Problem Statement and Goals
Software Engineering

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Table 1: Revision History

Date	Developer(s)	Change
09-19-2024	Jennifer Ye	Inital Rough Work
Date2	Name(s)	Description of changes
...	...	...

1 Problem Statement

[You should check your problem statement with the problem statement checklist. —SS]

[You can change the section headings, as long as you include the required information. —SS]

1.1 Problem

1.2 Inputs and Outputs

[Characterize the problem in terms of "high level" inputs and outputs. Use abstraction so that you can avoid details. —SS]

1.3 Stakeholders

1.4 Environment

This software will be compatible with any browser with a computer that is connected to the internet. This software will also be compatible with Windows 10 and 11. There is no hardware component.

2   Goals

This project has a total of seven goals.

Consolidated Organized Accurate Data with proper labels

The raw data input for this project is a csv file exported from Excel. With hundreds of experiments, where each has ten or more attributes will account for thousands of data points. As the study gets larger, the current data collection format is not sustainable. As such it is a goal to be able to migrate all the existing data to another solution where the solution is not only scalable but also extendable. To migrate all the data also entails that the data is properly labelled as it had been originally.

Querying from Multiple Sets

The experiment has multiple pages of Exec sheets that data is recorded on. Although the data is separated and organised across sheets, to be able to analyse the data queries will need to be made. This project should be able to pull data across sheets quickly and efficiently. Currently, retrieving the data is manual, slow and tedious. This project strives to make data retrieval easy and efficient.

Inter-Parameter Comparability

To further aid the data analysis of the experiment data, the product should be able to compare multiple parameters. This could be a simple binary comparison of two attributes or more, but also narrowing down the search windows. For example, the user could specify the time frame of when the experiments were done. Within that time frame, they might want to compare three different attributes from those experiences. One of the goals for this project is to be able to make the above example possible.

Web Interface

With a web interface, the user can easily interact with the backend processes. This interface should be user friendly and displays all the functions that are needed to input data, and return the appropriate data. The returned data should be given in a readable way.

Flexibility in Expansion (i.e. adding additional parameters)

Although a big portion of this project is to migrate the existing data into a better solution, the product should also be built with the possibility of expansion. As the experiment grows, there could be a new parameter to be recorded. There could also be the possibility for this tool to be used in other experiments that do not follow the same format. The product should still be able to handle those

new changes, among others. It is our goal to be able to create a tool to be used as a general data recording tool.

Visual Plot of Specified Parameters + Results

The product should be able to use the data it retrieves to interpret it in a visual manner. This product must be able to plot the data in the desired format of the user to then be exported. As the data will not be completely useful if it is not readable or understandable to the user.

3   Stretch Goals

Automatically Download Data from Data Collection Device

The current state of the experiment requires a data collection device. This device only holds a certain number of experiment trials. This data must also be manually exported at the end of each day. If the device is powered off or hits the limit of total possible recorded experiments, all the data will be lost. As a stretch goal, the product could be connected to this device and upload the data either when it finishes collecting data per experiment or once it hits a limit. This is a stretch goal as it requires the team to go through how the device actually records the data.

Dynamic Dashboard to Generate Comparison Reports

As an extension of one of the main project goals, the visual plot can be in the form of a dashboard with a small written conclusion of the data requested instead of just the plotted graph. The choice of visual plot can also be given to the user. The dashboard could change to dynamically to newly added information, user interactions and removals without having to regenerate the entire plot from scratch.

Mobile Development and Accessibility

This project is intended to have a website interface. As a stretch goal, the project could be extended to a mobile app for easy access and reachability. The website and mobile app could also incorporate more accessibility features for those with disabilities. This may be but not limited to colour contrasts, screen readers, big fonts and responsiveness to those who have trouble seeing.

Machine Learning Analysis and Projections

One major stretch goal is to incorporate an artificial intelligence machine learning to data analysis. In hopes to make data analysis easier for the user and more adaptable to any possible analysis. By introducing an machine learning algorithm, it would be able to automatically query the data, customise that query,

analyse the data and create a customizable dashboard board as well based on any sort of prompt. The machine learning aspect can also automatically return conclusions based on prompts

4   Challenge Level and Extras

The asigned challange level for this project is general. As this project does not have any direct need for research, the features and abilities needed to be developed may still be more complicated than aniticiapted. As such, there are three extra components the team has chosen to take up for this project.

- Usability Testing

- User documentation

This is not a final list of extras, however currently as a team we decided that these extras will not only benifet us as a team with ensuring the project is continuously moving forward but also ensuring that the stakeholders are kept in the know of how the project is progrssing

Appendix — Reflection

1. What went well while writing this deliverable?

   When writing this deliverable, it was simple in a sense where many of the topics and ideas presented here were talked about before hand with both the team and the supervisors. It was more of a matter of expanding on ideas and topics in further detail to ensure that the problem and goals were aligned with previous conversations. This allowed the writing process to be more time consuming than actually being difficult.

2. What pain points did you experience during this deliverable, and how did you resolve them?

   The biggest pain point during this deliverable was figuring out how to properly explain the problem and goals. Many if not all ideas presented were simply ideas. It was quite difficult to be able to not only explain the goals but to also connect it back to why they are important to have in this project. Displaying the understanding of how pieces fit together and explaining why certain things are in scope was the most challenging part of this deliverable.

3. How did you and your team adjust the scope of your goals to ensure they are suitable for a Capstone project (not overly ambitious but also of appropriate complexity for a senior design project)?

   As a team, this was very much a concern in the beginning. This resulted in our team setting up strong measures of communication. Before even starting on this deliverable we made sure to go through each section with the supervisor. We had discussions throughout the meeting where the team brings a more technical point of view to aid in the supervisor's needs and wants. It was through this process that we did not have to adjust the scope of the groups goals much as we started with the a strong foundation and understanding with all parties involved.