Web Based Stock Forecaster

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Abstract - *Stock Trading has become a competitive market. Bigger companies deploy mainframes in order to run super complicated, and compute intensive algorithms in order to earn huge profits. This creates a huge gap between performance of these companies and an individual investor. With the technology and research behind artificial intelligence it has become easier to write our own algorithms. This aids us in helping individual investors earning returns comparable to these big companies. Hence with his project we create a consumer facing web service which allows the individual stock traders to understand the market movement and move accordingly. The algorithms we use for this purpose are ANN and EMA.*

Key Words: **stock trading; algorithm; market movement; neural networks; moving average.**

1. INTRODUCTION

From its birth, the stock market has always been a place where businessmen could gain capital by selling shares of their companies and where investors can purchase these shares in hope to make a profit when those companies prosper.

- Although the market still serves both these purposes, today it is judged less by what it does for businessmen seeking capital but rather for what it can do for investors seeking gain. In a time of high taxes and low wages, trading stocks seems like a viable and almost effortless way of becoming very rich very quickly.

- The problem here lies with the fact that the same volatility in the market that can be exploited for gain, can be the cause for loss as well.

- Individual traders lack the appropriate tools needed for the decision making process when compared to existing professional traders.

- Today, to turn this guessing game of trading into at most an informed estimate we would have to go through hours upon hours of research to first acquire the knowledge needed to even begin to understand how trading decisions are made.

- As students, the time and energy needed for such undertakings simply does not exist. This dilemma is one of which anyone foreign to the field of stocks can relate to.

Most investment advisors suggest maintaining a diverse investment portfolio in order to reduce the risk of investment loss. With ten times the stocks, however, arises the ten times the difficulties stated previously. Added on are the problem of organizing and keeping track of each and every investment.

For the new and eager day trader among us, if the decision making of one investment seemed fearful how would he/she orchestrate his/her choices when suggested to acquire multiple shares? Without a proper way to declutter and systemize these decisions, these individuals may never move forward from owning one specific type of share at a time and thus be vulnerable to losses due to sudden and unforeseeable events even if their initial investment decision was deemed to be wise.

To summarize, the leading complications that exists with using the stock market as a viable stream of capital is the fact that many newcomers are not knowledgeable with the financial concepts needed to make an educated trade decision. Even then, the knowledgeable as well, may find that their techniques are time consuming and stress inducing. When deciding to swallow a set of data and, based on multiple patterns and trends, spit out a conscious commitment that can be the difference between a great profit and a terrible loss, human error is bound to occur. When a myriad of companies are further introduced into the equation, these obstacles accumulate exponentially and the need of quick, clear, and organized information is paramount.

2. SCOPE

Envision being able to search for a particular stock and get a reasonable trading decision within the blink of an eye; a place which not only makes making these decisions effortless, but also provides the information necessary to learn the process behind the decision if we should ever choose to. Thus, to allow for effortless accessibility to the common user, such as you and me, a web based software service is required.

- The first and foremost purpose of the system should be to predict future stock prices.

- Considering that we want quick gains without the necessities of research and market knowledge, technical analysis should be primarily used by the proposed system to predict trade decisions for the user.

- The use of software should not only automate this process but also produce prediction results with the accuracy of that greater than a human.

- Each of these results should also come with a reasonable confidence value asserting to the user how probable the given decision of "buy", "sell", or "hold out/sit in" is to be correct.

- There are various methods to gauge stock trends, and as many as possible should be used to increase prediction accuracy.

- The result of each model should be displayed to the user with up to date information regarding the current stock, as well as an overall decision based on a weighted average of all models.

- All of this should be easily accessible at 1-2 mouse clicks away.

Differing from other designs, each prediction result should have a way to reveal an explanation to the user of the technical analysis used to get to that specific result; an environment for users to learn similar processes used by professionals if he/she chooses to.

3. USE CASE DIAGRAM

The use case diagram is shown in Figure 3. As shown by the diagram a registered user is a specialization of a visitor and an administrator is a specialization of a registered user. A visitor can search or get a suggestion from the system. A registered user can accomplish all that of a visitor but also is allowed to track stocks. Tracking a stock is an extension of a search or suggestion because the registered user must first retrieve the stock before he/she can track it. Similarly for UC-14: Learn, a user must first get a prediction before he/she can learn the involved analysis behind it and thus it must be an extension of a search or suggestion. It should be noted that although an administrator has similar rights to that of a registered user (search, track, get a suggestion), the diagram does not show these connections because these are not ultimately the administrators goals. The database is a participant in all use cases, and thus its connections are not shown to reduce clutter.
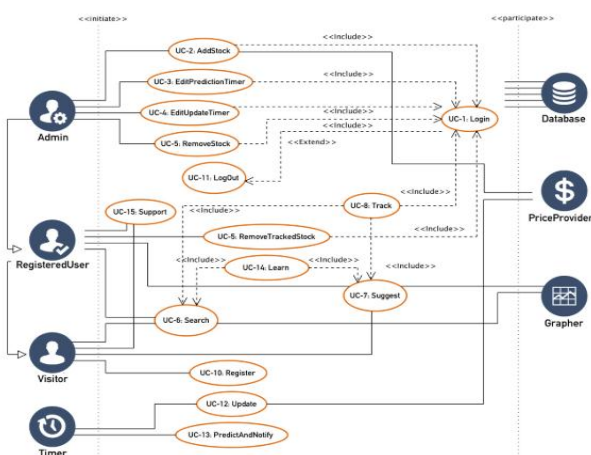

Fig -1: Use case diagram for our proposed web based stock forecasting system.

4. SYSTEM ARCHITECTURE AND SYSTEM DESIGN

4.1 Client Server Architecture

Client/Server is our main architectural style; it separates our system requirements into two easily programmable systems. First, the client, which acts as the User Interface, requests data from the server, and waits for the server's response. Secondly, the server, which authorizes users and processes stock data into information the user can use. It then sends this processed information to the client to display to the user.

4.2 Event-Driven Architecture

Our system will only need to execute its functions after some major state change. It has no real time components like a video game. Instead, we'll have two event emitters, the user and the timer. Both will drive the application to execute relevant operations though the execution of different events. These events include login, adding new stocks, deleting stocks, and requesting an updated lists of stocks for the user; and a time-based update for the timer.

4.3 Rule-Based System

Our application will be rule-based. In other words, the system will use a set of rules that we determine it to analyze the stock information it gathers. These rules comprise a semantic reasoned which makes decisions for the application and the user. It uses a match cycle act cycle to deduct which stocks will be best to buy and which stocks would be best to sell. Then, it outputs these results to the user-interface.

4.4 Data-centric Architecture

Our system relies heavily on its database, both the store relevant stock data and to analyze the data we give it.

5. OVERALL DESCRIPTION

5.1 Product Perspective

- Our business plan is to offer the service free and support the operations from commercial advertisement proceeds.

- Obviously, due to budget and technical limitations, not all existing stocks can be accounted for and thus, only a limited amount can be predicted by this service.

- These concerns also restrict the frequency of predictions as well as the rate of updating current stock prices.

- Thus, an administrative account should be created to allow changes to these limits should the service prove to be popular and budget allows for upgrades to superior hardware.

- The system should log and display to the

administrator how long a prediction session has taken so that he/she may make adjustments to timings and/or the list of predicted stocks to compensate.

- The system should also keep track of what stocks users are searching for display these analytics to the administrator.

5.2 Product Functions

- The system shall allow the administrator to add and remove stocks from the list of stocks that predictions are made on.

- The system shall continuously gather the time series of the current market data (stock prices, trading volumes, etc) for a set number of companies.

- The system shall periodically apply prediction algorithms or models on the obtained data and store the results to a central database.

- The system shall allow for users to search for a particular company and display the predicted trade decision associated with that stock.

- The system shall allow users to request a stock that is predicted to have a large gain in the near future.

- The system shall obtain and display a confidence value for each prediction given to the user.

- The system shall support registering new investors by providing a real world email, which shall be external to our website. Required information shall include a unique login ID and a password that conforms to guidelines, as well as users first and last name. Upon successful registration, the system shall set up an account for the investor.

- The system shall allow for registered users to track stocks that he/she owns or is interested in purchasing. Registered users shall be alerted via various methods chosen by that user, if an impending prominent prediction is made for a stock he/she has chosen to track.

- The system shall allow a method for users to learn the professional analysis used for each prediction method if he/she chooses to.

- The system shall allow for the administrator to alter the rate at which current stock prices are updated and the rate at which predictions are made.

- The system should log and display to the administrator the time taken for previous prediction sessions.

- The system should track what stocks users are searching for and log and display these analytics to the administrator.

- The system should provide the user with options to troubleshoot various issues such as, but not limited to, a FAQ, tutorial system, or methods to contact technical support (i.e send an email to the admin) and show solutions to similar issues other users had.

5.3 User Charateristics

- Registered User: a registered user.

- Visitors: any unregistered user

- User: both a registered user and visitor (will be used for diagrams and descriptions where both a registered user and a visitor can interact with the system)

- Database: records of stock information (i.e historical prices, prediction results, confidence value, etc), user data (i.e. username, password, tracked stocks, email, etc), and system data (timers, search logs, prediction time logs).

- Price Provider (i.e. Yahoo! Finance): Provides the current pricing of a stock of interest

- Timer: Tells the system when predictions should be made and when current stock prices should be updated.

- Grapher (i.e. Google Charts): Provide visual charts from raw data.

- Administrator: a special case User that maintains and updates website services.

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