DEVELOPMENT PLAN

A Purposeful Walk Down Wallstreet

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Senior Capstone Project

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1.1 Project Overview

The General Motors FinTech (financial technology) team is responsible for improving an existing application that makes predictions about the future behavior of various financial indexes. The application indicates whether or not one should buy, sell, or hold a group of assets that are currently under management. General Motors has been working with Wayne State University for 11 semesters on applications designed by students that utilize machine learning techniques in order to predict movements in various financial markets. Continuing with this past work, this team aims to enhance the application so it can conduct a thorough analysis of past financial data and make better decisions about managing a hypothetical portfolio of assets with increased accuracy and more robust and modular code.

1.2 Project Purpose, Scope, and Objectives

The purpose of this project is to improve existing code and algorithms. The scope of this project is to be used internally in future GM projects. The financial markets are impacted by many different external factors and this can cause rapid fluctuations in stock prices. This application will give users the ability to see the impact of these factors and make financial decisions prior to them occurring. The system will try to understand previous market trends that will allow it to predict the market situation.

The focus for this term will be on improvement to code, algorithms, and database design. Emphasis will be on improving the accuracy of the application. Current algorithms will be enhanced, and new trading strategies will be explored and added when appropriate. Depending on what the client wants, database conversion will be implemented.

The objective of this project is to develop a robust machine learning business intelligence application that makes financial decisions for the user based on predictions that are as accurate as possible. This semester we will be enhancing previously developed code. The focus of our work will be to increase the accuracy of trend forecasting and to reengineer the code so that it is more understandable and can be easily modified for future improvements.

1.3 Team organization

- Michael Shields *[Team Lead, Database Lead, Front-End Lead, Data Analyses, Algorithm Development]*
    - The team lead is tasked with overseeing each aspect of the development of the application while aiding each member when problems occur, whether those problems be technical or otherwise
    - The team lead will also be the main point of contact between the TA, Client, and Instructor
    - The database lead will be responsible with ensuring the database is connected to the backend and is correctly storing and accessing necessary data
    - The front-end lead will be responsible with ensuring the UI is workable and clear so other members can easily make use of the platform
    - Will assist with documentation throughout the course of the project

    - Will help develop and fine tune algorithms and data analysis
- Nabeel Asghar *[Documentation Lead, Presentation Lead, Algorithm Development]*
    - Documentation lead will oversee and finalize all documentation stylistically, as well as keep track of revision history
    - Work on algorithm development and documenting and reviewing the usage of the algorithms
    - The presentation lead is responsible for making sure all presentations are well formatted and include appropriate material
- Michael Chen *[Full Stack, Algorithm Development, Middle-Layer]*
    - Full stack lead will ensure that all aspects of the code are functioning properly and integrating well together prior to implementation
    - Work on algorithm development and documenting and reviewing the usage of the algorithms
    - Ensure python code is optimized and meets requirements
    - Assist with any other tasks designated by project lead
- Shojib Miah *[Technology Lead, Middle-Layer]*
    - Oversee the setting up and executing existing application
    - Investigate different technologies and learn how they work, as well as decide if we want to change which technologies to use
    - Work on middle-layer regarding Python and algorithm development

1.4 Problem resolution policies

In order to resolve interpersonal conflicts among team members we will implement a system. The member who perceived conflict will report to the team lead in order to try and work it out amongst the team. A meeting will be scheduled between the 2 parties in conflict and mediation will occur, led by the Team Lead. If the meeting does not solve the conflict, then we will reach out to the TA in order to schedule a secondary meeting led by the TA in order to try and resolve the conflict. If the involvement of the TA is insufficient to solve the issue, then we will bring the problem to the professor as a last resort.

All meetings with the Client, TA, and between group members require the attendance of every group member. Any group member absent from any of these meetings without notice will be contacted and warned by the group leader and any subsequent absences will be reported to the TA and will be addressed by all other group members. Any additional communication between team members can take place in either a WhatsApp group chat or through the Discord group dedicated to the project.

1.5 Project plan (iterations, project schedule)

We will have weekly meetings with our client, Joshua Feinstein, with our TA in attendance if necessary. These meetings will most likely occur on Monday evenings with arrangements being made for locations including a Starbucks in Grosse Pointe, the UGL, and the GM Renaissance Center. Our TA will also be meeting us separately on Tuesdays before class starts at 4:30 PM.

Our team will be meeting twice a week in person and electronically to discuss progress, communication, and coding. We are communicating via WhatsApp.

Project Schedule

Phase 1 - Getting the code up and running on every team member's computers.

January 23rd - Development Plan: Present a plan of development to the class and professor of what our schedule is and what we plan to do to complete this project from the client on time and complete.

Phase 2 - Identify areas of improvement and create a design specification.

February 4th - First Prototype: Present on our first prototype of the project to the class and professor. This will entail our fully running application from previous year's work. We will display our back end, middleware, and front-end and how they work together and how we will improve on some of their aspects.

February 11th - Software Requirements: Identify our requirements and describe our project low level deliverables. We will present these requirements to the class and professor.

February 20th - Application Testing: Test our project and any modifications to make sure it works. We will be doing automated testing.

February 25th - Design Specification: Create detailed documents describing our project at its specific low-level details

March 3rd - Second Prototype: Improve on our previous algorithms to make them more accurate and efficient.

Phase 3 - Make improvements to the project and finalize it.

March 24th - Third Prototype: Integration of new algorithms to increase profits.

April 14th - Final Presentation: Present on our finished product to the class.

1.6 Configuration management plan

Our project will be managed at the top. Our team lead, Michael Shields, will be given the tasks and it is his duty to divide the roles and give them to each team member. This will be done in person or via WhatsApp.

Our source control method will be done through Github. We will branch code based on per person to allow us to maintain the project stability.

1.7 Technologies

The technologies that will be used for this project has been predetermined since this project already has multiple semesters of foundation.

Front End:

- Tableau: Preferred by client for data visualization.

Back End:

- Python: Previous code for the algorithms used in the application are written using Python.
- IEX (Investors Exchange): This data source delivers market data from the exchange into the SQL Server database.
- SQL Server: The server holds raw data and calculations from the application's algorithms.