Appendix A

Table of Contents

Summary and Assessment of alternative approaches[1]

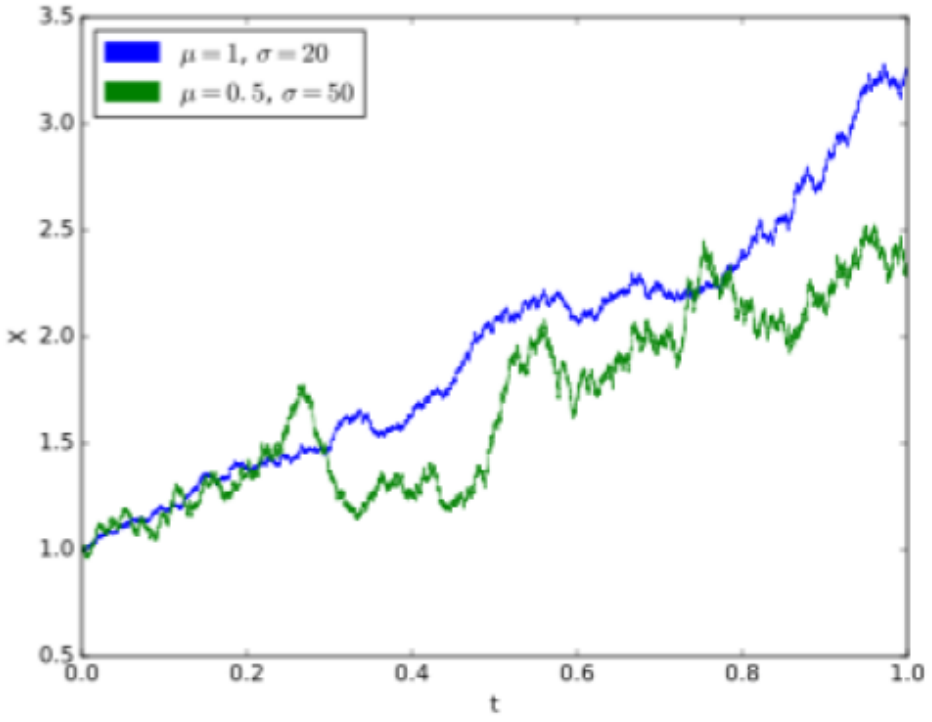
Upon some deliberation and analysing the student's overwhelmingly positive response to the survey (Appendix A, Survey), I decided to use the bespoke software development approach in order to meet the client's demands. There were alternative approaches such as off the shelf programs. Some of the reasons which made me make the above decision are as follows:

- Bespoke software is optimised to meet the needs of the client
- The client is in control is in control of the software development process
- Implementation of changes is fast which improves efficiency
- Off the shelf software may include many functions that are not necessary for the purposes of the stakeholders and may mean that the stakeholders are paying for features that they will not even use

[1] Bespoke Software. (n.d.). Retrieved January 27, 2020, from https://www.pssuk.com/AdvantagesBespokeSoftware.aspx

Geometric Brownian Motion Illustration[2]

Figure 1: an example of a variable, X (vertical axis) following Geometric Brownian Motion - also known as a *continuous stochastic process* - over time, t (horizontal axis). The statistical parameters μ and σ, calculated using a dataset of previous values for X give rise to different 'paths'.



[2] Maccone, Claudio (2013).

Survey

Figure 2: Form sent out to Economics students

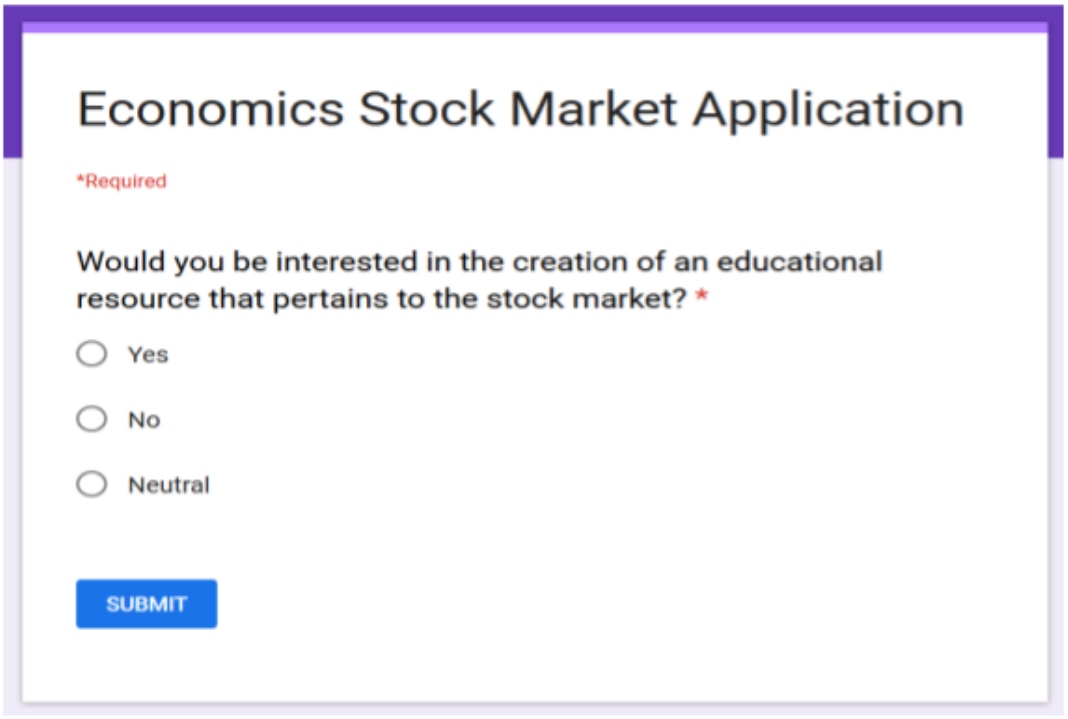
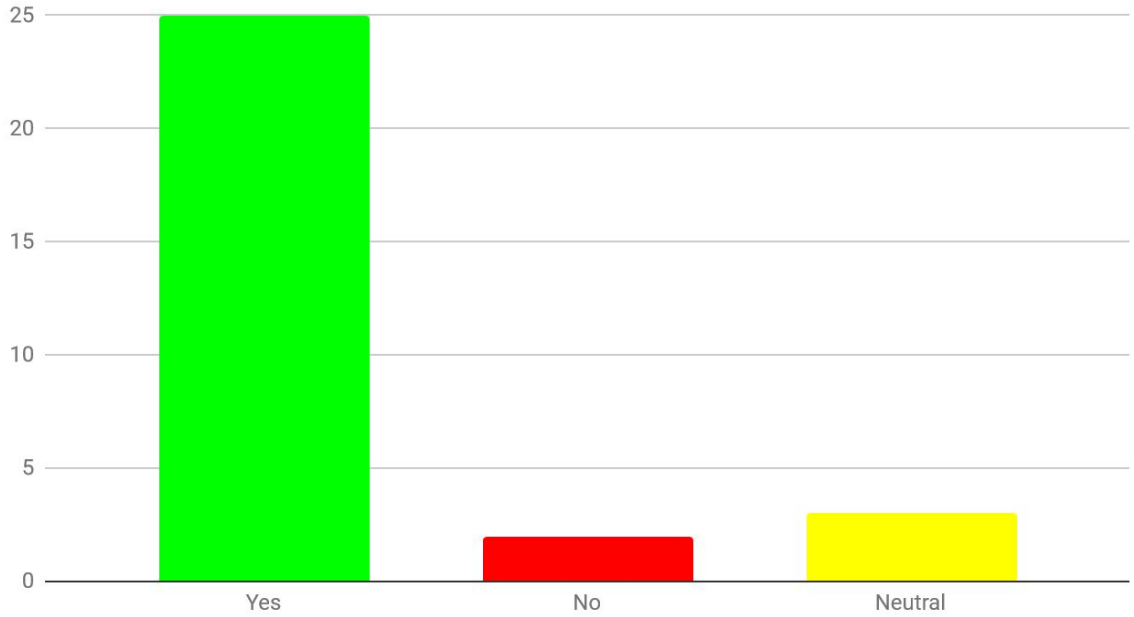


Figure 3: Results of Surevey pertaining to resource



Sample Time Series of Historical Data

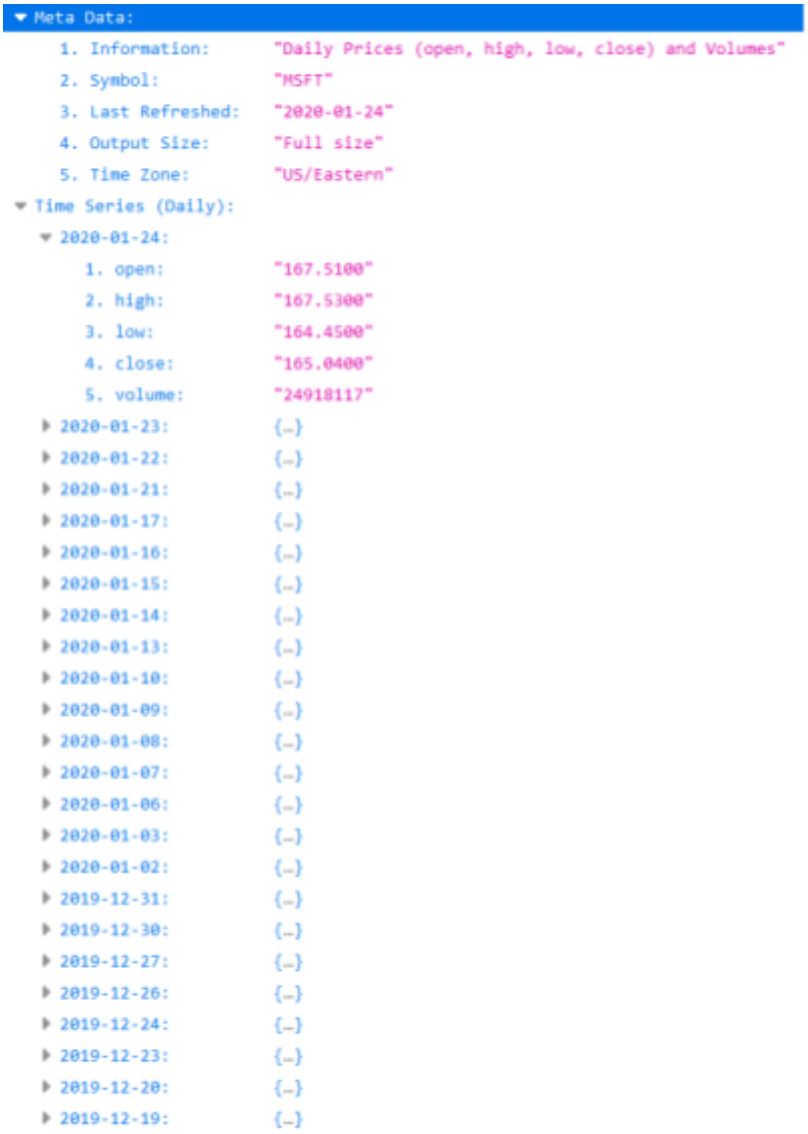
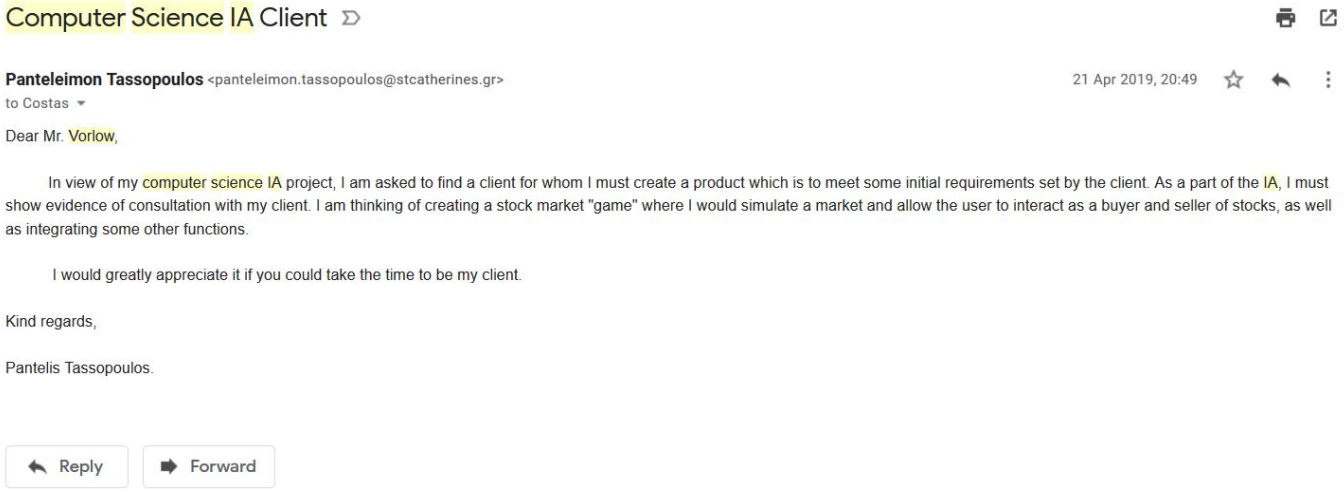


Figure 4: Time series of historical data from Microsoft in JSON file format (JSON file. (n.d.))

Communication with client (Mr. Vorlow)



Computer Science IA Client

Panteleimon Tassopoulos <panteleimon.tassopoulos@stcatherines.gr> 21 Apr 2019, 20:49

to Costas

Dear Mr. Vorlow,

In view of my computer science IA project, I am asked to find a client for whom I must create a product which is to meet some initial requirements set by the client. As a part of the IA, I must show evidence of consultation with my client. I am thinking of creating a stock market "game" where I would simulate a market and allow the user to interact as a buyer and seller of stocks, as well as integrating some other functions.

I would greatly appreciate it if you could take the time to be my client.

Kind regards,

Pantelis Tassopoulos.

Reply Forward

Interview with Mr. (Vorlow) - discussion of proposed solution (27-4-2019)

Myself: Hello again Mr Vorlow, how are you doing?
Mr. (Vorlow): I am doing fine Panteli[3]. How can I help you?
Myself: Well, in light of our brief discussion regarding the stock market resource, I spent some time thinking of a solution to your problem and I wanted to share with you my initial idea.
Mr. (Vorlow): Very interesting! I am all ears. Come, have a seat.
Myself: So, my thought was to create a java application that would enable students to create individual accounts where they would participate in a virtual stock market and trade.
Mr. (Vorlow): Ah, yes, I remember. You told me this last lesson, right?
Myself: Right.
Mr. (Vorlow): Alright, go on.
Myself: Well, I am thinking of splitting the app into two basic parts - one dealing with the users and their virtual environment, and the other being something along the lines of an analysis tool that

[3] Panteli(s): name of student who is doing the IA project.

would make rudimentary predictions on the various variables that are of interest in the stock market, such as the stock prices prices and the value of the user's investment.
Mr. (Vorlow): I see you are quite into it young man. However, you haven't made clear how to model the stock market in your program. I mean the price volatility and the 'random' nature of price fluctuations.
Myself: Well, I have thought of that, and after some deliberation, Sir, I am led to believe that an interesting way of implementing what you said is to use geometric brownian motion. I don't want us to bog down in details, but in essence, it has to do with 'random walks' and probability, as we assume the price to be stochastic. My understanding of this mechanism is not complete, but I hope to gain a stronger grasp of the concepts involved in due course.
Mr. (Vorlow): Ok, another comment would be that you did not mention in detail what a client can do in his or her account. I would like to hear more on that from you. But wait, how well acquainted are you with the processes that go on inside the stock market?
Myself: To be honest, I am not very acquainted with the structure of the stock market and how the trading goes on. But, I am willing to learn and apply my coding and mathematical skills to an unfamiliar context with hopefully yieldsome results.
Mr. (Vorlow): I am glad you are enthusiastic and willing to put some effort. So, people in the stock market have a portfolio which in turn has a value, that is, the value of the investment they have made, or the value of their stock. I see that the one part of your program can be dedicated to the portfolio of the user. It all has to do with demand and supply, not new territory for you. Anyways, my suggestion would be to track the value of the stock that they have bought and manage their account when they buy, sell, or short stocks.
Myself: Shorting stocks?
Mr. (Vorlow): You don't know what shorting is? Ok, briefly, it is "an investment or trading strategy you can say that speculates on the decline in a stock price."[4]
Myself: Ah, thank you sir for the clarification. By the way, I can see a way to do this. I could restrict the stock market to a particular industry, say, the tech industry and use real time data from the web, or sites from sources like Yahoo finance to obtain the desired results. I'll use what is known as an API[5], a collection of tools that will enable me to access this data.
Mr. (Vorlow): Very nice. I think this sounds promising. Continue to work on it and update me on the progress of the solution.
Myself: Yes, of course. Thank you very much.
Mr. (Vorlow): No problem. Have a nice day.

References:

JSON file. (n.d.). Retrieved from https://www.alphavantage.co/query?function=TIME_SERIES_DAILY&symbol=IBM&outputsize=full&apikey=demo

Maccone, Claudio. (2013). SETI, Evolution and Human History Merged into a Mathematical Model. International Journal of Astrobiology. 12. 218-245. 10.1017/S1473550413000086.

[4] Chen, James. "Short Selling Is Risky But Rewarding." *Investopedia*, Investopedia, 10 May 2019, www.investopedia.com/terms/s/shortselling.asp.
[5] API: Application Programming Interface