**Ceng 491 -- Group 15 Project KickOff Document**

**AlgoTrading Kickoff Document**

**Description**

This project aims to provide a general framework in order to create a pipeline for creating, testing and optimizing trading algorithms. The application will be web-based for being easily accessible, user-friendly, and easy to start for the users. Three main components can be further defined as follows:

a) Algorithm Creation Interface: This supports composing an algorithm from different indicators, using graphical user interface bindings.
b) Back Testing Client: This allows users to test their algorithms against previous real-world data, fetched from various sources.
c) Optimization & Feedback: The parameters used inside the indicator are optimized using various machine learning techniques to give the user feedback about his/her system.

**Master Feature List**

1. **Login and account creation features, user authorization**
2. **Ability to save and reload created algorithms**
3. Ability to upload custom data
4. **Drag and drop for ease of use of indicators and their relationships**
5. **Interactive graph visualization**
6. Cross-comparison features among algorithms and other investment options
7. **Live algorithm and its visualization**
8. **Real time updates of databases, algorithms and visualizations**
9. **Ability to watch selected stock prices in real time**
10. Ability to backtest algorithm against given or custom data
11. **Ability to add and modify a variety of built-in indicators**
12. Ability to create custom indicators
13. Optimizations of algorithm parameters with machine learning

**Workpackages**

|  |  |  |  |
| --- | --- | --- | --- |
| **WP #** | **Term** | **WP title**  | **Estimated number of man-months** |
| 1 | 491 | Project planning, library research and architecture design | 2 |
| 2 | 491 | Frontend initialization | 2 |
| 3 | 491 | Backend initialization | 2 |
| 4 | 491 | Production ready frontend development | 3 |
| 5 | 491 | Production ready backend development | 3 |
| 6 | 491 | Integration and testing of the frontend and backend | 3 |
| 7 | 492 | Development of the algorithmic trading backend | 4 |
| 8 | 492 | Optimization features and machine learning research | 5 |
| 9 | 492 | Integration and user testing | 3 |
| 10 | 492 | Wrap-up | 3 |
|  |  | Total: | 30 |
| i | opt (491) | Android Mobile Application  |  |
| ii | opt (492) | Predicting future market and profits |  |
| iii | opt (492) | Trading with real money |  |
| iv | opt (492) | Quality of life |  |

**Detailed Descriptions of High-Level Workpackages**

**WP1 - Project planning, library research and architecture design**

1. Develop the list of master features of the project.
2. Produce project development plan in accordance with Master Feature List.
3. Design the overall architecture of the project.
4. Analyze risks and make a management plan.
5. Make research about libraries

**WP2 - Frontend initialization**

1. Decide which resources to use
2. Design of the scenes and state logic according to multiple use cases
3. Start to develop frontend

**WP3 - Backend initialization**

1. Deciding on which resources to use
2. Design of the database
3. Creating API for frontend communication

**WP4 - Production ready frontend development**

1. Development of the drag and drop for indicators (and their relationships)
2. Development of the graph visualization (line, candlestick etc.) for data
3. Development of the cross-comparison with other options and its visualization

**WP5 - Production ready backend development**

1. Migration of the system to a suitable remote machine
2. Add authentication for users
3. Ability to add custom data

**WP6 - Integration and testing of the frontend and backend**

1. Establishing real time updates of databases, stock prices and visualizations
2. Establishing the communication between frontend and backend
3. Replacing the dummy data with respective real world data

**WP7 - Development of the algorithmic trading backend**

1. Implementing the backtesting algorithm
2. Implementing indicators and their integration to both frontend and backend
3. Developing custom indicator creation interfaces
4. Implementing the live algorithm and its visualization

**WP8 - Optimization features and machine learning research**

1. Finding appropriate machine learning techniques and utilizing them for parameter optimization in algorithms

**WP9 - Integration and user testing**

1. Making final integration tests to ensure overall compatibility of the components
2. Making user tests to ensure the usability of the system

**WP10 - Wrap-up**

1. Bug fixes, final corrections, concluding the project

**OPT1 - Quality of life**

1. Color coding indicators and their relations
2. Social media integration
3. Tutorial for teaching the usage of the system
4. Different front-end styles, e.g. night mode
5. Further improvements for a user friendly interface

**OPT2 - Predicting future market and profits**

1. Predicting future stock market prices with machine learning and giving feedback

**OPT3 - Trading with real money**

1. Establishing connection to real market servers to allow trading with real life money

**OPT4 - Android Mobile Application**

1. Clone of the web application
2. Make necessary changes for native platform

**Overall Systems Architecture**



**TimeLine**



**Risk Assessment**

|  |  |  |
| --- | --- | --- |
| **Risk #** | **Description** | **Possible Solution(s)** |
| 1 | Risks associated with machine learning processes, such as overfitting | Further research, more data, change in ML strategies |