School of Computing

Year 4 Project Proposal Form

SECTION A

Project Title: Braikout – A Machine Learning Trading Platform with Market Sentiment & Technical Chart Theory Analysis.

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Stream: CASE 4

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General Area Covered by the Project:

While this project contains elements from various areas within the field, if a category or genre had to be assigned, at its core the project will involve the development of a **FinTech web application,** and corresponding android application.

Machine learning will play a large role in the prediction of the direction of future prices on the daily time frame, which is a main feature of the application itself. Essentially this means determining whether the day will close higher or lower than the previous day's close.

Scraping **for sentiment analysis**, from various sources such as social media and news sites, will afford the trader a greater view of the market's possible future, and in turn make more confident trading choices.

As well as this, the evaluation and **time-series analysis of real time price** will play a role in picking out patterns that are forming on charts and notifying the user when a potential price breakout - which would be indicative of an imminent price change (either up or down) – has occurred. This feature will also automatically detect current support/resistance levels, and other Technical Analysis Indicators.

Data Analysis and visualisation will be used to give the user an idea of their current portfolio and trading history, as well as market sentiment.

Outline of Proposed Project:

Background

As an avid trader, not just of cryptocurrencies, but also of stocks and government-backed forex currencies, I am familiar with, and use regularly, many different exchanges on the web. Throughout these exchanges, there are two main issues that seem to repeat themselves, regardless of how easy to use or well designed the sites themselves may be.

The first issue is the lack of direction given to beginners in terms of price prediction or analysis. Of course, the big players in the game of trading make use of an abundance of algorithms and data scientists in order to trade, to the extent that it is even estimated up to 70% of Wall Street orders are made automatically using software. It is very difficult for the average trader, particularly if their

knowledge is that of a beginner, to be competitive in such an environment. Therefore, Braikout will aim to tackle this issue by giving the beginner their own system that will give them an insight into the type of data the big “players” are utilising, and allow them to trade on a more even playing field There have been many research papers on this topic, yet no exchange has implemented the methods to benefit their users until now.

The second issue I find myself having on a day to day basis is just how much information is needed to be tracked at any one time to be competitive, and avoid missing a potential buying or selling opportunity. Even having a complete understanding of technical analysis is useless if one happens to not be looking at the chart at the time of the breakout. Breakouts in trading typically come in three forms. The first is of patterns, such as flags, triangles or wedges that have formed on the chart. The next is when the price breaks upwards through previous resistance levels. The third is when the price falls below previous support levels. An obvious feature, yet one that is not implemented anywhere else, is a notification system that tells the user that a certain coin that they are following has just broken previous resistance levels (for example) and it may be a good time to buy. This would greatly reduce the number of monitors/windows needed to trade, and reduce the chance of missing out on a good opportunity.

Achievements

Trading & Interactive Charts: The primary function of the application is to allow users to quickly see price charts for the most popular forex trading pairs and cryptocurrencies, and make trades from within the application.
However, the application will also provide many unique features designed to tackle the multiple common issues with other platforms, as previously discussed.

Price Prediction using machine learning, Sentiment & Technical analysis: Users will now have the ability to look at a price prediction generated using a comprehensive neural network that not only takes into account previous prices, but also uses scraping in order to analyse the sentiment of the market, from news sites, social media sites and chat rooms/forums, in order to give the best chance of accurately depicting the current sentiment. The impact of Brexit on GBP/USD, GBP/EUR and GBP/CNY pairs shows just how powerful a tool sentiment is. In September 2017, rumours of a potential ban in China for bitcoin exchanges, along with the CEO of JP Morgan speaking negatively on bitcoin took the price from an all-time high of $5000, to $3000 in one week. Considering these examples, it is clear that no short-term price prediction method is complete without taking into consideration the sentiment of the market in real time.

The predictive model will also consider three traditional technical analysis indicators, namely Relative Strength Index (RSI), MACD divergences and trading volume.

Pattern Analysis & Breakout alerts: The application will also use time series analysis to pick out formations of patterns such as triangles, wedges, and areas of support/resistance. Once one of these patterns are breached in real-time, the user would receive a notification in the form of their choosing (Desktop notification, email, or SMS text message), which would suggest a potential buying/selling opportunity.

Data Visualisation: Users will have the ability to view their trading history and current portfolio in the form of charts and graphs in order to determine their current standing, as well as their past success, and in particular, what their portfolio looked like when they achieved that success.

Programming Language(s)

1) Python
2) Django
3) HTML/CSS
4) Javascript

Programming Tools / Tech Stack

1. PyEnv
2. Intellij
3. Django
4. MySQL/Elasticsearch
5. NumPy
6. Apache Web Server
7. Bitfinnex Trading API
8. Tradingview Chart API
9. Google Apps Services
10. Grafana/Kibana

Learning Challenges

New Technologies:

Python & Django – This will be the first time I have written any application in python. Despite my expertise being in Java, with some experience in Clojure from my work placement, I am aware of the usefulness of python and am intrigued by its wide array of libraries for specific tasks, and as such am hoping that it will be beneficial for me in this project. As well as this, it will be beneficial for my future career opportunities if I can add another popular language to the list of languages I am comfortable with developing in.

SciPy/NumPy – Although I have never used any charting or time series analysis software, to achieve the various real time price predictions and calculations necessary, this will be an area in which I will need to become proficient.

Machine Learning – Although part of our AI course in third year was based around machine learning, I have never written, or indeed even been exposed to, the idea of implementing this in code. Added to this is the fact that this code is in a language I am not comfortable with, which will certainly make for a challenge, particularly given the fact that I am not studying the Data warehousing module this year which covers machine learning. Despite this, I am confident in my ability to learn about the topic in my own time to bring myself to have a level of understanding of the topic which is sufficient for completing this project.

Scrapy – Sentiment analysis is certainly an area with which I have no experience, however something that will prove extremely useful to the typical user of the application and as such will be implemented.

Data Visualisation – This will be the first time throughout the course that I will be working with data visualisation tools such as Grafana/Kibana, which should be a challenge particularly in the case of real time data representation.

Platforms:

Hardware – This application will be built to run as a web application, meaning any PC, Laptop or Tablet will be suitable. It will be built mainly on my own personal desktop computer.

Software – The application will be developed on Windows 10 and Ubuntu 16.0.4. As there is no dependency for a specific operating system. Most of the development cycle will be completed on windows 10.

Special Requirements:

There are no special software requirements for the use of this application, however it will only be guaranteed for the latest version of Google Chrome, Firefox, and Microsoft Edge.