**Project Name**: Automated Algorithmic Stock Trading System using Machine Learning

**Group Number**: 8

**Participants**:

| Participant Name | Email | Roles |
| --- | --- | --- |
| Anjan Shrestha | anjanshrestha@my.unt.edu | Build platform to automate trading by using trained machine learning model |
| Naresh Balla | NareshBalla@my.unt.edu | Clean dataset and perform exploratory data analysis to know more about data |
| Bhargav Ram Pushadapu | BhargavRamPushadapu@my.unt.edu | Deploy applications to AWS cloud so that users can use our application |
| Byanagari Rohith | byanagarirohith@my.unt.edu | Perform exploratory data analysis on the dataset to know more about the dataset |
| Balaji Mandava | BalajiMandava@my.unt.edu | Train LSTM model and create output file for trained model |

**Project Workflow:**

We've created a WhatsApp group for this project's teamwork to improve communication. To improve collaboration, we set up a GitHub project to store all our code in one location. Additionally, we have scheduled a zoom meeting among team members for each milestone to assess our progress and address any roadblocks. For tracking tasks, we have used Trello software and a production project plan template in google sheet. Each team member will participate in research, planning, design, model implementation, training, validation, testing, and monitoring so that everyone in the team will have the knowledge necessary to create an effective model right away.

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| --- | --- |
| Github Link | <https://github.com/anjanshrestha123/automated-algorithmic-stock-trading-system> |
| Dataset | [Yahoo](https://www.zillow.com/research/data/) Finance API |
| Production Project Plan | [https://docs.google.com/spreadsheets/d/1KnotKDuMn6CdcOR6lmuMMhLGPv7c7GKttz6CBhznAGM/edit - gid=1853352180](https://docs.google.com/spreadsheets/d/1KnotKDuMn6CdcOR6lmuMMhLGPv7c7GKttz6CBhznAGM/edit#gid=1853352180) |
| Trello Link | <https://trello.com/b/DAiV60r9/project-2> |

**Project Abstract:**

The stock market is known for its dynamic and volatile nature, making it extremely challenging to make accurate predictions due to the numerous factors that affect stock prices, such as news, events, financial performance, and sentiment. There are three main types of stock analysis: fundamental analysis, technical analysis, and sentimental analysis. For this project, we will focus on technical analysis for predicting stock prices and automating stock trading using Machine Learning algorithm.

Technical analysis uses historical data such as stock prices, returns, and trading volumes to identify patterns in market movements and trading signals. This type of analysis is typically used for short-term trading, such as hourly, daily, weekly, or monthly, and can result in high returns if predicted accurately. Our goal is to use various python modules to extract stock prices, train and test our model, predict the prices of different stocks using technical analysis, and create a system that automates the stock trading by using prediction from the trained model.

**Diagram

Description automatically generated**

**Project Design and Milestones:**

Our goal is to create three different applications to build an automated algorithmic stock trading system. In project 2, we are planning to build the machine learning model and automated trading system. And, in project 3, we will be extending this system to have client-side application and deploy it to AWS cloud.

1. Machine Learning Model:

In project 1, we will be building Machine Learning Model which utilizes data from yahoo finance API, preprocesses it, plots different graphs for visualization, trains and tests the model using LSTM algorithm, and predicts the stock price using the trained model. We will be using Google Colaboratory and Jupyter Notebook as an IDE and using Python programming language with different libraries such as numpy, pandas, sklearn, tensorflow, matplotlib and so on.

1. Automated Trading System:

The second application is automated trading system which will be built in project 2 that runs 24/7 and gets the prediction from trained machine learning model and invokes Alpaca trading broker API to buy and sell stock. For the project, we will be using paper trading API so that real money won’t be used. Pycharm will be used as an IDE and various backend technologies will be used such as Python, Json, and so on.

1. Client-Side Application (Website):

In project 3, we will be building third application i.e., client-side website where users can interact and see their live transactions being traded in Alpaca broker by automated trading system. We will be using Visual Studio Code as an IDE and different front-end technologies such as HTML, CSS, Material Design, JavaScript, Angular, and so on.

This project will be divided into two main milestones that are described below:

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| --- | --- | --- |
| Milestone | Date | Incremental Feature |
| 1 | April 7th, 2023 | Build Machine learning model |
| 2 | April 14th, 2023 | Build automated trading system and completed project report |

**Resources and Related Projects:**

1. The article discusses building a simple trading system that uses real-time stock price data from Yahoo Finance in one-minute intervals. Instead of personal rules, an ARIMA model is used to make predictions. The system connects with brokers like Robin Hood and Alpaca to execute trades. The system is deployed on AWS, and the user receives Telegram notifications for every action performed by the system.

Reference links: <https://towardsdatascience.com/how-to-create-a-fully-automated-ai-based-trading-system-with-python-708503c1a907>

1. The article discusses using Python machine learning in algorithmic trading and focuses on building a Simple Moving Average (SMA) trading strategy. The SMA is used as a technical indicator to create trading strategies, and a simple crossover strategy is built by calculating two SMAs (shorter and longer) and triggering a trade when the shorter period SMA crosses above the longer period SMA. The article also mentions backtesting the strategy.

Reference links: <https://www.analyticsvidhya.com/blog/2022/04/how-to-use-algorithmic-trading-with-machine-learning-in-python/>