

# Market Magician

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**Abstract—** Currently, there is a lot of interest in the stock market. It can be confusing and daunting to invest money in the stock market since there is a lot of information that can be difficult to access. An AI stock market solution could make it easier, and more accessible, to the greater public to invest money more wisely and with the power of data at their disposal.

This paper presents our application Market Magician which is an AI stock market analyser. Market Magician uses historical data, news flow, and intra-day trading data to determine entry and exit points of a stock or fund by using a trained LSTM model and/or a Monte Carlo simulation to maximize profits.

**Keywords—** Machine Learning, LSTM, Monte Carlo, TensorFlow, Y Finance, Stock Market, Django.

## I. INTRODUCTION

The stock market is an exchange mechanism that helps individuals, named investors, buy, and sell shares in publicly traded companies. The stock market also signals signs of economic strength or weakness. How the stock market is performing is a major indicator of modern economies. This is due to companies being able to raise money to accelerate successful startups and pay off debt. Companies listed on the stock market must be public, shares are open to everyone not just a select few [1].

There are two main kinds of stocks: common stock and preferred stock. Common stock allows stock owners to vote at shareholder meetings and receive dividends. Preferred stocks do not allow stock owners to vote. However, preferred stock owners receive dividends before common stockholders do. Preferred stock owners also have priority if the company goes bankrupt and the assets are liquidated [2].

Publicly traded companies report earnings at the end of each quarter. These Earnings per share (EPS), are a major performance indicator of the company and play a critical factor in the stock's price [3].

It can be difficult for an investor to know which companies to invest in and how much money to invest into those companies. Stock prices change based on the demand for shares from new investors or the supply of shares from existing investors who want to sell. Investors decide to sell their stock based on how a company is performing, economic factors, and the current price of the share [1].

Market Magician is an AI application that provides a potential investor with all the information they need so they can wisely choose what company to invest in as well as how much money to invest in selected companies. Our application provides an investor with information on the top performing stocks as well as the risk levels associated with current stocks.

Market Magician does this by training an AI model based on selected stock price history. The AI model can then predict future prices for selected stocks

## II. LITERATURE REVIEW

AI has significantly changed the way the stock market functions. This is due to investors being able to mechanize their stock trading purposes as well as the financial markets restructuring themselves [4].

AI stock trading uses two approaches, sentiment analysis and complex algorithmic predictions, to analyze data and execute trades at the optimal price [5]. Sentiment analysis determines whether a given text contains negative, positive, or neutral emotions [6].

There are several types of AI trading such as: Quantitative trading, Algorithmic trading, High-frequency trading, Automated trading, and Arbitrage trading.

High-frequency trading (HFT), is currently a popular form of AI trading. HFT is a form of AI trading that allows high volumes of stocks and shares to be sold and bought mechanically at extremely high speeds [4].

By training an algorithm on a prescribed set of rules, such as charts, indicators, technical analysis or stock essentials, the investor can make a better decision on whether to buy or sell a stock, as well as how many shares to buy or sell.

There are various benefits to AI trading. Some of these benefits include: Reducing research time, improved accuracy, predicting patterns, stronger risk management, and lowering costs. Algorithmic trading has increased over the past ten years as AI techniques have increased. In the U.S. stock market, about 70% of trading is initiated through AI trading [4].

There are some downsides to AI trading. Some of these include: less transparency, reliance on historical data, large-scale errors, and cybersecurity. Algorithmic bias is also a potential problem investors utilizing AI trading can face. Algorithmic bias could skew the training data which could mislead investors about returns [7].

## III. Current Solutions

Currently, there are various AI stock trading companies available. Such as: AlgosOne, LevelFields, Trade Ideas, TuringTrader, Tickeron, and TrendSpider.

AlgosOne performs AI stock trading on various stocks using advanced deep learning tools. AlgosOne trades stocks from all types of sectors, from major online retailers,

technology industry companies and automotive giants to energy companies, food and beverage brands, pharmaceuticals corporations and telecommunications providers. LevelFields allows investors to monitor and analyze thousands of stocks. LevelField's AI also focuses on identifying events that significantly impact stock prices such as activist investments, CEO changes, or regulatory actions. Trade Ideas uses AI to scan the market in real-time. This provides traders with timely insights into potential stock movements. TuringTrader targets long-term growth and portfolio management. Tickeron uses AI robots to accelerate the trading process and analyze vast amounts of real-time market data. TrendSpider has its own automated pattern recognition which allows users to identify key trends and patterns across multiple timeframes without the need for manual charting.

Market Magician is different from these companies because our AI model can tell a user which company to invest in as well as what the risk level is for those specific companies.

#### IV. Product Requirements

Our goal with Market Magician is to develop a stock market AI that can make the stock market more accessible to everyday professionals as well as experienced traders. This will be achieved by having a centralized application with stock market history, historical prices, stock market predictions, a ticker with all available stocks on the public market, and market analysis.

The development of this application requires:

1. Web application: A user should be able to access the website which will contain their user profile. This profile will have a history of all their stock market exchanges. The profile will also have a history of their personal monetary gains and losses.
2. AI Model: The application must have an AI model that is trained to know the historical data of the stock market as well as the trends in the current market. The AI must provide the user with this information for the individual to invest in a stock.
3. Features: The application must be able to save and document all the user profile features, such as the wish list and stock watcher options. It must also record a user's transactions, both losses and gains.

#### V. Methodology

##### A. User Frontend

Cacoo, VSCode, and GitHub were tools used for efficient collaboration and design for the front-end application of Market Magician.

Cacoo was used to create a UI diagram to illustrate how the front-end web pages would look.

VSCode was the code editor used to code the front-end application of Market Magician.

GitHub was used to allow the team to collaborate and add to the overall code of the application.

The Market Magician application used: HTML, CSS, JavaScript, and React for the styling and functionality of the application.

##### B. Y! Finance API

The Yahoo! Finance tool is the backbone for collecting the trainable data of each company stock price we wish to predict. The Market Magician application fetches information from Yahoo! Finance upon a user request. This data includes, but is not limited to, the stock's Open, Close, High, Low, Volume, and Date. This data is then processed into a python DataFrame where it will be prepared for model training.

##### C. Django Backend API

The benefit of deploying our application on Django is two-fold: the first being that Django offers cloud based servers to host your application at no cost, and the second being that Django offers a way to deploy fast and secure applications faster. Django is an open source web development software that allows the use of a virtual environment to connect Django's API with our Market Magician's neural network.

##### D. Deep Learning Model

The core of Market Magician's neural network is a Long-Short Term Memory (LSTM) recurrent neural network (RNN). An LSTM, unlike conventional RNNs, are capable of learning long-term patterns and diminishing the effects of the vanishing gradient problem found in RNNs. This is incredibly useful for predicting the Stock price of any company using historical data.

For the training of every model, the start date will be set to Jan. 1 of 2010. Any company that was publicly traded from then on will be trained using information from that date forward, and every company since that date will have their data begin during their initial public offering (IPO).

#### VI. Product Results

The accuracy of the LSTM Model varied for each of the Magnificent 7 Stocks. Of the seven, Microsoft had the lowest error rate with a mean squared error of 0.0268 whereas Tesla had the highest error rate with a mean squared error of 0.0874. The table below shows the seven stocks within the Magnificent Seven and how each model compares to the other.

Company Name	Ticker Symbol	Mean Squared Error
Amazon	AMZN	0.0439
Apple	AAPL	0.0632
Google	GOOGL	0.0370
Meta	META	0.0358
Microsoft	MSFT	0.0268
Nvidia	NVDA	0.0641
Tesla	TSLA	0.0874

The significance behind the mean squared error is shows how accurate the model's predictions were at predicting the test prices. The lower the mean squared error, the more likely the model predicted the correct price through test data.

## VII. Conclusion

Market Magician employs an AI model to aid potential investors in choosing to buy or not buy stocks for a specific company. The AI model provides an individual with all available stock history to aid them in their choice of whether to buy or sell stock. Giving the investors all the information readily available will allow them to make the correct choices and save money or earn a lot of money. Market Magician can provide a user with confidence in the stock market and give them control over their money.

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