ON-LINE CLIMATE DATA PLOTTING TOOL IN JAVASCRIPT/HTML5

Project Proposal

Climate change is the single greatest threat to civilisation. World temperatures are rising because of human activity and ever accelerating climate change threatens every aspect of our lives. Climate change is an enormous challenge, compounded by many global issues that we have few solutions too. However, the scientific community can analyse the problem areas and address them with targeted action. We can only create solutions once we fully understand the data.

Woodfordtress.org is an online tool used for plotting climate statistics such as the mean global temperature and C02 levels. The user can choose between multiple datasets and with a series option to add multiple dataset results to the same plot. Processing steps can be applied to the data source such as a linear trend, differencing and basic filtering options.

The website was originally wrote using the C language; however, it has not been updated in several years. Therefore, it is my responsibility to re-implement and hopefully improve the website using a more modern web technology such as JavaScript. The intent behind this project is to create a platform that can be easily extended into the future, where users can add their own data sources applying their own processing steps to analyse and form a conclusion.

Workplan

This project will take 9 months to complete, so I have created a Gantt chart of my project plan to illustrate the stages of the developing a reliable web application. The first stage of this project is planning and will require me to further research the woodfortrees website and similar applications to understand the inner workings of its graph plotting tool. I aim to use the same datasets as those currently used by woodfortrees, in addition to other sources of data that I can use to evaluate my applications functionality and reliability in the later stages of development.

This will lead into the literature review, which will entail obtaining and collecting resources around the subject of climate analysis, as well as guides on creating functional and efficient web applications. This will be a mixture of academic papers and other web sources. I will outline in my literature review the reasons for choosing these resources and how I will apply them to the project. Giving citations and appropriate credit to those authors of each source.

The design phase will be another short phase in this project. This involves me producing lo-fi and hi-fi prototypes for the website to visualise the core elements and how I want the web pages to b

e formatted. I will prioritise the graph plotter page over the others as it will be the interactive forefront of the site. The final webpages may differ but its important for me to create an outline that will function as a basis that I can develop and improve later in code.

Once the planning and design stages are complete, I will aim to work through the coding and testing phases simultaneously. To produce a website of excellent quality requires I conduct regular testing during the coding. By overlapping the two I can incrementally add features and guarantee they work as intended. Testing is an area that I struggle with when programming, but hopefully by implementing it into the code regularly I can improve my ability to create suitable tests and apply them to the application. Testing and debugging will assume a considerable portion of this project, so it is vital that I stay pro-active with my approach and ensure I evaluate the core elements of the website before deploying or adding any additional features.

I aim to use a HTML/JavaScript canvas to create a base, Including the formatting CSS, structure, and navigation. I could potentially create the interactive graph plotting tool using a JavaScript chart library such as Chart.js. Or alternatively apply a python framework and a chart library such as Matplotlib to implement the graphs. I need to further research which route I take and weigh up the pros and cons of each framework and its corresponding tools.

During the early weeks (Week 12) of the coding and testing phase I will produce a report that will detail the progress I have made up to the end of the first semester. At this point in the development, I aim to have at least a working prototype, with minimal functionality that I can add in my report to present my projects progress. In this I will identify which features I have coded and tested, in addition to features which I’ve dropped and those I intend to implement further down the projects pipeline.

It Is crucial that I write a suitable test harness for the website and apply test cases for the application, comparing actual results to the expected results. A test harness will allow me to automate the testing process, generate test reports and enhance the quality of the software components. Implementation testing will also be a part of the testing stage and will require me to ensure any third-party applications function as intended when used within my system. The goal in this is to create a web application that is ready for me to host, deploy and maintain, so that it can be accessed and maintained by myself and other users long into the future. The website I intend to produce will not replace Woodfortrees.org but will run alongside it, and function as a backup if the original site shuts down.

For the last 10 weeks of my project, I will produce a project portfolio that will document the development pipeline and finished application, to introduce the project, related work and provide context for its creation. I am required to document the design methodologies used, including prototypes, UML’s and pseudocode. Explaining any design choices and technologies, commenting on any issues. I will note any mathematical equations and theoretical results I’ve applied. If I choose to include a survey I will need to include that in my portfolio, accompanied by an ethics applications. Furthermore I need to document the outcome of my development, analysis I apply and the results, which will then lead into an evaluation; highlighting any achievements and shortfalls and provide a conclusion to the portfolio. This portfolio should benefit others would want to reuse the application or ever reproduce my project.

The final stage of this project is an inspection of which I will need to use the last few weeks preparing for. This will involve me demonstrating my application for it to be assessed on the quality of its design and testing. I must ensure I am prepared to answer any related questions that the markers may have, commenting on areas which can be developed and improved in the future.

Risks

Although there are few risks to this project, it is important for me to recognise those risks so that I can avoid them throughout the development.

Using inaccurate datasets will affect the users graph results and statistics, therefore it is important that I consider and assess the accuracy of every dataset I include. If not, I risk the quality and integrity of the website, so I must ensure that the sources of data I use are accurate and dependable.

Third party system integration with the website can be straightforward in some instances but can also be particularly challenging. If I were to integrate any third-party software, I would need to ensure that the requirements are fully identified, tested, and prototyped sooner rather than later down the line.

Scope creep is another area considered a risk, as I may add features that were not a part of my original proposal. Features that cannot be implemented within the given timeframe. I should only add additional features once I have met the core requirements of the application. I am only a single developer working on the project, so I need to understand my capabilities and set myself achievable targets, without straying too far from my milestones applying any non-required features.

The Climate plotting tool application with this project may proceed to be a challenging endeavour, however I believe it will be beneficial to my personal and professional development. Providing me with opportunities to parse beyond my current understandings and apply what I have already learnt to produce a substantial piece of useful software that will hopefully exceed my own expectations.