Software Requirements Specification

for

Customizable Analysis and Visualization Tool for COVID Cases

Version 1.0

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Revision History

Name	Date	Reason For Changes	Version

1.   Introduction

1.1   Purpose

The purpose of this document is to present a detailed description of a customizable analysis and visualization tool for COVID cases. It will explain how the software is intended to operate along with its features, functions, and interfaces. This document is intended for both the client and developers of the software.

1.2   Document Conventions

8 pages, 12-pt font, single spaced, 1 inch margins

1.3   Intended Audience and Reading Suggestions

- Typical users who want to use the software to observe COVID statistics.
- Advanced users who want to use the software to observe data and utilize features of adding their own data and creating their own custom dashboard.
- Programmers who are interested in working on developing the project further.

1.4   Product Scope

The Customizable Analysis and Visualization Tool for COVID is an interactive website that shows COVID case data, allows users to perform customizable analyses/visualization of results, and allows users to add additional pieces of data. There are various COVID dashboards out there, but the analyses are pre-determined. We are developing a COVID dashboard where the analyses are not predetermined. In this software, the user will have the ability to customize and get the results they are looking for rather than being stuck with definite results.

1.5   References

Project Website: https://github.com/Senior-Design-CovidDash/CovidDashProjectSite

COVID Dashboard Example:
https://fdoh.maps.arcgis.com/apps/opsdashboard/index.html#/8d0de33f260d444c852a615dc7837c86

IEEE Template for System Requirement Specification Documents: https://goo.gl/nsUFwy

2.   Overall Description

2.1   Product Perspective

This COVID dashboard is designed for those who want a more detailed and customizable view of COVID data. It is built with more features than a typical predetermined COVID statistics website. These features include the ability to perform custom operations on variables, the ability to create and layer custom graphs, and the ability to add additional datasets to the custom dashboard. The product will be displayed as a website where personal dashboards can be created by users to then be made private or public. This will allow for custom dashboards to be made with the data and charts for the users personal choices of COVID data and displays. These datasets and displays can then be saved and shared with others.

2.2   Product Functions

- Display COVID case data and statistics via:
    - Datasets
    - Graphs/charts
    - Interactive maps

- Allow for the user to select specific variables and perform custom operations
    - Ranking
    - Averaging
    - Proportional comparisons

- Allows user to display their chosen data on various types of graphs
    - Graphs can be layered

- Allows user to save custom visualizations to a unique workspace

- Allows user to view multiple datasets at a time and delete previous datasets

- Allows users to submit an application to make their private datasets public

- Allow for the user to import their own datasets

2.3   User Classes and Characteristics

- Typical users who want to use the software to observe COVID statistics.

- Advanced users who want to use the software to observe data and utilize features of adding their own data and creating their own custom dashboard.
- Programmers who are interested in working on developing the project further

2.4   Operating Environment

- Web application (hosted in the cloud via Heroku) with responsive design to allow access on any size display.

2.5   Design and Implementation Constraints

- Time limit: 8 months
- Some applications/softwares that could be useful to us are not free or require certain licenses

2.6   User Documentation

- Knowledge Center
    - Help page on the website that includes searchable articles on how to perform certain functions the user may be struggling with
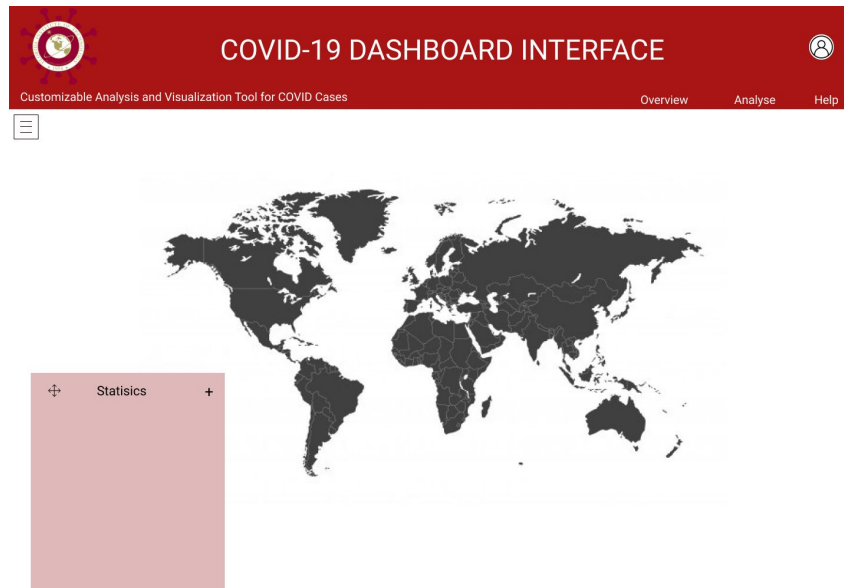
2.7   Assumptions and Dependencies

We are depending on the following software:
- Django
- QGIS
- PostgreSQL/SQLite
- Char.js
- Leaflet.js
- GeoJSON
- GitHub
- Various Google Products

3.   External Interface Requirements

3.1   User Interfaces

There is a top-bar and a menu. The little box on the top left is for a sidenav in case we need that for navigation on the website. The statistics box is to show stats. The plus sign is there in case the user wants to add another box for comparisons or other analyses. The four arrows are there in case the users would like to move the box around. The interactive map is displayed for users to navigate through locations to get statistics.

3.2   Hardware Interfaces

This web application will be able to work on computers/laptops and mobile devices. No other hardware is required.

3.3   Software Interfaces

This web application will be hosted in a cloud via Heroku with responsive design to allow access on any size display.

3.4   Communications Interfaces

Internet connection.

4.   System Features

4.1   Customizable Operations on Variables

4.1.1   Description and Priority

Users can select specific variables and perform custom operations on the selected variables. This allows users to compare filtered data across a multitude of different categories

Variables Include:
- Cases
- Location (city, zip code,county, state, country)
- Time (day, week, month, year)
- Age
- Ethnicity
- Schools
- Deaths
- Hospitalizations

Operations include:
- Aggregation:
  - Mean
  - Median
  - Mode
  - Range
  - Max
  - Min
  - Count
  - Variance
  - Standard Deviation
  - Sum
  - Frequency
  - Average
  - Rank
  - Correlation and Dependence
  - Growth
  - Slope
  - LINEST - describe linear trend
  - Percentile
  - Distribution (Exponential, Normal, Poisson, etc)
- Relative:
  - Ratios (X per Y)

○　Percentages
　　● Dataset Transformations:
　　　　○　Linear Scaling
　　　　○　Logarithmic Scaling
　　　　○　Ratio Scaling(X per Y)

This feature has the highest priority.

4.1.2　Stimulus/Response Sequences

Stimulus:

Users will be able to select multiple variables for one operation. (1-3 variables per one operation).

Response:

The system will gather the selected variables and provide a visualization for the user based on the selection. The selection {location: Florida, age: under 50} will create a COVID-19 analysis on people under 50 y/o in Florida based on the operation selected.

4.1.3　Functional Requirements

REQ-1: Dashboard presents a variety of variables and allows users to select the variables of their choice

REQ-2: System can perform custom operations with selected variables

4.2　Customizable Plotting of Results

4.2.1　Description and Priority

Users can display their results from variable operations using various charts, graphs, and plots. This provides the ability to see any trends from the selected data and does not limit users to using predetermined statistics and plots.

This feature has a high priority.

4.2.2　Stimulus/Response Sequences

Stimulus:

User chooses variable operation and charts/plots from the following:

- Bar graph
- Pie chart
- Line plot
- Scatter plot
- Histogram

Response:

Dashboard displays the selected chart with given data.

4.2.3 Functional Requirements

REQ-1: Dashboard displays custom charts/visualizations based on user selections.

4.3 Save Customizable Plots to Custom Workspace

4.3.1 Description and Priority

Users can save custom visualizations to their own unique workspace. These charts/graphs/plots will give the user the ability to easily access the custom analysis at any time and see the analysis with data updated daily. Variables, plot types, datasets, and operations all need to be saved to the users dashboard. Saving information must be formatted to read back the info.

This feature has high-middle priority.

4.3.2 Stimulus/Response Sequences

Stimulus:

User selects to save their customized dashboard.

Response:

Variables, plots, datasets, and operations are saved to a unique workplace.

4.3.3 Functional Requirements

REQ-1: Save all customizations of the dashboard (plots, variables, operations) to a unique workspace when user hits save.

4.4 Import Additional Datasets chosen by User

4.4.1 Description and Priority

Users can add additional types of datasets (airline travel data, school data, etc). Each user will be associated with a set of data, where their uploaded data is private to them and only them. For example, this feature could allow users to analyze the infection rates in areas with face-to-face classes versus areas with online education. Variables in the imported data must relate to the variables listed in 4.1 in order to save and operate on them. Variables must also be unique to avoid having the same name as in another dataset (i.e.: Fl 'cases vs govt 'cases').

This feature has middle priority.

4.4.2 Stimulus/Response Sequences

Stimulus:

User inputs data of choice

Response:

Data is imported and displayed on the dashboard

4.4.3 Functional Requirements

REQ-1: System must be able to accept input from datasets (json, csv, xls)
REQ-2: Imported data must relate to the variables listed in 4.1
REQ-3: Variable names from imported datasets must have unique names.
REQ-4: Dashboard must display the imported data.

4.5 Layer Datasets/Operations in a Single Plot

4.5.1 Description and Priority

Users can make use of the custom visualizations and layer plots on the visual. Overlaying related data and plots makes statistical comparisons much more efficient and puts all the data in one location for users.

This feature has middle priority

4.5.2 Stimulus/Response Sequences

Stimulus:

User selects multiple types of data they want to visualize together.

Response:

Plots are layered and display all the data in one location/chart.

4.5.3 Functional Requirements

REQ-1: Allow user to layer multiple plots on top of each other to form one single plot with the combined data.

4.6 Automatic Updating of Datasets

4.6.1 Description and Priority

Current datasets in use will be automatically updated. For an existing dataset, automatic pulling of the most recent data will occur daily.

This feature has middle priority.

4.6.2 Stimulus/Response Sequences

Stimulus: Dataset is in use on dashboard

Response: Data automatically is updated

4.6.3 Functional Requirements

REQ-1: Data is automatically updated daily

4.7 Shared, Curated, and Private Datasets

4.7.1 Description and Priority

There will be 3 data types: shared, curated, and private. Private data is seen only by the specific user. Shared data is data made public but not checked by the admin. Finally, curated data is public data checked by the admin. If users want to submit an application to make their shared data curated, they can. An application will require a sample of the data, source, API URL (if applicable), description, and contact information for further questions.

This feature has the lowest priority.

4.7.2   **Stimulus/Response Sequences**

Stimulus:

User chooses their data to be private, shared, or curated.

Response:

User's data becomes private, shared, or curated.

4.7.3   **Functional Requirements**

REQ-1: Make data private by default
REQ-2: Allow shared data to be seen by the public (not approved by admin)
REQ-3: Allow datasets to be sent to admin to be approved as curated data
REQ-4: Allow for curated data to be seen by the public

5.   Other Requirements

5.1   Features for Admin User

➢ Checks data in the curation process to determine if it should be made public
➢ Add/edit/delete datasets
➢ User management
➢ Manage allowable operations and plot types

6.   Nonfunctional Requirements

6.1   Security Requirements

Datasets must be private and secure to users who choose to keep their data private. Data that is made public by the administrator (curated data) will have been reviewed and secured to make it safe and reliable for users.