Carter Williams

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Dr. Zhonghang Xia

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Phase Three Report

**Summary**

Phase three of the term project is the final phase of the term project. This phase, I added onto work mostly done in phase two by adding three key features. Stock data is updated every Friday at 11:59 P.M. and saved to the database; this includes data about the stock’s price each day of the week. Stock data is also graphed over a given period with a 50-day simple moving average; the data from the data range is also used in a multiple linear regression model to predict the closing price of a stock based on three variables. Finally, expense tracking is also added with features like pie charts, bar charts, warnings when the expenses exceed the income, and a prediction of monthly/yearly expenses based on income.

**Description**

Phase three of the term project added financial tools and functions to the existing website that allows users to perform many more actions. Before discussing the new features, the requirements from the rubric include:

1. The user can post a memo/plan about income, cost, budget, and family members can comment on the post by the reply function. The receipts and documents can be uploaded to the website.
2. Record the user’s expenditures on food, health, entertainment, etc, into the system, and the user can search the record for a specific time.
3. Use a pie chart to display the user’s expenditures with the corresponding percentages.
4. Periodically update financial data in the system. For example, stock market data are supposed to be updated on a daily base.
5. Use bar charts to show the user expenditures, incomes, and other financial data on a month/year base.
6. Show a red flag (some signals) when the user’s expenditure exceeds his/her income.
7. Plot the simple moving average (SMA) curve for the expenditure and close stock price for a given period.
8. Use a linear model (e.g., linear regression model) to predict the future (tomorrow/next month/year) expenditure and close stock price.

This section will briefly describe how the project meets these requirements using a black-box approach. In other words, this section will describe these new features with little regard to the technical details. The implementation details will be discussed in the next section.

Requirement 1 was met in phase one of the project; users make a post with a title, body, and multiple files; these files can be a pdf, image, zip folder, etc. Any other user can make a comment on the post while viewing it.

Requirement 2 required completely new functionality to be added to the project by creating a new part of the database to handle keeping track of expenses. Users can add new expenses by specifying the date, amount, category, and an optional, short description. These expenses are then displayed in a table, and the table data can be filtered by the year, month, or day.

Requirement 3 builds off requirement 2, and simply requires a pie chart to be built based on the user’s expense data. Expense data is used to create a pie chart that is then saved as a ‘.png,’ and this image is displayed to the user with percentages for each piece.

Requirement 4 was partially implemented in phase two by building the database to handle this data. Every Friday at 11:59 P.M., the system grabs financial data for stocks currently in the database from the past week and uses it to store in the database.

Requirement 5 was met by creating a bar graph that displays the user’s specified income, total expenses for the time frame specified, and total value for currently held assets. If the time frame is a year, the yearly income and expenses are shown; if the time frame is a month, the monthly income and expenses are shown. The total asset value does not change based on the timeframe specified.

Requirement 6 was met by creating a check on the page that shows expenses. The check adds all expenses from the current month and checks it against the user’s monthly income. If the expenses are higher than the income, a warning message is shown on the expenses page that shows the current month’s expenses and income.

Requirement 7 was met in two different places. First, a graph plots the simple moving average for expenses in a specified time frame. The simple moving average windows range from 50 to 2 depending on the number of datapoints in the dataset. Secondly, the close stock price of a specified stock is plotted on graph along with a 50-day simple moving average. The data’s date range is specified by the user.

Requirement 8 was the hardest to meet but was accomplished in two parts. Firstly, a user’s expenditures can be predicted for a month or year based on all user data. Income and expense data is gathered from all users in the database (there are too little users, so data was fabricated to implement this feature), and the income is used as the independent variable in a simple linear regression model. The model is developed from the user’s data and used to create a linear line for predicting a user’s expenses based on their income. This model is then used to predict the user’s expenses for the month or year based on their income. Secondly, a multiple linear regression model is used to predict the close stock price based on the open, low, and high for a day. The training data is grabbed from a time period specified by the user, and the user can specify the three independent variables to predict the closing price.

As seen from the previous paragraphs, all requirements were met for phase three. The next section will discuss more technical details regarding the implementation of the requirements.

**Technical Details**

**Summary of Achievement**

**Discussion**