and deep learning techniques [9].

Stock price prediction is a crucial issue within the financial world, because it contributes to the event of effective strategies for stock market transactions. during this paper, a generic framework employing Long STM (LSTM) and convolutional neural network (CNN) for adversarial training to forecast high-frequency stock exchange is proposed. This model takes the publicly available index provided by trading software as input to avoid complex financial theory research and difficult technical analysis, which provides the convenience for the standard trader of nonfinancial specialty. Our study simulates the trading mode of the particular trader and uses the tactic of rolling partition training set and testing set to research the effect of the model update cycle the prediction performance [10].

Methodology

Stock market includes daily activities like sensex calculation, exchange of shares. Our prediction system will be useful for new investors to invest in stock market based on the various factors like's stock details and stock prediction. Our software will perform very important task into the stock market based on the company's stock values and gives the better prediction result to the investors. Diverse securities exchange parameters are utilized for break down financial exchange expectation are as per the following:

SET list: The SET Index is a composite financial exchange list which is determined from the costs of every single basic stock on the principle leading body of the Stock Exchange, with the exception of stocks that have been suspended for over one year.

Basic analysis: Fundamental examination of stocks is a method which is useful in settling on speculation choices. Its fundamental significance lies in deciding the inherent estimation of a security. It would then be able to be contrasted with the currentstock cost and decided whether the stock is exaggerated or underestimated.

Shutting estimation of the index:"Closing cost" for the most part alludes to the last cost at which a stocktrades amid an ordinary exchanging session. For some U.S. markets, ordinary exchanging sessions keep running from 9:30 a.m. to 4:00 p.m.

Moving normal hybrid inputs:The most fundamental kind of hybrid is the point at which the cost of an advantage moves from one side of a moving normal and closes on the other. Value hybrids are utilized by merchants to distinguish moves in force and can be utilized as an essential passage or leave methodology.

Stock offer esteem: An offer cost is the cost of a solitary offer of various saleable loads of an organization, subordinate or other money related resource. In layman's terms, the stock cost is the most astounding sum somebody is eager to pay for the stock, or the least sum that it very well may be purchased for.

Architecture

Stock price of particular commodity and stock value in previous years is acts as input to training. Statistical features are extracted and analyzed from given data and fed to classifier for comparison.it forms stock chart as training data. Current stock values of commodity are given as input to system. Feature extraction is a process of dimensionality reduction by which an initial set of raw data is reduced to more manageable groups for processing. A characteristic of these large data sets is a large number of variables that require a lot of computing resources to process.
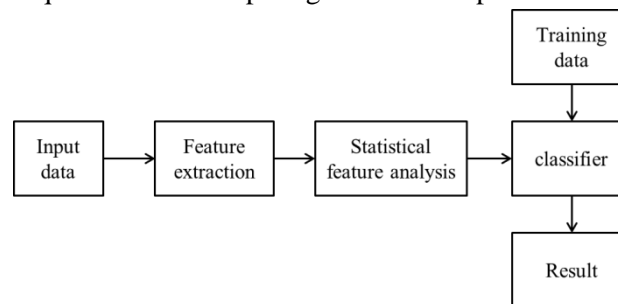

Figure 1. System architecture

Statistical analysis theory is the frequently-used method of data feature extraction. It can analyze the statistical laws when several objects and several indices are interrelated; it is a comprehensive analysis method. Statistical methods are based on forceful theory, have lots of algorithms, and can effectively analyze and process the data. Analyzing the data features or classifying the data subsets should subject to statistics irrelevant assumption.

Classifier (here CNN) classifies features from input data and matched with statistical features from data and according to comparison classifies system stock into following categories:

1. Abrupt decline: if stock values are abruptly decreasing over particular period of time in past years then system predicts that stocks prices will abruptly decline in future.

2. Smooth decline: system predicts that in near future prices of particular stock will decline smoothly (comparing pattern from last some years as specified in stock chart).

3. Stable: stock prices will be stable over the time period

4. Smoothly increase: value of stock will smoothly increase

5. Abruptly increase: if stock values are abruptly increasing over particular period of time in past years then system predicts that stocks prices will abruptly decline in future.

Findings

Artificial Intelligence has been witnessing a monumental growth in bridging the gap between the capabilities of humans and machines. Researchers and enthusiasts alike, work on numerous aspects of the field to make amazing things happen. One of many such areas is the domain of Computer Vision.

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The agenda for this field is to enable machines to view the world as humans do, perceive it in a similar manner and even use the knowledge for a multitude of tasks such as Image & Video recognition, Image Analysis & Classification, Media Recreation, Recommendation Systems, Natural Language Processing, etc. The advancements in Computer Vision with Deep Learning has been constructed and perfected with time, primarily over one particular algorithm a Convolutional Neural Network.
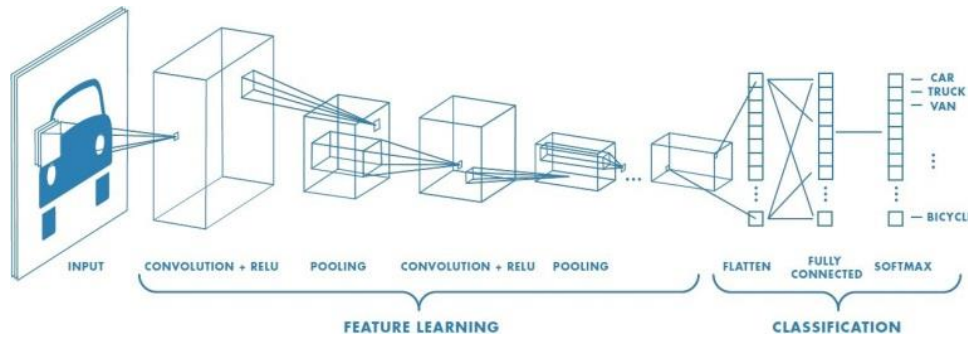

Figure 2 Architect CNN [12]

A Convolutional Neural Network (ConvNet/CNN) is a Deep Learning algorithm which can take in an input image, assign importance (learnable weights and biases) to various aspects/objects in the image and be able to differentiate one from the other. Architecture of CNN is comprised of 3 layers 1) input, 2) feature learning, and 3) classification, shown in fig 2. Feature learning is divided into subgroup like convolution layer, RELU layer and pooling layer. Whereas, the classification layer is divided into sub layer flattein, fully connected layer and softmax. An example of CNN sequence to classify handwritten digits is shown in fig 3.
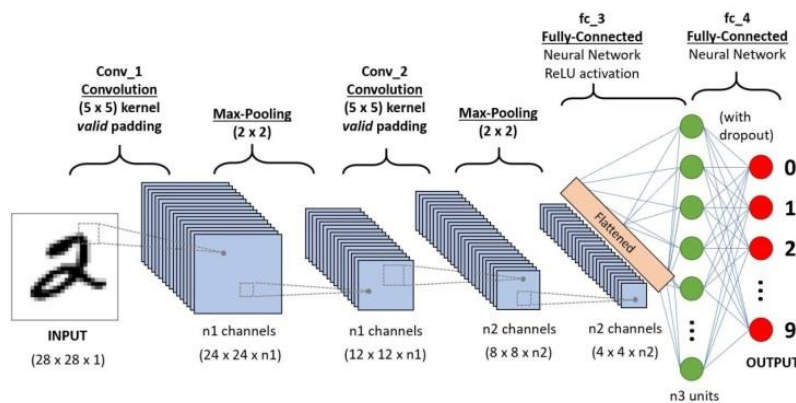

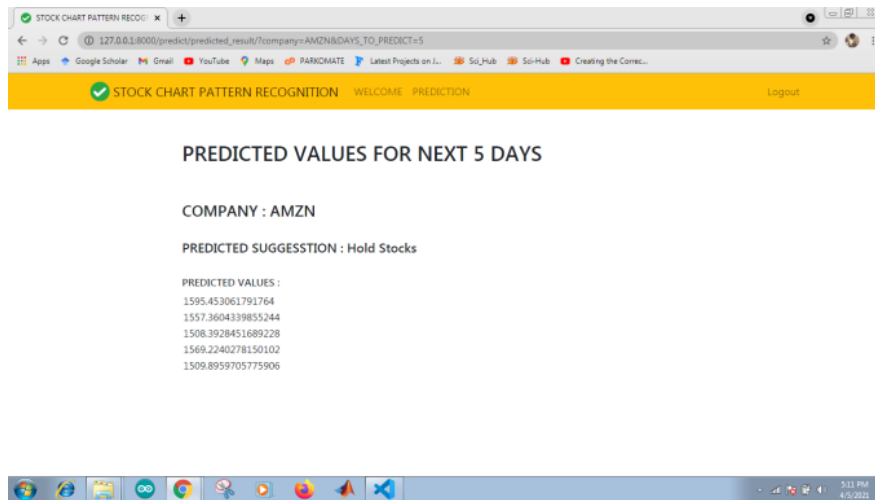*Figure3 A* CNN sequence to classify handwritten digits

Figure 4 Stock Predication

Table1.
Comparison of Different System

Algorithm	Mean2 Error Rate
SVM	5
Existing System	4
Proposed System	1

Discussion and Conclusion

Anticipating the securities exchange cost is exceptionally well known among financial specialists as speculators need to know the arrival that they will get for their ventures. Generally the specialized experts and intermediaries used to foresee the stock costs dependent on chronicled costs, volumes, value designs and the essential patterns. Today the stock value expectation has turned out to be mind boggling than before as stock costs are influenced because of organization's money related status as well as due to socio practical state of the nation, political environment and cataclysmic events and so on. The arrival from the offer market is constantly unsure and equivocalness in nature thus conventional procedures won't give precise expectation. A ton explore has been made around there and progressed insightful procedures going from unadulterated numerical models and master frameworks to neural systems have likewise been proposed by numerous budgetary exchanging frameworks for stock value expectation. In this paper we are going to utilize CNN (Convolution Neural Network) for anticipating stocks an incentive for following day.

We can use better pre-processing technique to eliminate noise from information so that in further processes like classification and prediction noise doesn't make any impact.

References

[1] Marc Velay and Fabrice Daniel, "Stock Chart Pattern recognition with Deep Learning", Researchgate, June 2018

[2] Victor Skuratov, Konstantin Kuzmin, Igor Nelin, Mikhail Sedankin, "Application of a convolutional neural network to create a detector of technical analysis figures on exchange quotes charts", (2019), «EUREKA: Physics and Engineering» Number 6 DOI: 10.21303/2461-4262.2019.001055

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[3] International Journal of Current Trends in Engineering & Technology Volume: 02, Issue: 01 (JAN-FAB, 2016) 18 Stock Market Prediction Using Support Vector Machine Mr. SachinSampatPatil, Prof. Kailash Patidar, Assistant Prof. Megha Jain

[4] Genetic Algorithm-Optimized Long Short-Term Memory Network for Stock Market Prediction Hyejung Chung and Kyung-shik Shin Sustainability 2018, 10, 3765; doi:10.3390/su10103765

[5] An optimized CNN based robust sentiment analysis system on big social data using text polarity feature Komalpreet Kaur, Chitender Kaur, Tarandeep Kaur Bhatia International Journal of Innovative Technology and Exploring Engineering (IJITEE) ISSN: 2278-3075, Volume-8 Issue-6, April 2019

[6] Performance Comparison of Machine Learning Methods for Solving Handwriting Character Recognition Problem Ş.G.KIVANÇ1, A.E. BAKTIR2 and B.ŞEN3 International Conference on Advanced Technologies, Computer Engineering and Science (ICATCES'18), May 11-13, 2018 Safranbolu, Turkey

[7] JSRD - International Journal for Scientific Research & Development| Vol. 6, Issue 07, 2018 | ISSN (online): 2321-0613 All rights reserved by www.ijsrd.com 408 Stock Market Prediction using RFR, DTR & SVR Ravikant1 Suman Kumar Swarnkar2L. P. Bhaiya

[8] International Journal of Computer Sciences and Engineering Open Access Research Paper Vol.-6, Issue-5, May 2018 E-ISSN: 2347-2693 Stock Market Analysis and Prediction using Hadoop and Machine Learning Piyush Jain, Kaustubh Bhat, HarshalKesharwani3 ,PriteshBhate, Khushboo P Khurana

[9] International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056 Volume: 06 Issue: 05 | May 2019 www.irjet.net p-ISSN: 2395-0072 © 2019, IRJET | Impact Factor value: 7.211 | ISO 9001:2008 Certified Journal | Page 4842 Stock Market Forecasting Techniques: A Survey Rashmi Sutkatti1, Dr. D. A. Torse

[10] Xingyu Zhou, Zhisong Pan, Guyu Hu, Siqi Tang, Cheng Zhao "Stock Market Prediction on High-Frequency Data Using Generative Adversarial Nets", Mathematical Problems in Engineering Volume 2018, Article ID 4907423, 11 pages

[11] https://www.analyticsvidhya.com/blog/2020/10/what-is-the-convolutional-neural-network-architecture/

[12] Aaryan Gupta, Hamza Abubakar, "Evolution of Convolutional Neural Network Architectures", medium May 17, 2020 ·