A Sentimental Approach to Financial Analysis

Group 31 Team Software Engineering Assignment 1

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1. Project Proposal

1.1. Introduction

The aim of this project is to make a cross-platform mobile application that presents a user with current financial data on a given stock. It will include a round-up of current news and opinions from influential people within the financial domain, a summary of Companies House data and a ticker showing current prices and trends. This will provide a user with enough resources to build up their own opinions and allow them to make an informed investment decision.

To make profitable investments, accurate and current data is required due to the volatile nature of stocks. Stock prices rise and fall every second due to several variables. Data will be extracted from numerous sources including Yahoo Finance, the Twitter API, Companies House and open-source news API's.

A sentiment analysis algorithm will be performed on news and Twitter API data, identifying news as positive or negative and giving an indication of how reputable sources are viewing a stock. Companies house data will allow a review of industry averages and quarterly and annual reports. Comparisons will be made between data sources to provide a well-rounded view of a company, presented in an easy to understand format. Image 1 represents the anticipated data flow of the application.
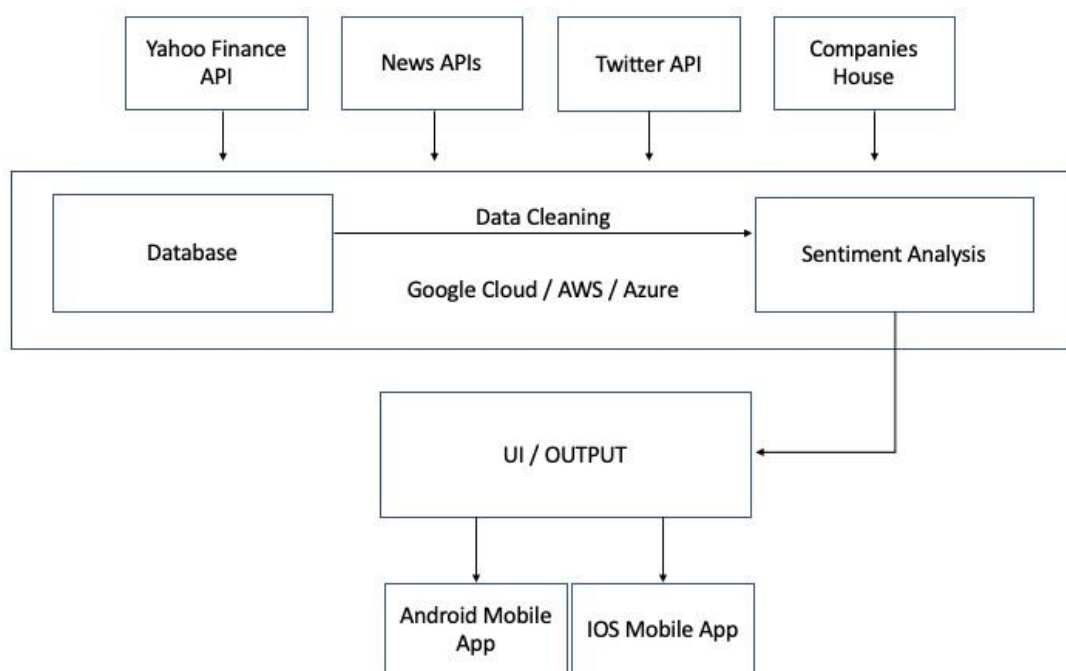

Image 1: Application Data Flow

1.2. Project Management Methodology

Due to working in a semi-remote capacity, the Agile approach best suited the needs of the team due to flexibility, fast development and allowing for small milestones to be set. (Guru99, 2019)

1.3. Project Life Cycle

The project is broken down into 6 phases that follow a typical development cycle for a mobile application. (DevOps, 2017) The phases are: (Binani, 2019)

- Planning
- Design
- Prototyping
- Development
- Testing
- Release

Phases are divided into smaller milestones which will evolve throughout the development cycle. Overlap may occur between phases and milestones may run concurrently. (Ashwini, 2017)

1.4. Time Management

A Gantt chart is used to track project progress, manage milestones and allow for effective time management. The chart is continuously updated, showing a true reflection of progress and granularity of milestones.

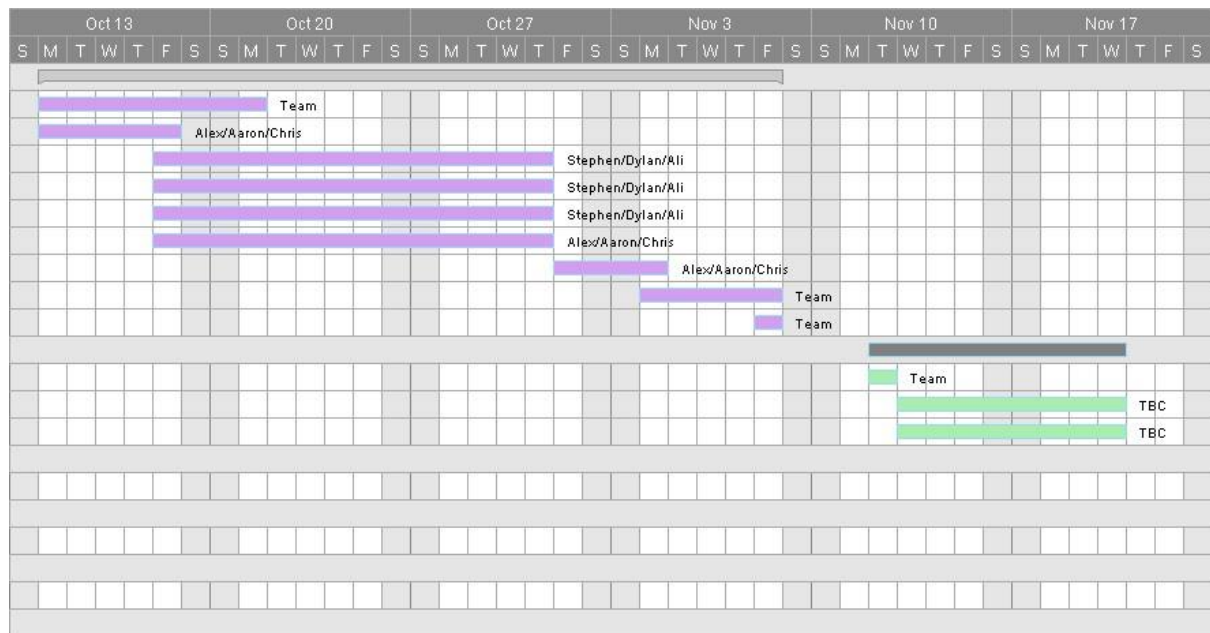| Task Name	Start	Finish	Assigned To	Status
Planning Phase	10/14/19	11/08/19		
Project Planning	10/14/19	10/21/19	Team	Complete
Team Skills Assessment	10/14/19	10/18/19	Alex/Aaron/Chris	Complete
Legal Statement Research	10/18/19	10/31/19	Stephen/Dylan/Ali	In Progress
Political Impact Research	10/18/19	10/31/19	Stephen/Dylan/Ali	In Progress
Ethical Standpoint Research	10/18/19	10/31/19	Stephen/Dylan/Ali	In Progress
Competition Research	10/18/19	10/31/19	Alex/Aaron/Chris	In Progress
Technical Feasibility Analysis	11/01/19	11/04/19	Alex/Aaron/Chris	In Progress
Final Product Proposal	11/04/19	11/08/19	Team	Not Started
Phase wrap up / Team Reflection	11/08/19	11/08/19	Team	Not Started
Design	11/12/19	11/20/19		
Front and Back End Design Plainning Meeting	11/12/19	11/12/19	Team	Not Started
Front End Wire Frame (Provisional)	11/13/19	11/20/19	TBC	Not Started
Back End Design (Provisional)	11/13/19	11/20/19	TBC	Not Started
Prototyping (Placeholder)				
Development (Placeholder)				
Testing Phase (Placeholder)				
Release Phase (Placeholder)				

Image 2: Gantt Chart Part 1

Image 3: Gantt Chart Part 2

1.5. Team Skills Assessment

A personal skills assessment was collated, and a matrix produced allowing milestones to be assigned to appropriate team members, ensuring that the team is working efficiently on milestones and assisting with sourcing cover if required.

Name	Programming	Pseudo Code	Research	Design	Testing	Writing
Aaron Dawson	4	2	3	3	2	4
Alex Marshall	2	3	3	4	4	3
Ali Almarri	2	1	3	2	2	2
Chris Kirby	4	3	3	2	4	3
Dylan Moyles	2	2	3	3	4	4
Stephen Tuke	3	3	3	2	4	4

Table 1: Skills Matrix

1.6. Document & Code Management

Microsoft Teams will be used for managing documentation. It allows for collaboration between team members and holds a centralised calendar to assist with time management and meeting planning.

GitHub will be used to manage code specific files including the front and back end of the application. GitHub allows for collaborative programming between team members, version control and rollback.

1.7 Risk Assessment

A risk assessment was produced to ensure potential risks were identified and ensure appropriate contingency measures are in place.

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No.	Risk	Contingency
1	Team member leaves mid-project or is unavailable due to sickness	Multiple team members to be assigned to each milestone to ensure cover is in place
2	Multiple team members working on a single-code base resulting in confusion or error	Regular meetings, clear communication and documentation and effective use of GitHub mitigates error and confusion
3	Code or documentation could get overwritten or deleted	Work backed up and managed on Microsoft Teams and GitHub allowing for backed-up storage and version control
4	Deadlines could be missed	Effective use of the Gantt chart and multiple team members working on clearly defined milestones will allow for deadlines to be managed with work reallocated if necessary
5	Data Protection act could be violated	No user login on the application or storing of cookies to ensure we are not handling personal data
6	Liability if we make predictions based on collected data	Present a disclaimer that makes us not liable if anyone uses the application to make investment choices

2. Market Research

Yahoo! Finance, one of the data sources, is also one of our largest competitors in the financial information market for providing up-to-date investment data to anyone that has access to the internet. The site provides data to over 70 million unique monthly users. (Furhmann, 2019)

Screenshot 1: Yahoo Finance News Section (Yahoo! Finance, 2019)

Summary | Chart | **Conversations** | Statistics | Historical data | Profile | Financials (NEW) | Analysis | Options | Holders | Sustainability

💬 1,971 reactions on $TTWO conversation

Sign in to post a message.

Top reactions ⌄

Jan 18 days ago   ...
With the news that red dead redemption coming to pc the revenue will boost even higher end this year and that will be visable in the next quarter results at 7 Nov.

↩ Reply   👍5 👎

sam 5 days ago   ...
Follow the trend, sell ttwo and buy atvi

↩ Reply   Replies (1)   👍1 👎6

Fred 10 days ago   ...
Outer Worlds is out now

↩ Reply   👍2 👎

Screenshot 2: Conversations tab on Yahoo Finance (Yahoo! Finance, 2019)

yahoo! finance   [Search for news, symbols or companies]   🔍

Finance Home | News | Market Data | Videos | Industry News | Work & Management | Personal Finance | Brexit | My Portfo

116.90 -3.45 (-2.87%)
At close: 1 November 4:00PM EDT

Summary | Chart | Conversations | Statistics | Historical data | Profile | Financials (NEW) | Analysis | Options | Holders | Sustainability

Previous close	120.35	Market cap	13.231B	
Open	121.28	Beta (3Y monthly)	0.68	
Bid	117.00 x 1300	PE ratio (TTM)	43.38	
Ask	0.00 x 800	EPS (TTM)	2.69	
Day's range	116.81 - 121.56	Earnings date	7 Nov 2019	
52-week range	84.41 - 135.70	Forward dividend & yield	N/A (N/A)	
Volume	1,984,390	Ex-dividend date	N/A	
Avg. volume	3,328,629	1y target est	136.65	

1D 5D 1M 6M YTD 1Y 5Y Max   Full screen

122.50
120.35
118.167
116.85
116.00

10   12   14   16

Trade prices are not sourced from all markets

Screenshot 3: Current and historical share price and financial ratios relating to the company (Yahoo! Finance, 2019)

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Income statement All numbers in thousands

Breakdown	TTM	30/03/2019	30/03/2018	30/03/2017
Total revenue	2,820,871	2,668,394	1,792,892	1,779,748
Cost of revenue	1,633,748	1,523,644	898,311	1,022,959
Gross profit	1,187,123	1,144,750	894,581	756,789
⌄ Operating expenses				
Research development	248,421	230,170	196,373	137,915
Selling general and administrative	713,247	672,634	503,920	496,862
Total operating expenses	1,003,897	943,036	744,262	665,484
Operating income or loss	183,226	201,714	150,319	91,305
Interest expense	-	8,032	-	-
Total other income/expenses net	456	4,958	-14,742	1,350
Income before tax	217,493	232,785	136,625	76,965
Income tax expense	-90,931	-101,052	-36,908	9,662
Income from continuing operations	308,424	333,837	173,533	67,303

Screenshot 4: Yahoo Finance's Financials tab (Yahoo! Finance, 2019) Positive points:

- A straightforward user interface which is simple for any user to navigate the site and utilise, with a consistent layout across different stocks making it more engaging.
- The "Conversations" tab as seen in screenshot 2 allows users to discuss their thoughts on the specific company.
- As Yahoo Finance is not an investment platform and only a repository of financial information, it is able to provide a largely unbiased service for users.

Negative points:

- The "Conversations" tab which allows anyone to share thoughts is not a reputable source, yet they are promoted as if they are, possibly misleading inexperienced users.
- This product displays news stories relating to the company; however, the second article is an advertisement. This is distracting for users who want to see relevant stories and want to know how negative or positive the article is.
- The importance of the ratios shown in Yahoo Finance screenshot 4, such as Price-to-Earnings ratio is not conveyed to the user. This could lead inexperienced users to believe that they are not useful.

SWOT Analysis of the Financial Information Industry:

Strengths	Weaknesses

• Large customer base. • High market value at \$68.212 trillion for investments. (Barton, 2019)	• Too much information provided by existing services, overcomplicated. • It is difficult to make any revenue from providing financial information unless you sell ads or group up with a stock brokerage. • Requires a lot of computing power.
Opportunities	Threats
• A product which displays less information but highlights the most influential data.	• Main competitors, Yahoo Finance and Google Finance are very large players who will buy out small competitors. (Reynolds, 2017) • Stock market crash, we are due a crash as a downturn in the economy happens around every 10 years, it has now been 11. (Blackley, 2019)

Table 2: SWOT Analysis

The product is aimed at a mass market. Individuals make up 12.4% of trades on the London stock exchange. This is a large market considering banks and investment trusts only make up 3.2% (Barton, 2019). It is targeting the middle class. People who have savings that they are looking to build on, but without the expertise to understand the current services.

3. Legal, Ethical and Political Statement

3.1. Legal
By using official APIs to embed content, there will not be any fair use or copyright issues.

Not allowing a user to create an account and not storing user data prevents potential GDPR/Data Protection Act 2018, breaches. Laws such as the Computer Misuse Act 1990, do not apply to the project; it is not using any data that is not open source or that we are not authorised to access. It will not be emailing a user, avoiding Privacy and Electronic Communications (EC Directive) Regulations 2003 conflicts.

After researching and considering the relevant legislation, we are confident that our application complies with all current laws.

3.2. Ethical

3.2.1. Utilitarianism
Utilitarianism is the belief that the ethical choice is the one which results in the greatest happiness of the greatest number of people. (Oxford Learner's Dictionaries, 2019) It is difficult to argue whether our project is ethical based on utilitarian theory, as it considers the consequences of an action which means we will need to predict the potential effects it could have on people.

The application will make finding financial information on companies easier and more accessible, reducing the amount of work and stress that goes into researching these areas. Making such data more accessible could result in people building confidence to invest in the stocks of a company and potentially increasing savings. Such a result increases the happiness of a user. This would deem our project as ethical.

On the other hand, making this data more accessible and leading someone to invest in a company which turns out to be a bad investment would result in a financial loss. This would lead to stress and potentially a negative impact, depending on the size of the investment. This consequence would result in a large amount of unhappiness and therefore our product could be unethical according to utilitarian theory.

Based on this knowledge, the team decided not to make any predictions to the end-user, but instead present them with the most up-to-date information to allow them to draw their own conclusions. It would be unethical to make such predictions as people could be risking money on inaccurate projections and could easily make a bad investment based on our advice.

3.2.2. Deontology

Deontology focuses on the action being taken and is not concerned with the consequences of that action, instead of considering whether an action is right or wrong in and of itself, some choices are considered morally forbidden. (Stanford Encyclopaedia of Philosophy, 2016). A prominent theorist, Emmanuel Kant, did not agree with using consequentialist arguments because they ignore the intent behind an action. Kant theorised that there is a categorical imperative that should be adhered to in order to be ethical, which means that you should only do something if you consider that to be the acceptable way for everyone to act. (BBC, 2019)

The creation of the app is considered ethical as the purpose is to help inform a user and steps have been taken to reduce the risk of consequences which demonstrates the intention behind creating the app as not being harmful.

The creation of the application also satisfies the ideals of Kant's categorical imperative; this is because the application is made in a way that we would be willing to have the actions taken by other people.

In order to ensure that our team is acting ethically, we are not using the application to monetise a user by using their data or asking them to pay to access the app, doing this would be exploitative, which would violate Kant's categorical imperative and hence being immoral.

Whilst this application can be considered moral when using deontological ethics, it is important to note that there are flaws with using deontological arguments, primarily that it does not consider that an action can have further consequences. This means that use of the application could still potentially lead to an overall reduction in the happiness of the world, though it may still be considered moral by this standard.

3.2.3. Virtue Ethics

In our project, the application will not collect data from a user so it cannot be stolen or exploited. It will be transparent about data sources which are trusted so we know it will present accurate information and we will aim not to provide false or inaccurate data. All data that is presented to a user is only to help them make an informed decision, rather than telling them which decision to make. It will be using APIs provided by companies to present the information rather than copying it to our application so that the original creators can be recognised. By taking these actions our application would be considered ethical by virtue ethics theory.

3.3. Political

We will implement news sources from across the political spectrum and keep the site as neutral as possible. The project is unlikely to have political consequences as we are not producing any controversial content.

One issue that may be encountered is that if data is sourced from a wide range of sources, it may be difficult to tell if the information presented is factually accurate or is being produced to cause controversy.

4. Group Work Reflection

4.1. Group Review

The group was indecisive and slow to decide on a project idea and had difficulty arranging the first meeting due to communication barriers.

After the first meeting with the group supervisor, Chris and Aaron emerged as natural leaders and the group was able to pull together as a team to formulate a project plan. The team was separated into two groups with each managing a separate milestone, allowing Dylan to take up a leadership role within a sub-group.

With numerous leaders emerging, other group members (Alex, Ali and Stephen), were not able to demonstrate leadership skills, however, by being responsible specific tasks, those team members showcased their resourcefulness, excelling in project research and proving invaluable in planning the future project development.

It was concluded that the group focus should be to improve communication and to better manage resources.

4.2 Individual Action Plan

Based on feedback across the team, the following individual action plan was created to aid with selfimprovement and to benefit the team as a whole:

Name	Improvement Goal
Chris Kirby	Improve communication by engaging more with less outspoken team members.
Aaron Dawson	Communicate with others more to make efficient use of time and each other's skills.
Alex Marshall	Be more confident in taking on more work and procrastinate less.
Stephen Tuke	Organize time better to improve work.
Dylan Moyles	Plan and work on tasks immediately so less time is wasted.
Ali Al Marri	Contribute more to the task by learning the material first.

Table 3: Individual Action Plan

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