



PES UNIVERSITY, BANGALORE

Department of Computer Science and Engineering

PROJECT REPORT
ON
STOCK MARKET PREDICTOR

SUBMITTED BY

Mihir Jayaprakash	PES2UG20CS196
Mitul Joby	PES2UG20CS199
Navyae Goyal	PES2UG20CS219
Noel Jacob Abraham	PES2UG20CS234

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
BENGALURU – 560100, KARNATAKA, INDIA



PES UNIVERSITY, BANGALORE

Department of Computer Science and Engineering

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Project Proposal

TITLE : Stock Market Predictor

GITHUB: <https://github.com/Mitul-Joby/Stonkinator>

Proposed Project Description

Stock market prediction and analysis are some of the most difficult jobs to complete. There are numerous causes for this, including market volatility and a variety of other dependent and independent variables that influence the value of a certain stock in the market. These variables make it extremely difficult for any stock market expert to anticipate the rise and fall of the market with great precision.

However, with the introduction of Machine Learning and its strong algorithms, the most recent market research and Stock Market Prediction advancements have begun to include such approaches in analyzing stock market data.

This article will walk through a simple implementation of analyzing and forecasting the stock prices of a Popular Worldwide Online Retail Store in Python using various Machine Learning Algorithms.

Clientele

The project's machine learning algorithms can be widely utilized by many organizations in Stock market prediction.

General public interested in the Stock market can make great use of this tool to aid them in their investment plans.

Plan Of Work

Login Page and Register Page	- Mihir
Predict Page, Model construction, backend server	- Mitul
Predictions Page, Model training, testing	- Navyae
Home Page and Land Page	- Noel

Software Requirement Specifications

Introduction

Product Name: Stock Price Predictor

Version: 1.0

This document goes through the specifications of both the front end and the back end of the product.

Purpose

The stock market is a collection of buyers and sellers of stocks/shares, which represent ownership claims on businesses. Investments are usually made with an investment strategy in mind.

The stock market is always fluctuating and is known for being volatile, dynamic, and nonlinear. Accurate stock price prediction is challenging because of multiple external factors such as socioeconomic conditions, inflation, exchange rates, politics unexpected events, a company's financial performance, and so on.

However, this also means that there's a lot of data to find patterns and make models and predictions. These models don't even need to reach high levels of accuracy because even 60% accuracy can deliver solid returns. Thus, with the help of ML techniques, one can detect stock market trends.

Intended Audience and Reading Suggestions

This product is aimed to predict trends in the stock market and make predictions. The entire idea of predicting stock prices is to gain significant profits for the users.

It is intended that the document may be read by developers, project managers, marketing staff, users, testers, and documentation writers.

The remainder of the document contains all descriptions of product functions with functionality and basic Interface requirements. Readers are expected to read the stated references for a greater technical understanding.

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Product Scope

This product aims to predict trends in the stock market and allow users to gain significant profits for such as predictions. The product hopes to support cross-platform as web-based clients and terminal clients.

The product shall analyze quantitative information that could identify trading signals and capture the movement patterns of the stock market.

The product hopes to be a relevant indicator for long-term investment. The fundamental analysis relies on both historical and present data to measure profits/losses.

References

Schwert, G.W., 1989. Why does stock market volatility change over time? The journal of finance, 44(5), pp.1115-1153.

Yadav, A., Jha, C.K. and Sharan, A., 2020. Optimizing LSTM for time series prediction in Indian stock market. Procedia Computer Science, 167, pp.2091-2100.

Vanukuru, Kranthi. (2018). Stock Market Prediction Using Machine Learning. 10.13140/RG.2.2.12300.77448.

Overall Description

Product Perspective

Stock price analysis has been a critical area of research and is one of the top applications of machine learning. A stock market is a public market where you can buy and sell shares for publicly listed companies. The stocks, also known as equities, represent ownership in the company. The stock exchange is the mediator that allows the buying and selling of shares.

Stock market prediction using machine learning means the ability of the software to predict the future stock prices based on past events. It takes time series and based on patterns and trends; it predicts the future price of a particular stock of a particular company. This not only helps companies to raise capital but also helps in raising personal wealth.

Product Functions

Stock market prediction and analysis are some of the most difficult jobs to complete. There are numerous causes for this, including market volatility and a variety of other dependent and independent variables that influence the value of a certain stock in the market. These variables make it extremely difficult for any stock market expert to anticipate the rise and fall of the market with great precision.

However, with the introduction of Machine Learning and its strong algorithms, the most recent market research and Stock Market Prediction advancements have begun to include such approaches in analyzing stock market data.

The main objective of this project is to do the following:

- Although predicting the stock market is difficult since it is volatile, however with the help of machine learning, it is possible to help investors to make better decisions
- It gives investors a new perspective into the current trends in the stock market
- It also gives investors a new perspective into patterns of the stock market based on historical data (long term data)
- It helps in correct prediction of a stock; a correct prediction of stocks can lead to huge profits for the seller and the broker. Frequently, it is brought out that prediction is chaotic rather than random, which means it can be predicted by carefully analyzing the history of respective stock market.

User Classes and Characteristics

Our target audience as mentioned above is for anyone and everyone that surfs through the internet, who are looking to gain profits from the predictions.

There will also be an Admin class to manage the product who will have majority permissions.

Operating Environment

The product can operate in:

- Web Browser
- Command Line

The product is designed this way to make it accessible to almost anyone with the knowledge of surfing the internet.

Design and Implementation Constraints

- The limitation of this project is that it only considers the closing price of the stock and no other attributes such as opening price, high and low price and volume.
- The stock market is very volatile and it is hard to predict even with a very good machine learning algorithm.
- The stock market is very noisy and it might throw some unexpected results.

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2.6 Assumptions and Dependencies

- Training data is either collected from past stock values.
- All users have the basic knowledge of the stock market.
- It is assumed the system is equipped with a GNU.
- It is assumed that there won't be any major noises or anything extremely unpredictable.

External Interface Requirements

User Interfaces

The user will be able to select the stock on the home screen that they want to predict using our product, upon the selection another page opens showing the projected graph inferred using the stock's past trends. Simple buttons like selection and enter are going to be used. Error messages show if not enough data is available on the stock or the wrong stock name is entered.

Software Interfaces

We use python to code the network model, which will be running on a server. We will be using various libraries such as:

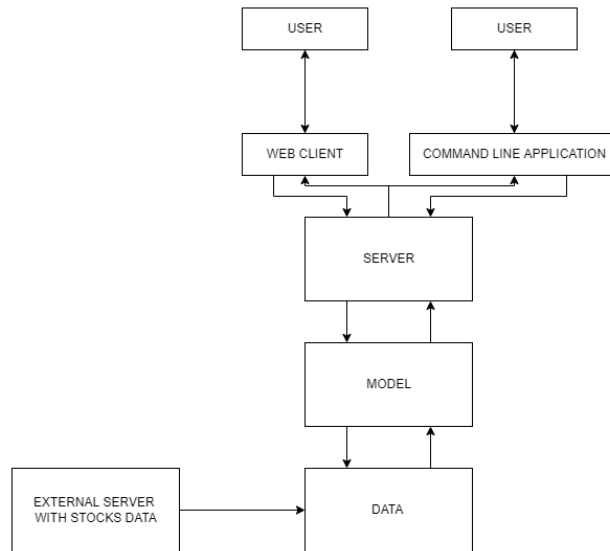
- Math
- Pandas_datareader
- NumPy
- Pandas
- Sklearn.preprocessing
- Keras.models
- Keras.layers
- Matplotlib.pyplot

We plan on using React JS along with redux for the web browser clients. We will also be using MongoDB as our database for storing user information, sessions, and predictions.

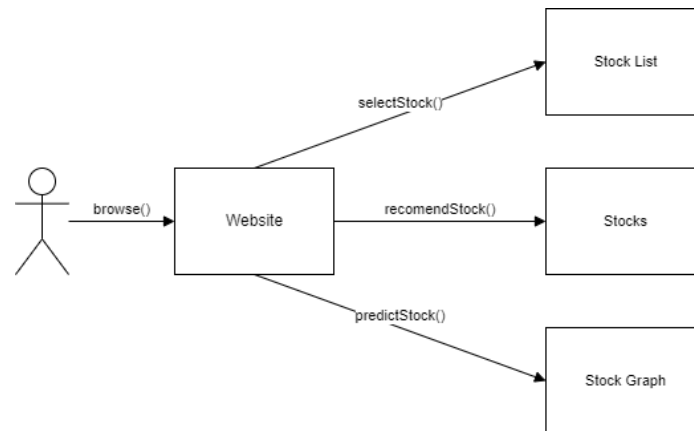
Communications Interfaces

Consists of a webpage which allows the user to access the predictions and will be using HTTP. The product will require an FTP connection as all computations will happen on a server. A command prompt, and a Python IDE downloaded version 3.8 above for development. set up of a working monitor for display and keyboard for user input. No cross-platform implementation.

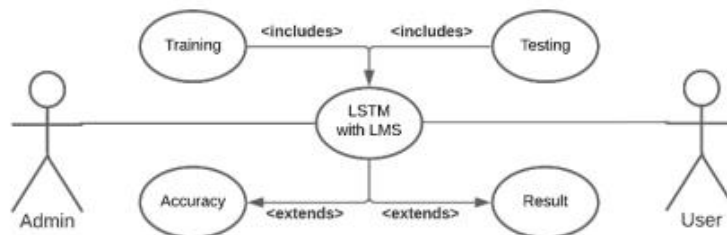
Analysis Model



UML Diagrams



Website



LSTM Model Predictor

System Features

5.1.1 Description and Priority

System is implemented using python language

- Data is first scraped and then put into a data frame
- The data is then scaled to normalize it using MinMaxScaler()
- Create the training dataset
- Train the dataset
- Get the models predicted value
- The data is then plotted

5.1.2 Stimulus/Response Sequences

- User enters the stock to be predicted
- The algorithm looks for past trends
- Our product displays the projected graph

5.1.3 Functional Requirements

FR1: Landing page- The user should be on a responsive and professional looking landing page. The website should be responsive and mobile compatible.

FR2: Login Page- The user should be able to login and only authorized users should be able to predict the price

FR3: Choosing stock- The user should be able to choose the stock they want to predict from the list given

FR4: Prediction page- The software must perform pre-processing on input for model training, such as checking for missing data values. It uses LSTM. It analyses the input data by generating the closing stock price that is most likely to occur.

FR5: Past Prediction page- The software stores user's predictions with stock along with the date it was predicted along with the 5 days predicted value and the then module's RMSE or accuracy value.

Other Non-functional Requirements

Performance Requirements

NFR1: It is expected that the time taken to analyze the stock market does not exceed an appropriate time limit.

NFR2: The system is expected to give results within an acceptable error margin so it does not affect the investors and lead them to take a wrong decision.

Safety Requirements

NFR3: It is expected that in order to make the system safe and reliable, the data chosen and the preprocessing that takes place, happens correctly.

NFR4: It is expected that the machine learning algorithm that is implemented is error free and handle cases within a certain tolerance.

NFR5: Users should use the product with caution because of the volatile nature of the stock market.

Security Requirements

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Software Quality Attributes

- It is expected that time taken to make the predictions does not take too long.
- The system should be adaptable and must be able to react to new trends and patterns in the stock market.
- The model should work for various stocks.
- The prediction made by the machine learning algorithm should be reliable.

Business Rules

Taxes will be applicable on the transaction of selling a share. Hopes to be profitable, successful, high-yielding, gainful, remunerative for the user.

Other Requirements

- An in-depth knowledge of the stock market
- Risk Assessment
- Natural ability to make good judgements
- Decide a time horizon before buying a stock
- Be responsible and spend money wisely

Appendix A: Glossary

ML	- Machine Learning
LSTM	- Long short-term memory
UML	- Unified Modelling Language
FTP	- File Transfer Protocol
HTTP	- Hypertext Transfer Protocol
IDE	- Integrated Development Environment

Appendix B: Requirement Traceability Matrix

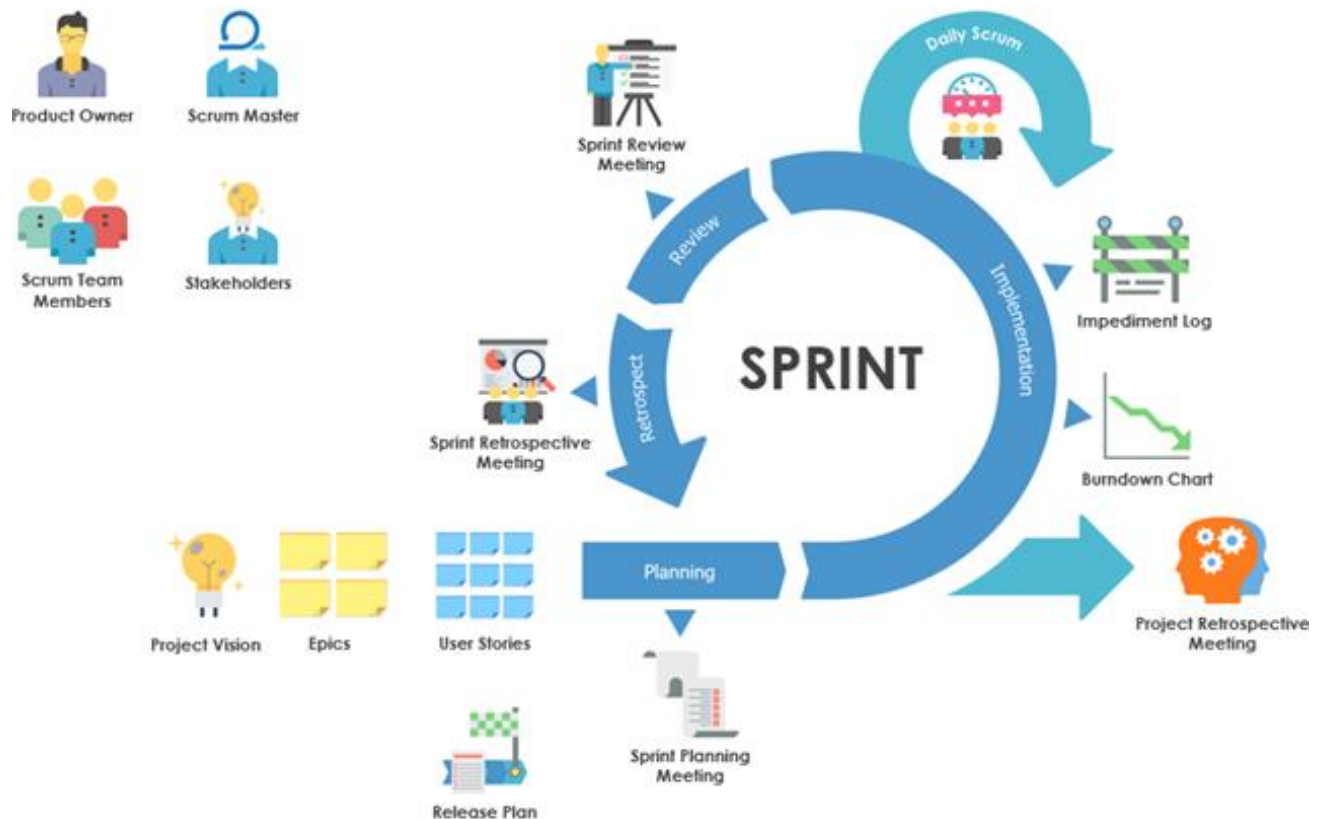
SL NO	REQUIREMENT ID	BRIEF DESCRIPTION OF REQUIREMENT	ARCHITECTURE REFERENCE	DESIGN REFERENCE	CODE FILE REFERENCE	TEST CASE ID	SYSTEM TEST CASE ID
1	FR01	Landing Page	Static Site Generation (SSG)	Self	-	UT01	UT01
2	FR02	Login Page	Static Site Generation (SSG)	Self	-	UT02	UT02
3	FR03	Search for Stock Page	Static Site Generation (SSG)	Self	-	UT03	UT03
4	FR04	Prediction Page	LSTM	Self	-	UT04	UT04
5	FR05	Past predictions page	Static Site Generation (SSG)	Self	-	UT05	UT05

PROJECT PLAN

1. Identify the lifecycle to be followed for the execution of your project and justify why you have chosen the model.

The life cycle followed for the execution of our project is the Agile Scrum. This methodology involves multiple iterations of certain steps and a daily scrum to update each other on the progress.

These iterations are the sprints and are pre decided before starting the project. We follow a continuous deliverable format which verifies tasks for the day and if the sprint completion is up to date.



2. Identify the tools which you want to use throughout the life cycle like planning tool, design tool, version control, development tool, bug tracking and testing.

Planning tool: JIRA

Design Tools: PowerPoint, Canva

Version Control: git

Development Tool: VS Code, Python

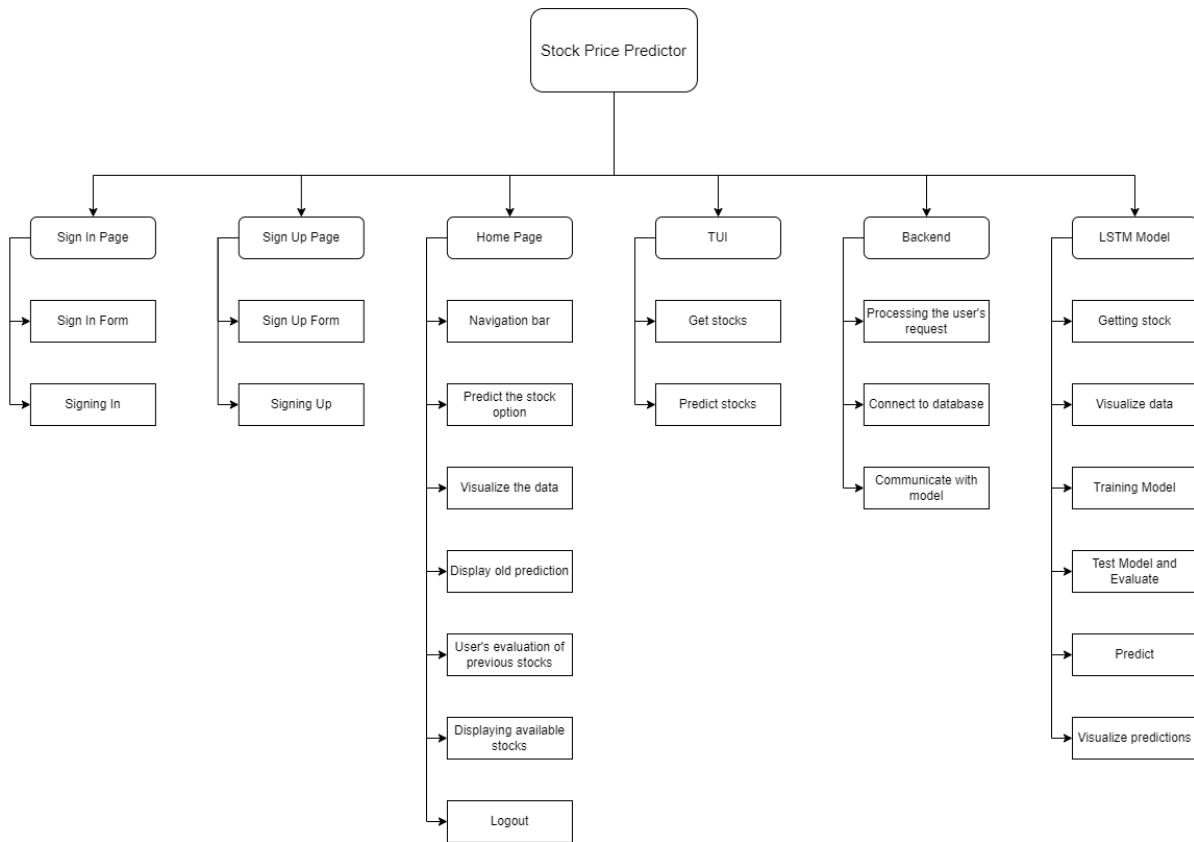
Bug Tracking: JIRA

Testing: Selenium

3. Determine all the deliverables and categorize them as reuse/build components and justify the same

- Login Page, Register Page: Reuse
There are many existing login page components that we can use and change to our requirements.
- Update the databases with companies' stock: Build
- Try to add as many companies' stock prices to the database: Build
A simple process of adding data to an existing database and connecting them
- Generate plots for historical stock prices: Build
Deliverable that takes care of generating historical data such as closing price, opening price, high and low and then based on that prints the stock prices.
- Generate future prices of the stock: Build
Generating the future prices of the stock using machine learning.

4. Create a WBS for the entire functionalities in detail.



Rough estimate of effort required

Organic models are used when the problem statement is well understood and have been used in the past, and works well with small teams. The module selected for testing was the LSTM model.

This model was selected because it is the core module and is a dependency for other modules.

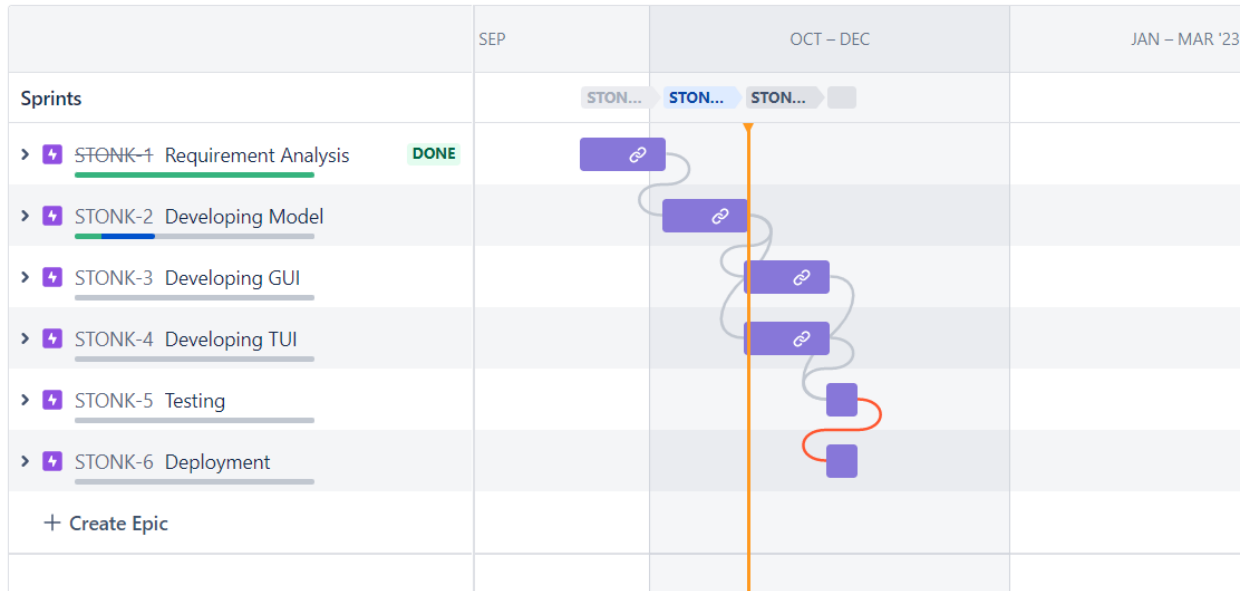
KLOC = 2

a = 2.4

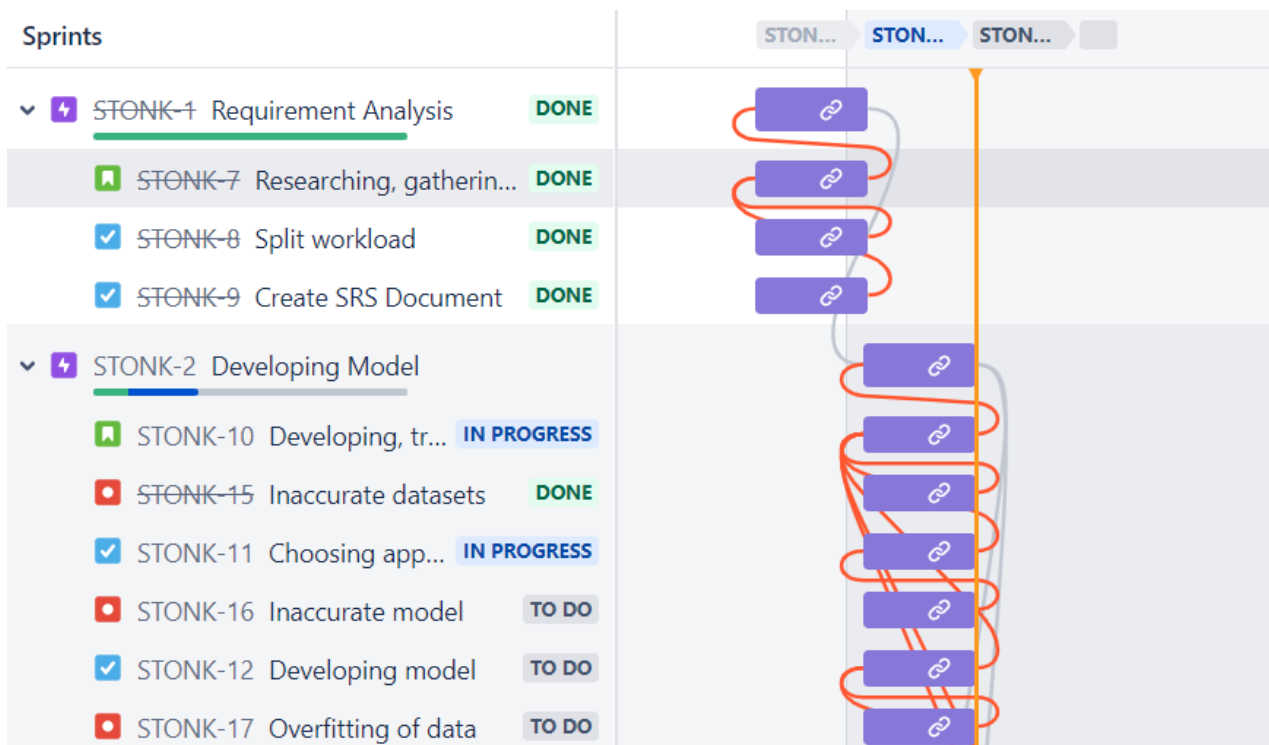
b = 1.05

Effort = $a \cdot (KLOC)^b = 4.96$

Gantt chart



Sprints



STONK	Task	Status
STONK-12	Developing model	TO DO
STONK-17	Overfitting of data	TO DO
STONK-18	Slow Implementation	TO DO
STONK-13	Training the model	TO DO
STONK-14	Testing the model	TO DO
STONK-3 Developing GUI		
STONK-19	Create Frontend Ap...	TO DO
STONK-20	Create components	TO DO
STONK-23	Browser compatibili...	TO DO
STONK-25	Input form not work...	TO DO
STONK-21	Connect to model A...	TO DO
STONK-22	Create responsive UI	TO DO
STONK-24	Improve UI	TO DO
STONK-4 Developing TUI		
STONK-26	Create terminal app...	TO DO
STONK-27	Connect to backend...	TO DO
STONK-29	Server connection is...	TO DO
STONK-28	Optimize performan...	TO DO
STONK-5 Testing		
STONK-30	Testing and integrat...	TO DO
STONK-31	Seamless integration	TO DO
STONK-6 Deployment		
STONK-32	Deploying and final ...	TO DO
STONK-33	Deploy to a server	TO DO
STONK-34	Did not deploy pro...	TO DO

Product Backlog

▼ STONK Sprint 2 4 Oct – 25 Oct (9 issues) 0 0 0 Complete sprint ...

STONK-10	Developing, training and testing the model	DEVELOPING MODEL	IN PROGRESS	
STONK-15	Inaccurate datasets	DEVELOPING MODEL	DONE	
STONK-11	Choosing appropriate model	DEVELOPING MODEL	IN PROGRESS	
STONK-16	Inaccurate model	DEVELOPING MODEL	TO DO	
STONK-12	Developing model	DEVELOPING MODEL	TO DO	
STONK-17	Overfitting of data	DEVELOPING MODEL	TO DO	
STONK-18	Slow Implementation	DEVELOPING MODEL	TO DO	
STONK-13	Training the model	DEVELOPING MODEL	TO DO	
STONK-14	Testing the model	DEVELOPING MODEL	TO DO	

+ Create issue

▼ STONK Sprint 3 25 Oct – 15 Nov (11 issues) 0 0 0 Start sprint ...

STONK-19	Create Frontend Application	DEVELOPING GUI	TO DO	
STONK-20	Create components	DEVELOPING GUI	TO DO	
STONK-23	Browser compatibility issues	DEVELOPING GUI	TO DO	
STONK-25	Input form not working	DEVELOPING GUI	TO DO	
STONK-21	Connect to model API	DEVELOPING GUI	TO DO	
STONK-22	Create responsive UI	DEVELOPING GUI	TO DO	
STONK-24	Improve UI	DEVELOPING GUI	TO DO	
STONK-26	Create terminal application	DEVELOPING TUI	TO DO	
STONK-27	Connect to backend server	DEVELOPING TUI	TO DO	
STONK-29	Server connection issues	DEVELOPING TUI	TO DO	
STONK-28	Optimize performance	DEVELOPING TUI	TO DO	

+ Create issue

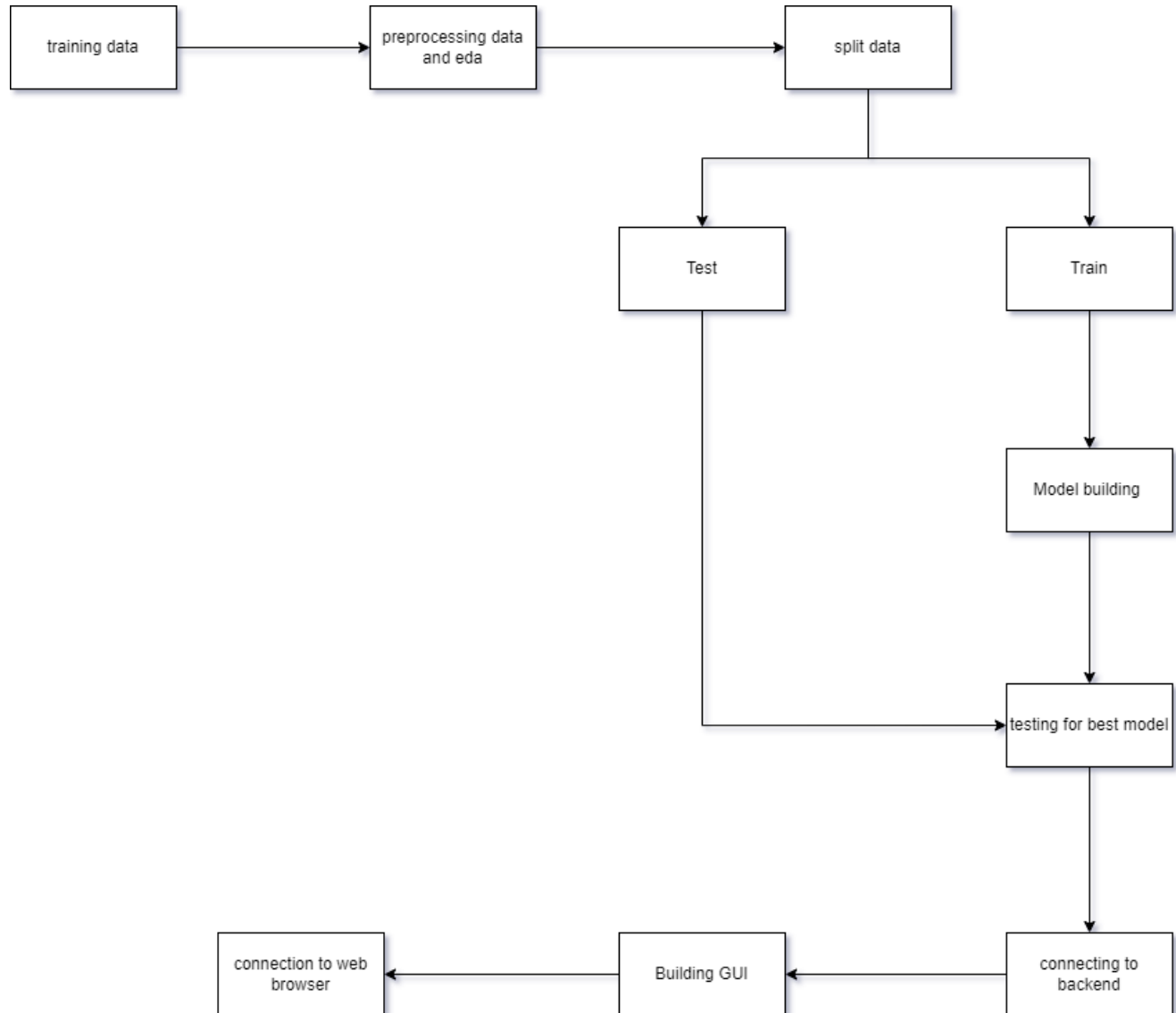
Quickstart

▼ STONK Sprint 4 15 Nov – 22 Nov (5 issues) 0 0 0 Start sprint ...

STONK-30	Testing and integrating	TESTING	TO DO	
STONK-31	Seamless integration	TESTING	TO DO	
STONK-32	Deploying and final checks	DEPLOYMENT	TO DO	
STONK-33	Deploy to a server	DEPLOYMENT	TO DO	
STONK-34	Did not deploy properly	DEPLOYMENT	TO DO	

+ Create issue

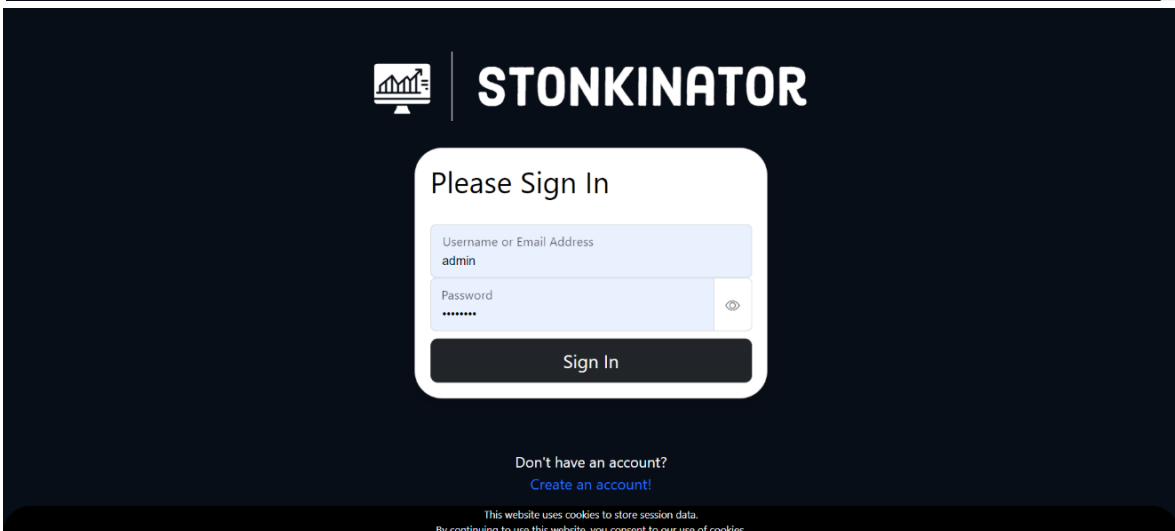
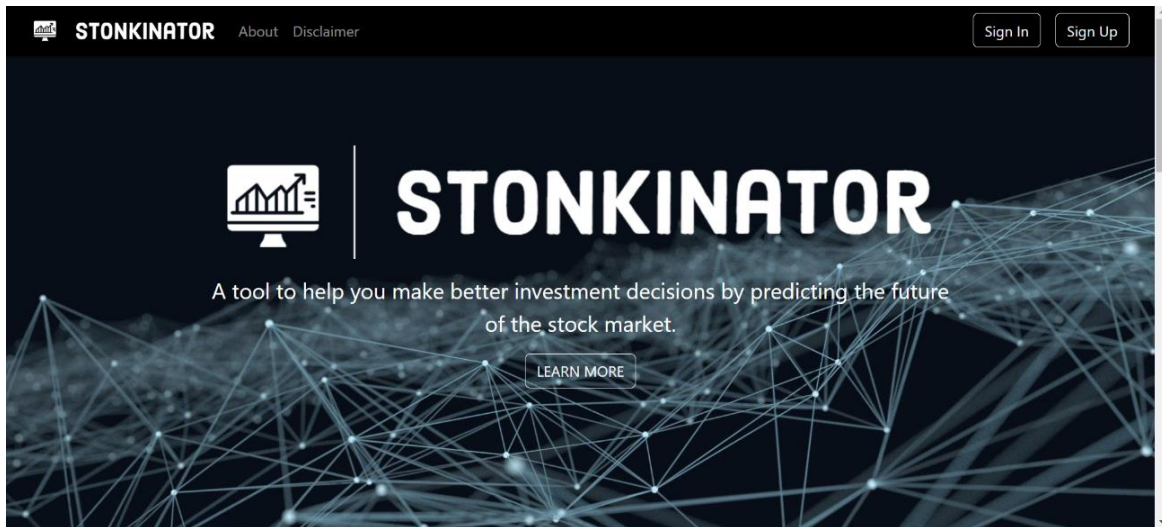
DESIGN DIAGRAM



TEST PLAN DOCUMENT

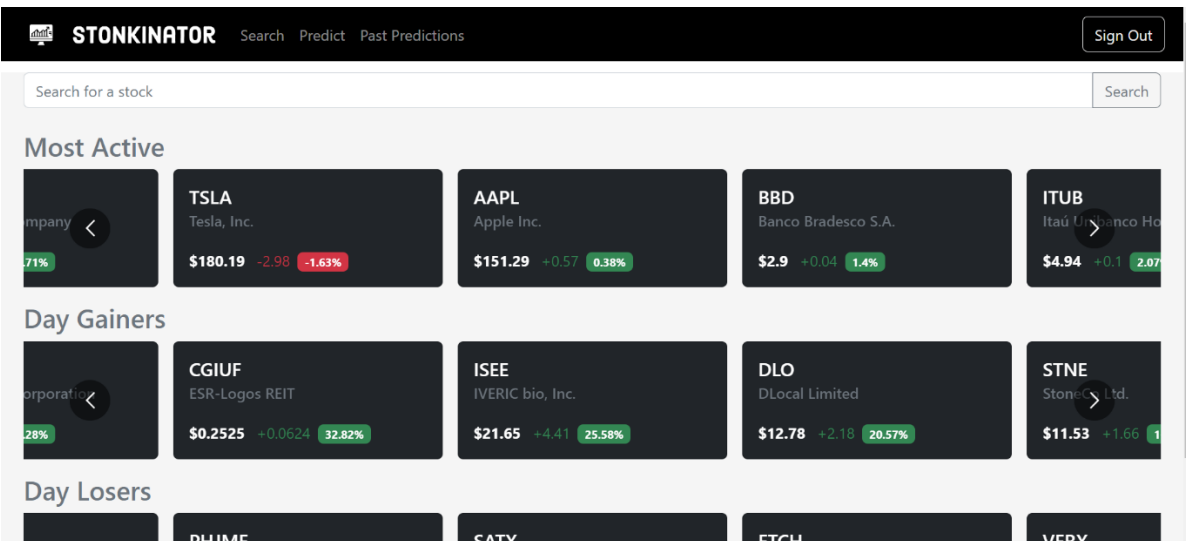
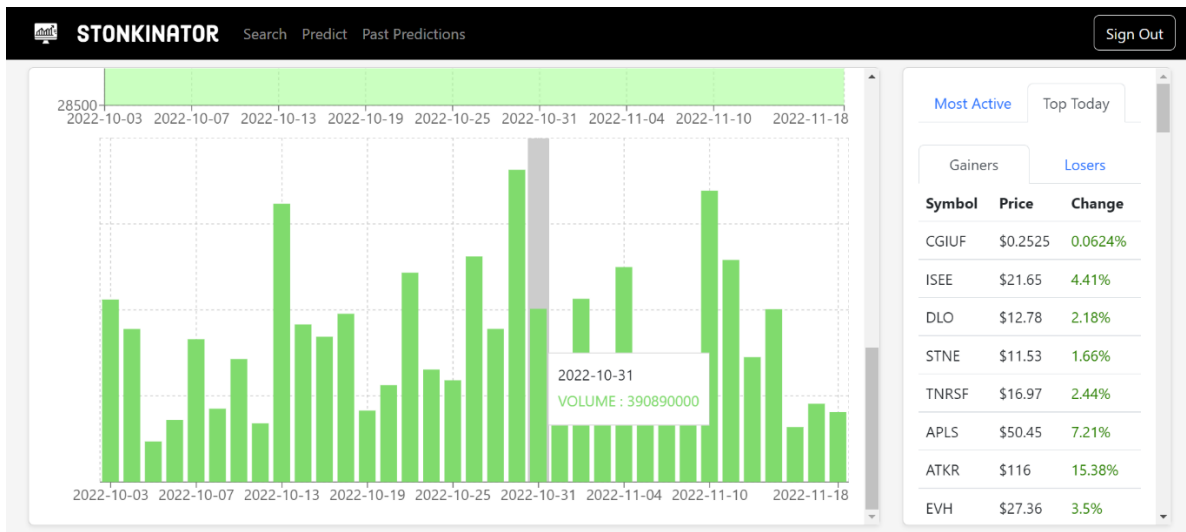
TEST CASE ID	NAME OF MODULE	TEST CASE DESCRIPTION	PRE-CONDITIONS	TEST STEPS	TEST DATA	EXPECTED RESULTS	ACTUAL RESULT	TEST RESULT
UT-01	Landing Page	Testing different browser compatibilities.	Access to browser.	1.Navigate to website. 2.Resize browser to different sizes with developer tools and pre-set mobile size configurations.		Render all components and scale to various browser sizes.	Rendered all components and scaled to various browser sizes as expected.	PASSED
UT-02	User registration module	To test the signing up functionality	Access to browser.	1.Navigate to sign up. 2.Enter Name, email, Username and Password 3.Click Submit	Name: Admin Email: admin@email.com Username: admin Password: admin	Should reject password and say it is too short.	Rejected password and said it was too short.	PASSED
UT-03	User registration module	To test the signing up functionality	Access to browser.	1.Navigate to sign up. 2. Enter Name, email, Username and Password 3.Click Submit	Name: Admin Email: admin@email.com Username: admin Password: df23hjka78	Tell user account has been created and redirect to sign in page.	Said user account had been created and redirected to sign in page.	PASSED
UT-04	User login module	To test the signing in functionality	Access to browser. Registered account on website.	1.Navigate to sign in. 2: Enter Username and Password 3: Click Submit	Username: admin Password: df23hjka78	Sign in to website, show client homepage.	Signed in to website and showed client homepage.	PASSED
UT-05	Searching and choosing a stock module	To test the search feature functionality.	Access to browser. Registered account on website. Signed in.	1.Navigate to search page 2.Search for a stock.	Stock ticker: TSLA	Show graph of past 50 days of Tesla and information about the stock.	Showed graph of past 50 days of Tesla and information about the stock.	PASSED
UT-06	Searching and choosing a stock module	To test the search feature functionality.	Access to browser. Registered account on website. Signed in.	1. Navigate to search page 2.Search for a stock.	Stock ticker: NOTREALSTOCK	Say that stock searched for is invalid.	Said that stock searched for is invalid.	PASSED
UT-07	Predicting a stock module	To test the predict feature functionality.	Access to browser. Registered account on website. Signed in.	1.Navigate to predict page 2.Predict a stock.	Stock ticker: TSLA	Show graph of past 50 days of Tesla along with next 5 days prediction along with model accuracy and information about the stock.	Showed graph of past 50 days of Tesla along with next 5 days prediction along with the model accuracy and info about the stock.	PASSED
UT-08	Past predictions module	To test the past predictions, feature functionality.	Access to browser. Registered account on website. Signed in. Already predicted some valid stocks.	1.Navigate to past predictions page.		Show list of stocks along with days on which it was predicted along with predictions.	Showed list of stocks along with days on which it was predicted along with predictions.	PASSED

SCREENSHOTS



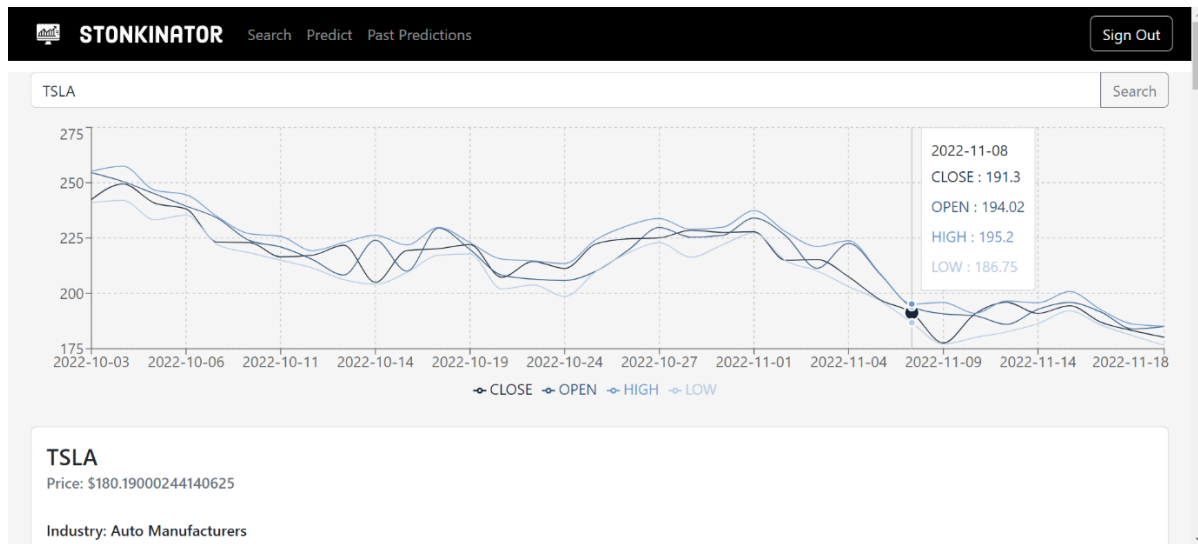
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STONKINATOR Search Predict Past Predictions Sign Out

TSLA
Price: \$180.19000244140625
Industry: Auto Manufacturers
Sector: Consumer Cyclical

Tesla, Inc. designs, develops, manufactures, leases, and sells electric vehicles, and energy generation and storage systems in the United States, China, and internationally. The company operates in two segments, Automotive, and Energy Generation and Storage. The Automotive segment offers electric vehicles, as well as sells automotive regulatory credits. It provides sedans and sport utility vehicles through direct and used vehicle sales, a network of Tesla Superchargers, and in-app upgrades; and purchase financing and leasing services. This segment is also involved in the provision of non-warranty after-sales vehicle services, sale of used vehicles, retail merchandise, and vehicle insurance, as well as sale of products to third party customers; services for electric vehicles through its company-owned service locations, and Tesla mobile service technicians; and vehicle limited warranties and extended service plans. The Energy Generation and Storage segment engages in the design, manufacture, installation, sale, and leasing of solar energy generation and energy storage products, and related services to residential, commercial, and industrial customers and utilities through its website, stores, and galleries, as well as through a network of channel partners. This segment also offers service and repairs to its energy product customers, including under warranty; and various financing options to its solar customers. The company was formerly known as Tesla Motors, Inc. and changed its name to Tesla, Inc. in February 2017. Tesla, Inc. was incorporated in 2003 and is headquartered in Austin, Texas.

Average 7 :	Avg Vol (3 month) 3 : 73.97M	Avg Vol (10 day) 3 : 98.7M	Shares Outstanding 5 : 3.16B	Implied Shares Out
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STONKINATOR Search Predict Past Predictions Sign Out

News
Latest news about TSLA

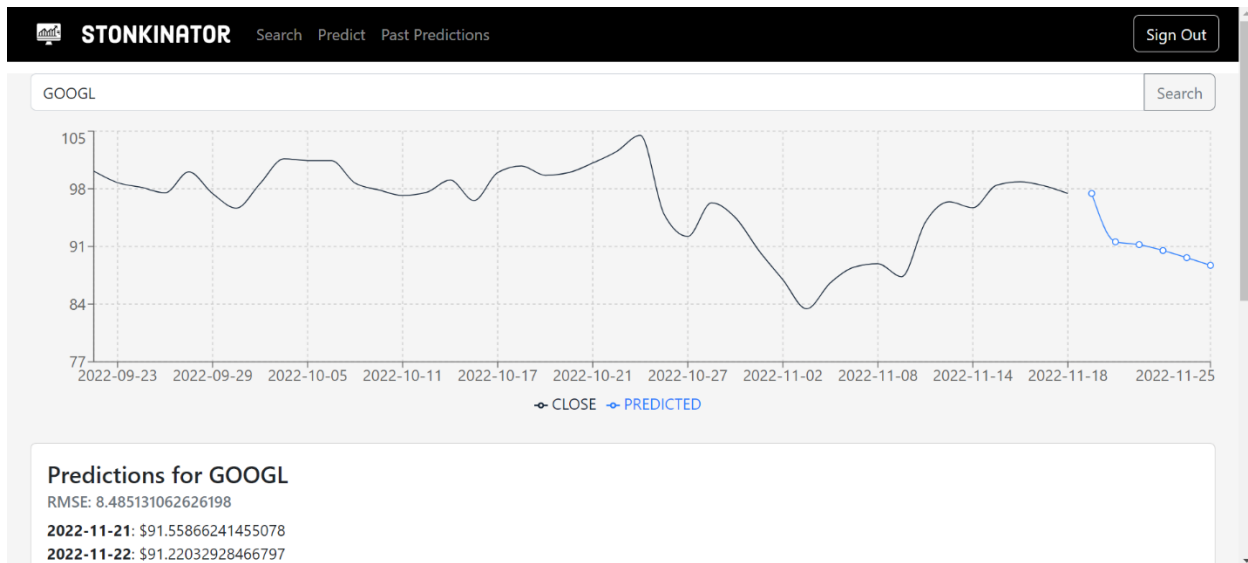
[Tesla safety at centre of South Korean trial over fiery, fatal crash](#)
Sun, 20 Nov 2022 23:02:50 +0000
In an upscale Seoul neighbourhood two years ago, a white Tesla Model X smashed into a parking lot wall. The fiery crash killed a prominent lawyer - a close friend of South Korea's president. Choi Woan-jong, who had eked out a living by driving drunk people home in their own cars, says the Model X sped out of control on its own and that the brakes failed in the December 2020 accident.

[INSIGHT-Tesla safety at centre of South Korean trial over fiery, fatal crash](#)
Sun, 20 Nov 2022 23:00:00 +0000
In an upscale Seoul neighbourhood two years ago, a white Tesla Model X smashed into a parking lot wall. The fiery crash killed a prominent lawyer - a close friend of South Korea's president. Choi Woan-jong, who had eked out a living by driving drunk people home in their own cars, says the Model X sped out of control on its own and that the brakes failed in the December 2020 accident.

[Market Rally Holds Key Levels, But This Has Been Difficult: Tesla Woes Continue](#)

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STONKINATOR Search Predict Past Predictions
Sign Out

Predictions for GOOGL

RMSE: 8.485131062626198

2022-11-21: \$91.55866241455078

2022-11-22: \$91.22032928466797

2022-11-23: \$90.50595092773438

2022-11-24: \$89.6326675415039

2022-11-25: \$88.70360565185547

GOOGL

Price: \$97.43000030517578

Industry: Internet Content & Information

Sector: Communication Services

Alphabet Inc. provides various products and platforms in the United States, Europe, the Middle East, Africa, the Asia-Pacific, Canada, and Latin America. It operates through Google Services, Google Cloud, and Other Bets segments. The Google Services segment offers products and services, including ads, Android, Chrome, hardware, Gmail, Google Drive, Google Maps, Google Photos, Google Play, Search, and YouTube. It is also involved in the sale of apps and in-app purchases and digital content in the Google Play store; and Fitbit wearable devices, Google Nest home products, Pixel phones, and other devices, as well as in the provision of YouTube non-

STONKINATOR Search Predict Past Predictions
Sign Out

Past Predictions

<p>TSLA</p> <p>2022-11-21</p> <p>2022-11-21: 197.26739501953125</p> <p>2022-11-22: 198.49497985839844</p> <p>2022-11-23: 201.23809814453125</p> <p>2022-11-24: 204.82118225097656</p> <p>2022-11-25: 208.93992614746094</p> <p style="margin-top: 10px;">RMSE: 21.103382463576153</p>	<p>AAPL</p> <p>2022-11-21</p> <p>2022-11-21: 144.99212646484375</p> <p>2022-11-22: 145.0689697265625</p> <p>2022-11-23: 144.77560424804688</p> <p>2022-11-24: 144.2884063720703</p> <p>2022-11-25: 143.7022247314453</p> <p style="margin-top: 10px;">RMSE: 5.513463910253683</p>	<p>GOOGL</p> <p>2022-11-21</p> <p>2022-11-21: 91.55866241455078</p> <p>2022-11-22: 91.22032928466797</p> <p>2022-11-23: 90.50595092773438</p> <p>2022-11-24: 89.6326675415039</p> <p>2022-11-25: 88.70360565185547</p> <p style="margin-top: 10px;">RMSE: 8.485131062626198</p>
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