In project3 folder

<https://github.com/Kulbear/stock-prediction.git>

<https://github.com/huseinzol05/Stock-Prediction-Models.git>

<https://github.com/kartik-joshi/Stock-predection.git>

<https://github.com/Rajat-dhyani/Stock-Price-Predictor.git>

<https://github.com/BenjiKCF/Neural-Net-with-Financial-Time-Series-Data.git>

<https://github.com/rosdyana/CNN-Financial-Data.git>

<https://github.com/rosdyana/Going-Deeper-with-Convolutional-Neural-Network-for-Stock-Market-Prediction.git>

<https://github.com/RajatSablok/EmoStock.git>

<https://github.com/eytanohana/LSTM-for-stock-price-prediction.git>

not in

<https://github.com/dark-0ne/StockPredictor.git>

<https://towardsdatascience.com/aifortrading-2edd6fac689d>

might be good, already folder of same name.

<https://github.com/UWFlex/stock-prediction.git>

<https://www.kaggle.com/magichanics/amateur-hour-using-headlines-to-predict-stocks>

<https://github.com/jangarong/StockMarketPredictions.git>

<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0212320#sec002>

Output

Dense

LSTM

CNN

Input

CNN for feature extraction, LSTM for interpreting features across time steps.

Single CNN layer 🡪 sequence of LSTM models (one for each time step)

- wrap CNN model (n layers) within TimeDistribution layer

|  |  |
| --- | --- |
| 2  3  4  5  6  7  8 | model = Sequential()  # define CNN model  model.add(TimeDistributed(Conv2D(...))  model.add(TimeDistributed(MaxPooling2D(...)))  model.add(TimeDistributed(Flatten()))  # define LSTM model  model.add(LSTM(...))  model.add(Dense(...)) |

Use LSTM to learn long term relationships of features extracted with CNN

…best model with linear layer before and after LSTM

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Available exchanges from yahoo

<https://help.yahoo.com/kb/exchanges-data-providers-yahoo-finance-sln2310.html>

company name to ticker

<https://www.marketwatch.com/tools/quotes/lookup.asp>

pyhton from js

<https://stackoverflow.com/questions/13175510/call-python-function-from-javascript-code>

**html page** with

* user input box for ticker symbol
* link to yahoo page for available exchanges
* link to get symbol from company name
* graph of chosen stock
* box with co info
* ? long term chart of stock

**Information page**

* History of stock market

A stock exchange, securities exchange, or bourse[note 1] is a facility where stockbrokers and traders can buy and sell securities, such as shares of stock, bonds, and other financial instruments. Stock exchanges may also provide facilities for the issue and redemption of such securities and instruments and capital events including the payment of income and dividends.

There is little consensus among scholars as to when corporate stock was first traded. Some see the key event as the Dutch East India Company's founding in 1602,[7] while others point to earlier developments (Bruges, Antwerp in 1531 and in Lyon in 1548).

On the other hand, economist Ulrike Malmendier of the University of California at Berkeley argues that a share market existed as far back as ancient Rome, that derives from Etruscan "Argentari". In the Roman Republic, which existed for centuries before the Empire was founded.

One such service was the feeding of geese on the Capitoline Hill as a reward to the birds after their honking warned of a Gallic invasion in 390 B.C. Participants in such organizations had partes or shares, a concept mentioned various times by the statesman and orator Cicero. In one speech, Cicero mentions "shares that had a very high price at the time".

"It is not quite accurate to call [Amsterdam] the first stock market, as people often do. State loan stocks had been negotiable at a very early date in Venice, in Florence before 1328, and in Genoa, where there was an active market in the luoghi and paghe of Casa di San Giorgio, not to mention the Kuxen shares in the German mines which were quoted as early as the fifteenth century at the Leipzig fairs, the Spanish juros, the French rentes sur l’Hotel de Ville (municipal stocks) (1522) or the stock market in the Hanseatic towns from the fifteenth century. The statutes of Verona in 1318 confirm the existence of the settlement or forward market ... In 1428, the jurist Bartolomeo de Bosco protested against the sale of forward loca in Genoa. All evidence points to the Mediterranean as the cradle of the stock market. But what was new in Amsterdam was the volume, the fluidity of the market and publicity it received, and the speculative freedom of transactions. — Fernand Braudel (1983)

n England, King William III sought to modernize the kingdom's finances to pay for its wars, and thus the first government bonds were issued in 1693 and the Bank of England was set up the following year. Soon thereafter, English joint-stock companies began going public.

The first publicly traded shares were issued in Amsterdam. The VOC raised capital by being the first company in the world to issue publicly traded shares in the year 1602 .

The Dutch East India Company or in modern spelling the Dutch East India Company (Vereenigde Oostindische Compagnie), abbreviated to VOC (1602-1800), was a private Dutch trading company with a monopoly on overseas trade between the Republic of the Seven United Netherlands and the area east of Cape de Good Hope and west of the Strait of Magellan .

Besides the borrowing capacity provided to an individual or firm by the banking system, in the form of credit or a loan, a stock exchange provides companies with the facility to raise capital for expansion through selling shares to the investing public

New York Stock Exchange: the New York Stock Exchange (NYSE) requires a company to have issued at least a million shares of stock worth $100 million and must have earned more than $10 million over the last three years.[20]

NASDAQ Stock Exchange: NASDAQ requires a company to have issued at least 1.25 million shares of stock worth at least $70 million and must have earned more than $11 million over the last three years.[21]

London Stock Exchange: the main market of the London Stock Exchange requires a minimum market capitalization (£700,000), three years of audited financial statements, minimum public float (25%) and sufficient working capital for at least 12 months from the date of listing.

Bombay Stock Exchange: Bombay Stock Exchange (BSE) requires a minimum market capitalization of ₹250 million (US$3.5 million) and minimum public float equivalent to ₹100 million (US$1.4 million).

The earliest recorded organization of securities trading in New York among brokers directly dealing with each other can be traced to the Buttonwood Agreement. Previously, securities exchange had been intermediated by the auctioneers, who also conducted more mundane auctions of commodities such as wheat and tobacco.[11] On May 17, 1792, twenty four brokers signed the Buttonwood Agreement, which set a floor commission rate charged to clients and bound the signers to give preference to the other signers in securities sales. The earliest securities traded were mostly governmental securities such as War Bonds from the Revolutionary War and First Bank of the United States stock,[11] although Bank of New York stock was a non-governmental security traded in the early days.[12] The Bank of North America, along with the First Bank of the United States and the Bank of New York, were the first shares traded on the New York Stock Exchange.

In 1817, the stockbrokers of New York, operating under the Buttonwood Agreement, instituted new reforms and reorganized. After sending a delegation to Philadelphia to observe the organization of their board of brokers, restrictions on manipulative trading were adopted, as well as formal organs of governance.[11] After re-forming as the New York Stock and Exchange Board, the broker organization began renting out space exclusively for securities trading, which previously had been taking place at the Tontine Coffee House. Several locations were used between 1817 and 1865, when the present location was adopted.

In 1943, trading floor is opened to women.

A stock exchange is an exchange (or bourse)[note 1] where stockbrokers and traders can buy and sell shares (equity stock), bonds, and other securities.

The stock market is one of the most important ways for companies to raise money, along with debt markets which are generally more imposing but do not trade publicly.[44] This allows businesses to be publicly traded, and raise additional financial capital for expansion by selling shares of ownership of the company in a public market. The liquidity that an exchange affords the investors enables their holders to quickly and easily sell securities. This is an attractive feature of investing in stocks, compared to other less liquid investments such as property and other immoveable assets.

History has shown that the price of stocks and other assets is an important part of the dynamics of economic activity, and can influence or be an indicator of social mood. An economy where the stock market is on the rise is considered to be an up-and-coming economy. The stock market is often considered the primary indicator of a country's economic strength and development

Changes in stock prices are mostly caused by external factors such as socioeconomic conditions, inflation, exchange rates

The efficient-market hypothesis (EMH) is a hypothesis in financial economics that states that asset prices reflect all available information at the current time.

The Efficient-market hypothesis is an assumption that asset prices reflect all available information meaning that it is impossible to systematically "beat the market."

According to standard theory, a decrease in price will result in less supply and more demand, while an increase in price will do the opposite. This works well for most assets but it often works in reverse for stocks due to the mistake many investors make of buying high in a state of euphoria and selling low in a state of fear or panic as a result of the herding instinct.

The 'hard' efficient-market hypothesis does not explain the cause of events such as the crash in 1987, when the Dow Jones Industrial Average plummeted 22.6 percent—the largest-ever one-day fall in the United States.[54]

This event demonstrated that share prices can fall dramatically even though no generally agreed upon definite cause has been found: a thorough search failed to detect any 'reasonable' development that might have accounted for the crash. (Note that such events are predicted to occur strictly by randomness, although very rarely.)

Sometimes, the market seems to react irrationally to economic or financial news, even if that news is likely to have no real effect on the fundamental value of securities itself.[64] However, this market behaviour may be more apparent than real, since often such news was anticipated, and a counter reaction may occur if the news is better (or worse) than expected. Therefore, the stock market may be swayed in either direction by press releases, rumors, euphoria and mass panic.

New York Stock Exchange (NYSE) circuit breakers

|  |  |
| --- | --- |
| 7% | Trading will halt for 15 minutes only if drop occurs before 3:25 p.m |
| 13% | Trading will halt for 15 minutes only if drop occurs before 3:25 p.m. |
| 20% | Trading will stop for the day |

For stock prediction with ANNs, there are usually two approaches taken for forecasting different time horizons: independent and joint. The independent approach employs a single ANN for each time horizon, for example, 1-day, 2-day, or 5-day. The advantage of this approach is that network forecasting error for one horizon won't impact the error for another horizon—since each time horizon is typically a unique problem. The joint approach, however, incorporates multiple time horizons together so that they are determined simultaneously. In this approach, forecasting error for one time horizon may share its error with that of another horizon, which can decrease performance. There are also more parameters required for a joint model, which increases the risk of overfitting

When they’re done, they come up with nice plots that show that they were almost perfectly able to predict an asset’s price movement. What they don’t show, however, is that their LSTMs basically just get really good at using the previous day’s price (or some combination of the previous day and the recent history of stock prices prior to that day) to act as a stand-in for the next day’s price.

The accuracy of the next day’s price isn’t perfect, but if you keep predicting prices in this manner and plot them out, to the naked eye, it will look as if these prices are almost exactly predictive of reality.

In reality, you can’t trade these prices on a day to day basis because the per-day accuracy is not good enough to make money, and since these LSTMs aren’t predicting forward looking predictions more than one day in advance (typically), you can’t trust these networks to predict the longer-term price movements for a stock.

You might have already correctly guessed that the fundamental flaw with this model is that for the prediction of a particular day, it is mostly using the value of the previous day.

11/17 info page tiles

> A stock is a share in a company. If you buy stock in a company, you are buying shares, or a percentage of the company, you become part owner. Companies looking to earn capital have two choices, borrow money or sell pieces of their company.

In simplest terms, if a company is worth one million dollars and they sell a million shares, each one is worth one dollar. Later, if the company becomes worth two million dollars, each share becomes worth two dollars. Conversely, if the company later becomes worth a hundred thousand dollars, each share is only worth ten cents.

> We all know what a market is, a place to buy or sell goods. Markets have been around for thousands of years; even before currency was invented, people would gather to trade their goods.

A stock market is a little more complicated and a little less tangible, it has become an entity within itself, an aggregation of all the buyers and sellers. We can give it a net worth, we can quantify its value and track its changes.

A stock exchange is the more tangible idea of a marketplace, a place where stocks are bought and sold. The New York Stock Exchange (NYSE) is the most familiar and largest in the world and it has a physical location on Wall Street in New York, USA. A stock exchange itself can be evaluated and valuated.

> Many believe that the founding of the Dutch East India Company in 1602 was the start of corporate trading. Others would go as far back as ancient Rome and quote Cicero (106-43 BC) from a speech, “shares that had a very high price at the time”.

In 1693 King William of England issued government bonds to help subsidize expenses of war. In 1792 the Buttonwood Agreement was signed in New York and began organized securities trading; in 1817 they re-formed as the New York Stock Exchange, which later, in 1943, allowed women onto the trading floor.

The buying and selling of commodities at a stock exchange has changed over the years. Initially, all business was done in person, on ‘the floor’ of the exchange. The advent of the telegraph first allowed for remote trading. Phone lines and computers expanded the ease of remote trading and currently anyone with a computer or smart phone (and internet access) can buy and sell in real time.

> Machine learning was a term first used in the late 1950’s and throughout the 60’s and 70’s computers were taught to recognize patterns in an attempt to “teach themselves” and give them the ability to make predictions. Even the most advanced machine learning models of today are still just looking for patterns.

In the past 60 years computer processing has gotten cheaper and faster and more advanced algorithms are able to be used on data. Things like weather forecasting are able to process a slew of inter-related, constantly changing variables with fairly decent accuracy.

> Unlike the weather, the stock market does not follow the laws of Newtonian physics. It behaves sometimes in a logical fashion and other times emotionally, following the whims of the populous; behaving out of fear or hope, confidence or panic. Its variables are things of global or local happenings, details about the company, how much their product is valued by its consumers, or how it or they are perceived by the public, etc. At nearly every level of these variables are humans and predicting their behavior is a science within itself.

People have come up with all kinds of variables to use in their models when trying to predict the market. Keywords from past news headlines have been compared to the market, recently the presidents tweets have been used in the same manner. Ultimately there is no way to really predict the stock market; the Efficient Market Hypothesis states that the value of a stock, or an entire market, is dependent on all available information at the moment. Moments are constantly changing and so any prediction can only be accurate to now, not into the future.

> Though not controlled by Newtonian physics, the market is part of the universe and is still susceptible to the uncertainty principal, exemplified in quantum physics; in a nutshell, nothing can ever be certain, only predicted with a certain level of accuracy. This is not to say that both short and long term predictions can not be made by individuals studied in necessary variables with more accurate than not outcomes.

> When we train a computer model to predict stock prices based on historical data, we are asking the computer to find patterns and project those patterns into the future. More often than not when we plot actual prices vs predicted prices from a set of historical data, the computer’s predictions almost perfectly match the actual prices. The truth is the computer has simply gotten good at projecting a current price forward in time by a day or two; it finds patterns that fit up until the current moment but the truth is that a pattern into the future does not exist until it happens. The predictions that are made can seem fairly accurate but you can’t trade these prices because the per-day accuracy is not good enough to make money.

Being able to predict the stock market would be like winning the lottery. As modern humans we are often times driven by money. Money for food and shelter, for a ‘rainy day’, for our retirement and of course money to enjoy ourselves, to have a nicer house, a nicer car, to be able to retire early. For many, the stock market becomes a means of investing in our future, in our children’s future. We hope that we make wise decisions and that we don’t ‘loose our shirt’. One can be most secure in the long term fact that markets rise over time and in the interim dance up and down.

If by chance we could predict this up and down dance or predict what stocks will rise sharply and for how long, then what? All things behave differently when they are observed, from a single photon of light to a multi-trillion dollar market. The market would adapt and our model would become obsolete.

The reality is an accurate model at best could do no more than to widen the gap between those who have and those who have not.

11/18

Douglas High – I am a proud father and lover of life. I have experience as a professional chef, electrician, and a mainframe programmer. Most recently (and prior to COVID) I have been putting my electrical and practical skills to use helping my clients bring their project ideas to fruition. An avid hiker, I enjoy forging my own trails and I am most at home thriving in harsh conditions of nature. I enjoy camping in severe weather, snow storms being my favorite. I have a fond curiosity of time, space, and reality and in understanding things beyond the realm of what we have evolved to easily perceive. I am looking forward to re-entering the field of data analysis and expanding on new technologies just learned.