ECE – 568: SOFTWARE ENGINEERING OF WEB APPLICATIONS

STOCK FORECAST

Final Project : Preliminary Presentation

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Group 7

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Contribution Breakdown

“For the project, all group members contributed equally”

No.	Phase	Members
1	Project Meetings	All Members
2	Project Phase I: Data Collection	All Members
3	Project Phase II: Data Storage	All Members
4	Project Phase III: Short and Long Term	All Members
5	Report and Presentation	All Members

Special Features that we plan to integrate

- Personalized implementation of the web application with user specific details like personal holdings in a particular stock and loss/profit on buying/selling according to prediction.
- Inclusion of the fundamental analysis factor through trend analysis which would help strengthen our prediction through an impact of news volume/ search engine hits on a particular stock.

General Background

- Money is generally invested in stocks, bonds, options, mutual funds, savings account.
- Stock market investment usually offer the highest returns, with high risks.
- Stock market is volatile and unpredictable sphere and users need to understand the risks involved.
- Stock market prediction implies an attempt to determine the future value of a company's stock which can then be used for successful stock dealings.
- Successful prediction equates to significant profit during stock market dealings.

General Background

Two main systems for stock prediction

- *Human Interpretation*
  - Prediction by traders and analysts based on experience and looking at stock movements.
- *Machine Learning Tools*
  - Intelligent Trading Systems created to predict future prices and manage investment decisions.
  - Most tools use Support Vector Machines(SVM) or Neural Networks
  - Improvements needed to make the prediction error as smaller as possible.

General Background

Based on this we intend to develop a system for a naïve front end client that would assist him by providing assistance in his/her short term and long term next steps regarding his/her stock holdings in a limited number of companies (currently GOOG, AAPL, MS, JPM and YHOO) based on back-end technical analysis using prediction tools that would include Bayesian Curve Fitting, State Vector Machines etc.

System Requirements

Requirements based on front end user's perspective

ID	Description
REQ1	The system should allow user to create an account
REQ2	The system should allow user to add 5 shares to account
REQ3	The system should allow user to login to his account
REQ4	The system should allow user to view personal page and have news feed on landing page (Home Page)
REQ5	The system should allow user to access all pages from navigation from all pages
REQ6a	The system should allow user to check his personal portfolio (individual stock holdings)
REQ6b	The system should allow user to view his net worth

System Requirements

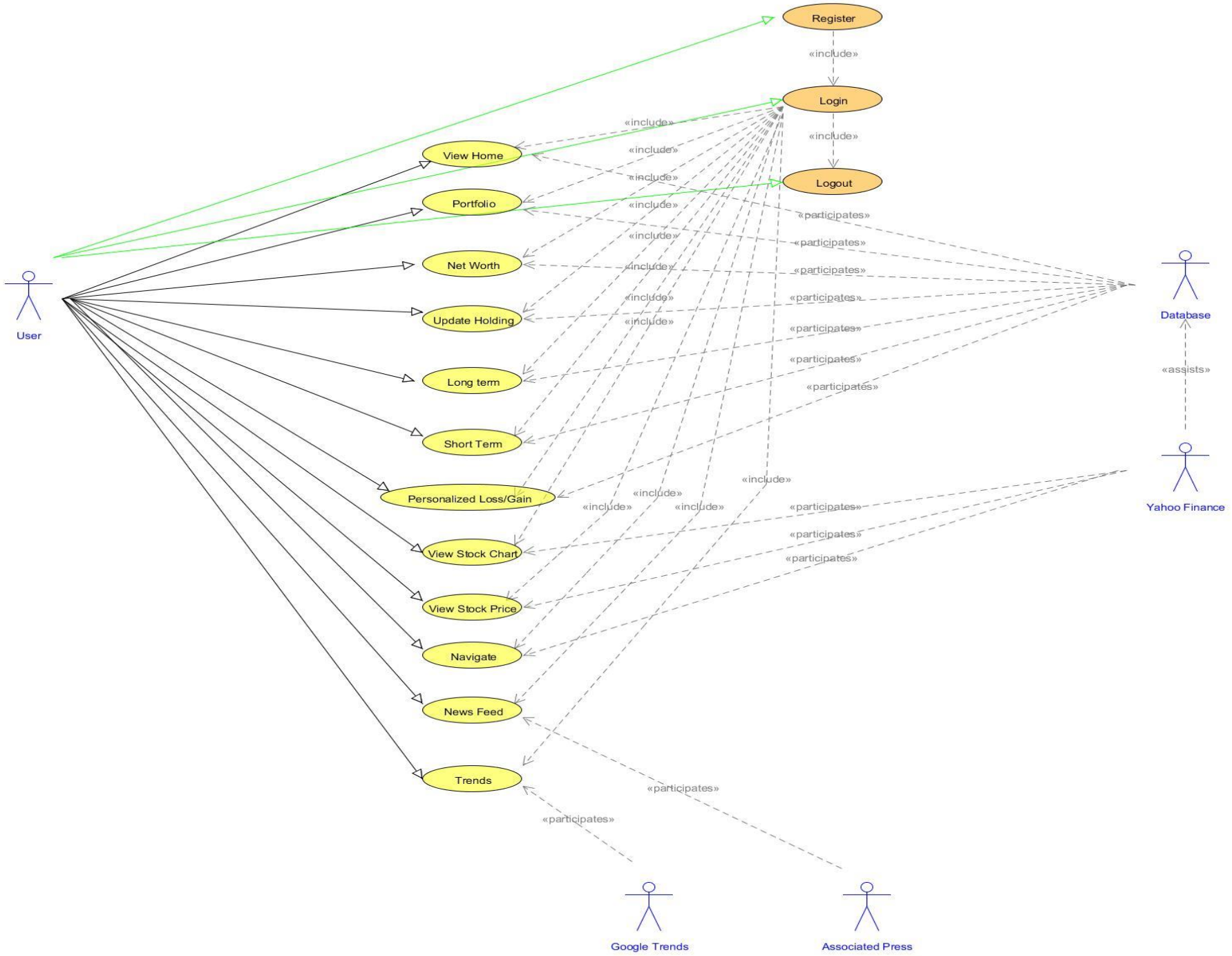
ID	Description
REQ7	The system should allow user to update current stock holdings
REQ8	The system should allow user to view current price of selected stock
REQ9	The system should allow user to view charts of selected stock
REQ10	The system should allow user to view short term prediction for selected stock
REQ11	The system should display personalized user profit/loss to user if he follows the prediction
REQ12	The system should allow user to view long term prediction for selected stock
REQ13	The system should display personalized user profit/loss to user if he follows the prediction
REQ14	The system should allow user to view search trends for the selected stock
REQ15	The system should allow user to logout.

Use Cases

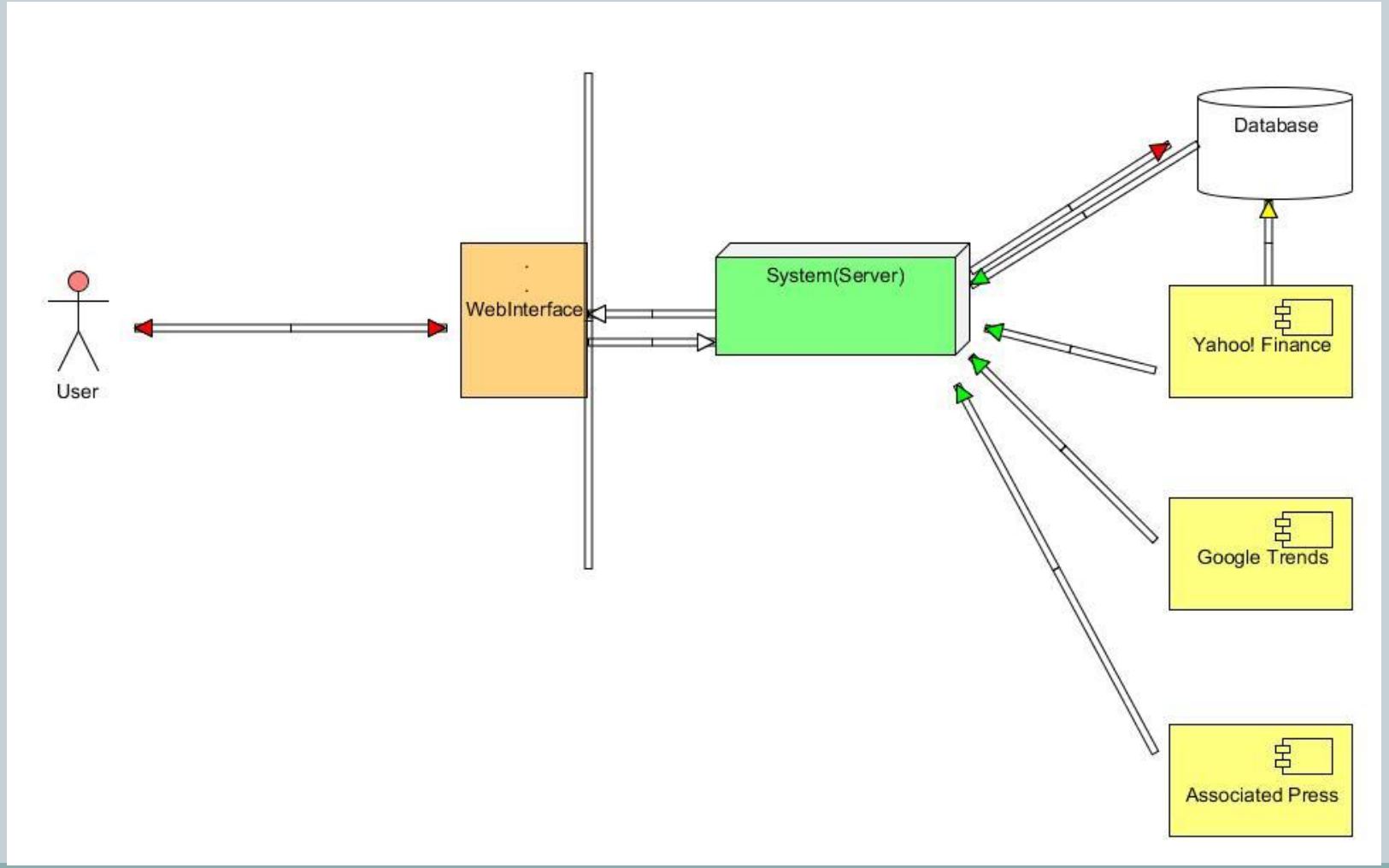
ID	Name	Description	Req. Satisfied
UC1	Register	To access account user needs to create account with id, password, stock holdings etc	REQ1, REQ2
UC2	Login	User logs in with userid and password	REQ3
UC3	Home	User can view his personal home page upon login	REQ4
UC4	News Feed	User can view news feed of stocks which he has chosen	REQ4
UC5	Navigation	User can navigate to any page.	REQ5
UC6	Portfolio	User can view his portfolio which is updated whenever any transactions are done	REQ6a
UC7	Net worth	User can view his net worth amount which is updated during transactions	REQ6b

Use Case

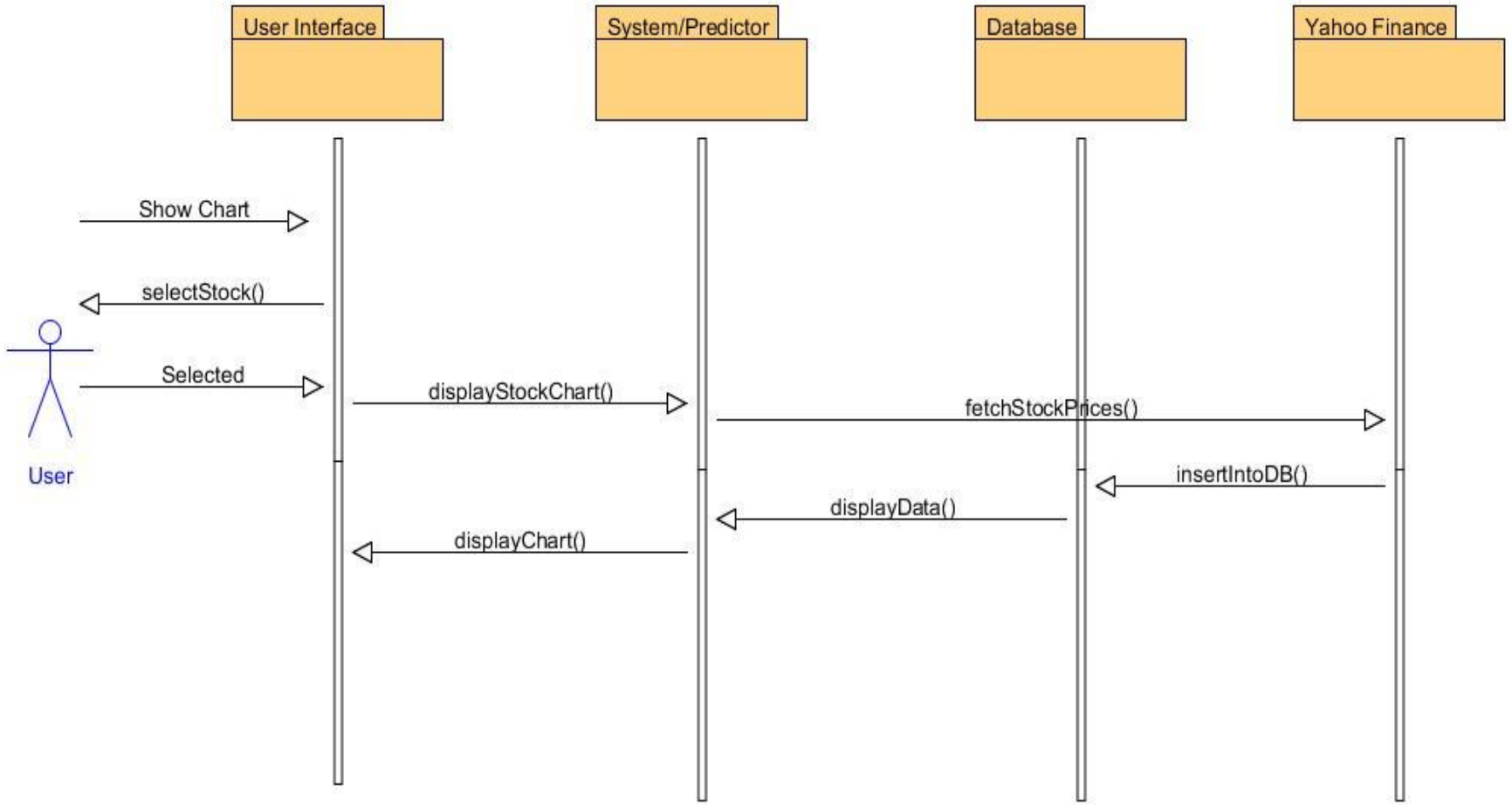
ID	Name	Description	Req. Satisfied
UC7	Update Holdings	User can use the stock predictions to buy or sell stocks which is then updated into DB.	REQ7
UC8	View Stock Price	User can view stock prices for the stock which he selects	REQ8
UC9	View Stock Chart	User can view stock charts for the stock which he selects	REQ9
UC10	Short Term Prediction	User can use this prediction to predict short term stock changes which is then displayed	REQ10
UC11	Long Term Prediction	User can use this prediction to predict long term stock changes which is then displayed	REQ12
UC12	Personalized Loss/Gain	Based on prediction and stock holdings user can view the loss/gain when selling/buying.	REQ11, REQ13
UC13	Trends	User can view trends of companies selected	REQ14
UC14	Logout	User can logout of the application	REQ15


Register
Login
Logout
View Home
Portfolio
Net Worth
Update Holding
Long term
Short Term
Personalized Loss/Gain
View Stock Chart
View Stock Price
Navigate
News Feed
Trends
User
Database
Yahoo Finance
Google Trends
Associated Press
«include»
«participates»
«assists»

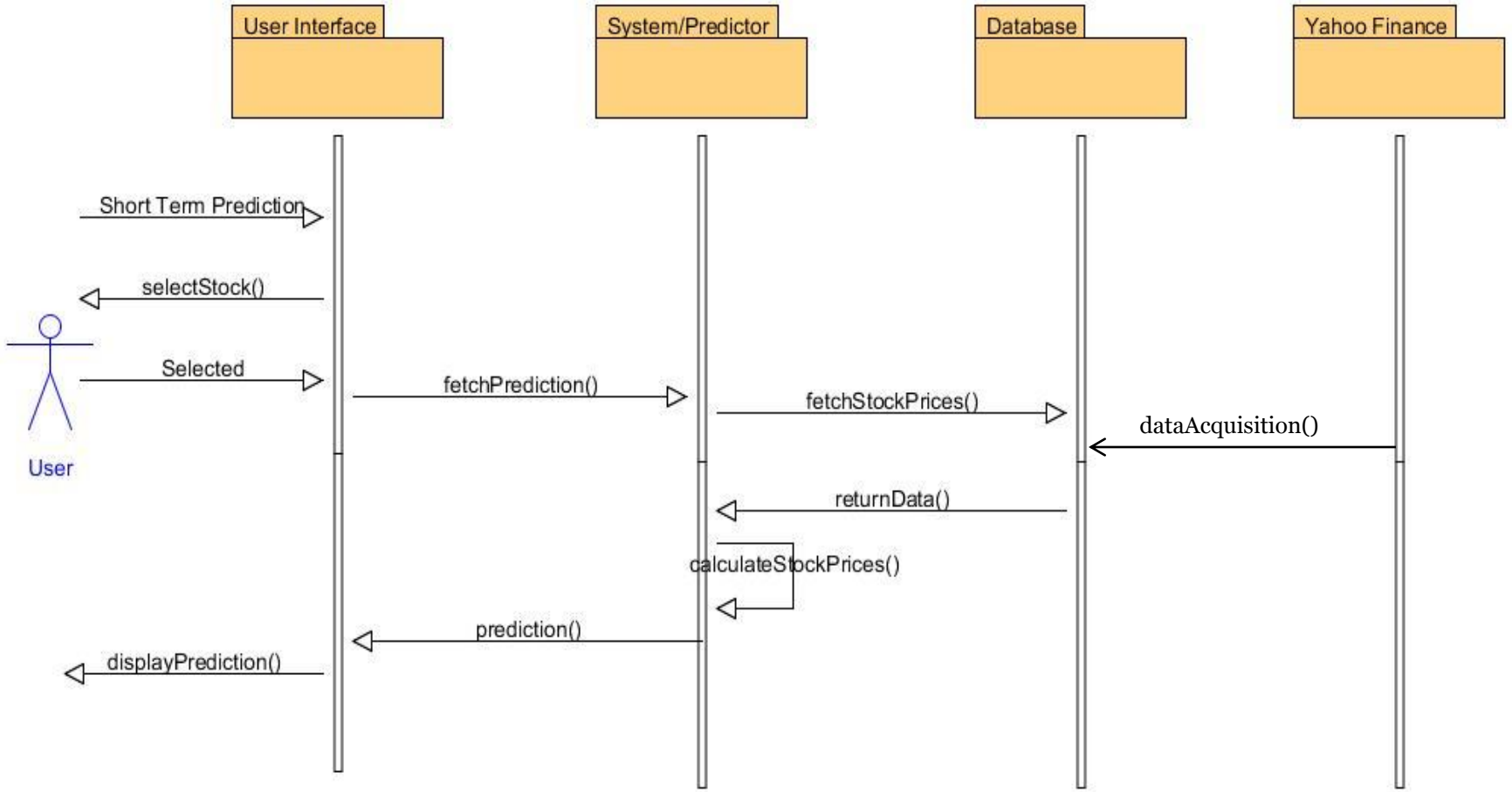
System Diagram



Web Service Interface



Web Service Interface



Prediction Strategy

For Prediction we use technical analysis as well as fundamental analysis to an extent to provide with a better prediction, we are doing two types of prediction

- Short Term Prediction
- Long Term Prediction
- Trend based prediction

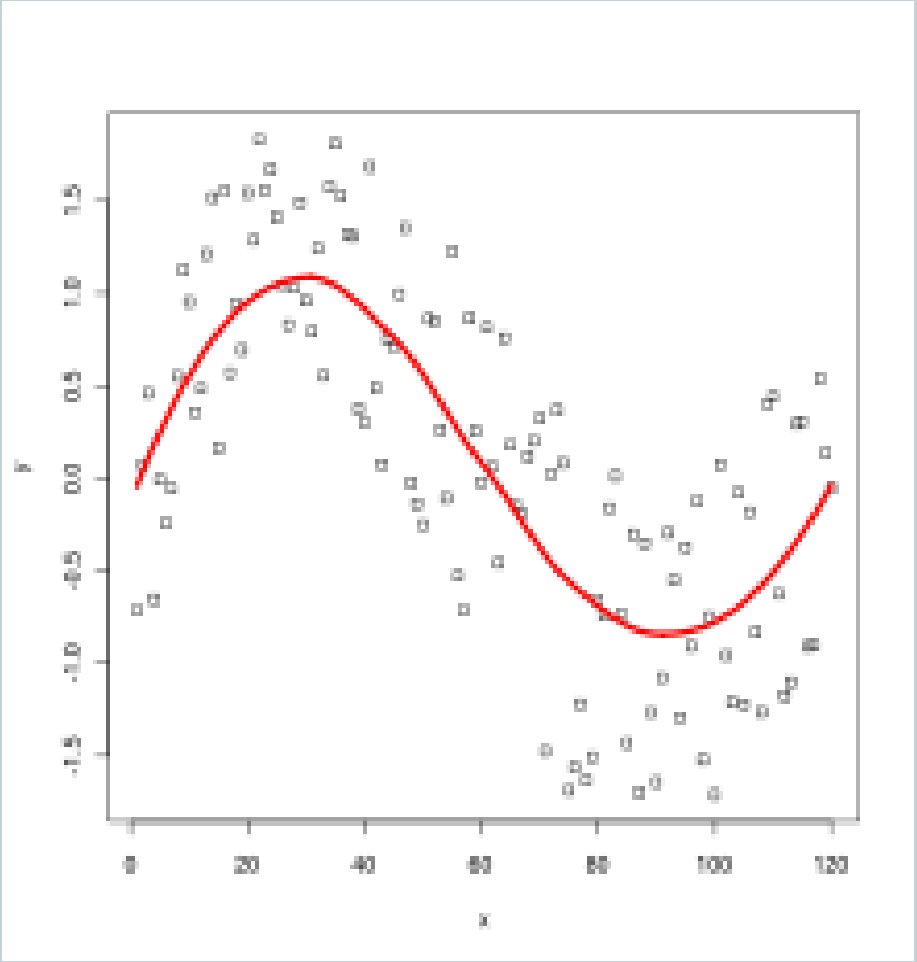
Prediction based on Bayesian

- We use the previous data to fit a curve that should determine a function which can be used to predict the future value.
- The error for a future long term/short term prediction varies depending on the type of curve, and the market outlook.
- For curve fitting we are using Bayesian Probabilistic analysis over the neural network curve fitting as the prediction with the probability of random variable is better calculate than regression analysis.

Prediction based on Bayesian

- Curve fitting using Bayesian probabilistic theory
- The training data x and t, along with a new test point x, and our goal is to predict the value of t
- Normally distributed random variables using probability values

Prediction based on Bayesian



The curve is best fit if the data points are in linear or polynomial function.

An exponential fit results in a wrong prediction.

Prediction given will be positive or negative(directional) not values.

The error may increase if the training set is small, or the prediction is anticipated for a period too far away in the future.

Prediction based on pattern signatures

Patterns that are proven to reduce uncertainty of forecast:

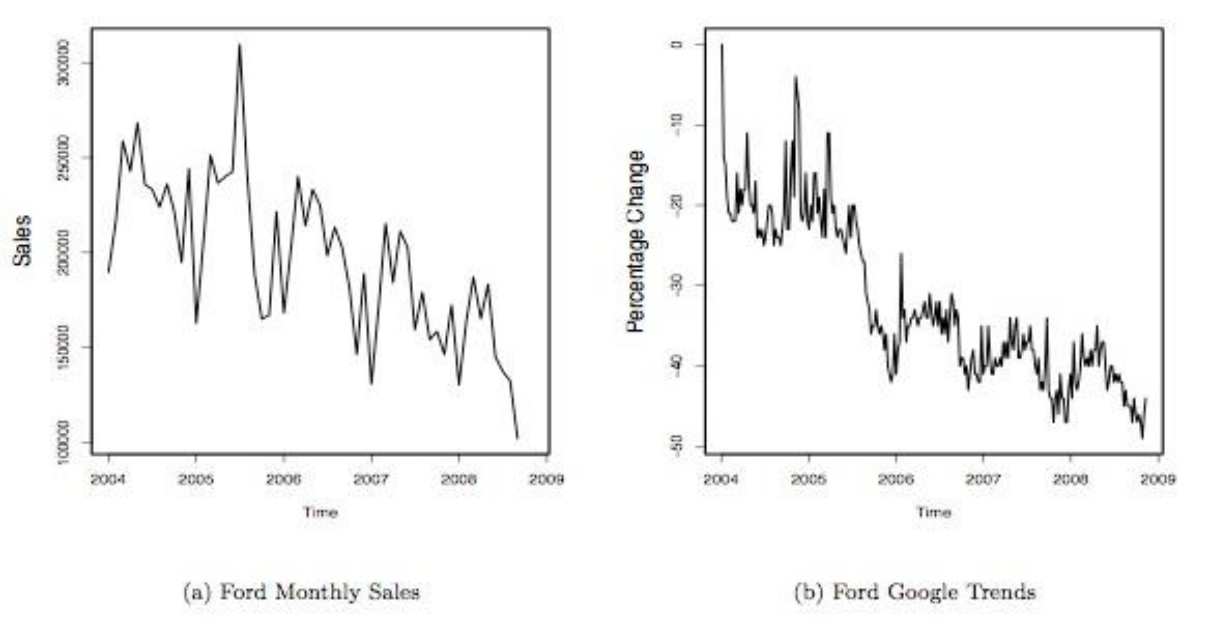
- Head and shoulders.
- Cup and Saucer.
- Candle stick patterns.

Algorithms used to learn and predict the patterns: (Ensemble techniques)

- Support Vector Machines as weak classifiers for each pattern.
- Mixture of Experts to learn weights of several weak classifier denoting the expertise of a model.

"Algorithms analyzing previous price lines doesn't have high confidence on the price forecast"

A better contemporary prediction possible using Google trends (Or twitter trends)



(a) Ford Monthly Sales

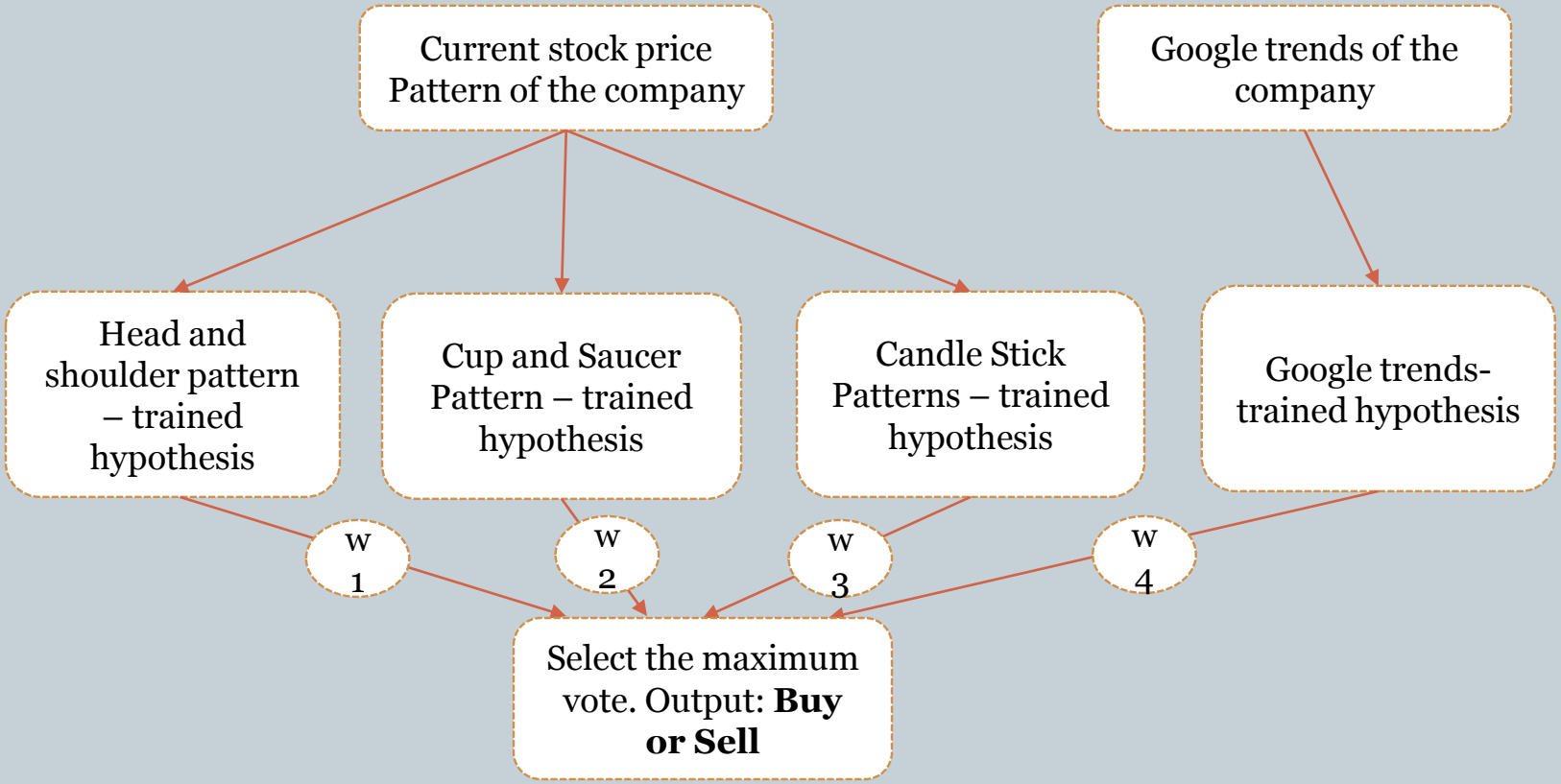
(b) Ford Google Trends

Adding google trends to increase confidence of prediction as these trends generally confirm and indicate the drastic change in stock price of if the stock price will continue to be flat.

In this project, analysis of google trends is accounted as one of the classifiers used in boosting.

Image reference: Forbes

Algorithm work flow:



Web Sources

The major web sources that we currently intend to use to acquire our data include

- Yahoo! Finance - https://code.google.com/p/yahoo-finance-managed/wiki/YahooFinanceAPIs
- Google Trends - http://www.google.com/trends/
- Associated Press - https://developer.ap.org/

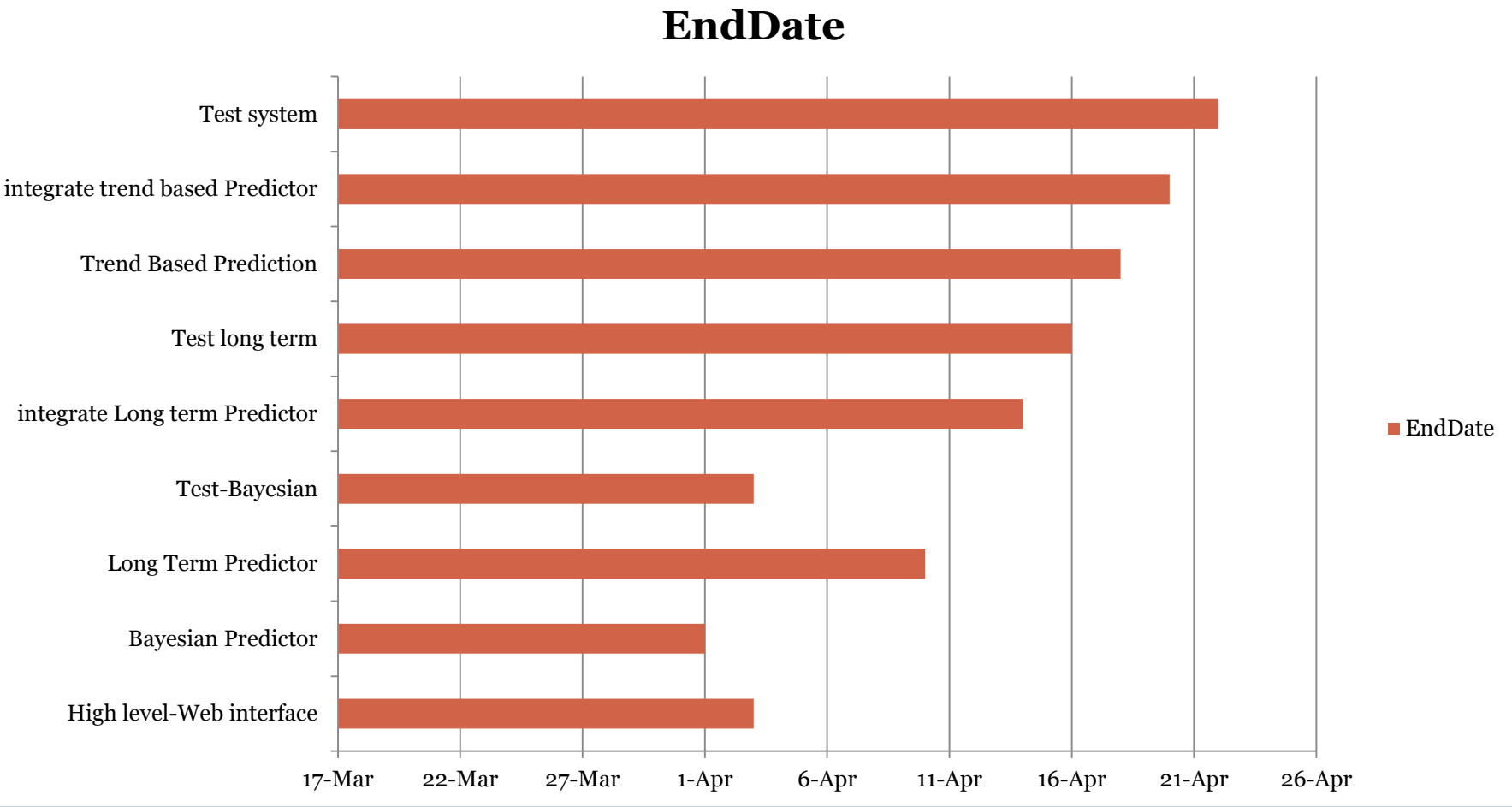
Google trends will allow us to implement the additional feature of trend analysis which will help us bring the effect of fundamental analysis into the picture.

Achieved Tasks

Use Case Identifier	Use Case Name	Status
UC8	View Stock Price	Complete
UC9	View Stock Chart	Complete
UC10	Short Term Prediction	Data Collection Module in place
UC11	Long Term Prediction	Data Collection Module in Place

- The server that would host the web application is up and running and can be accessed (only on the university network) at hs-rack5.cs.rutgers.edu
- The view stock chart section is available at eden.rutgers.edu/~ys360/mashup.php –> works for over 500 tickers.

Plan of Work


EndDate
Test system
integrate trend based Predictor
Trend Based Prediction
Test long term
integrate Long term Predictor
Test-Bayesian
Long Term Predictor
Bayesian Predictor
High level-Web interface
17-Mar
22-Mar
27-Mar
1-Apr
6-Apr
11-Apr
16-Apr
21-Apr
26-Apr
EndDate

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