Software Design Document

**Victoria State Accident Data Analysis**

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**S5182075 – Atticus Burgess - Requirements (10 marks), I CAN HELP WITH ANYTHING JUST ASK :)**

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# System Vision

## Problem Background

Road accidents have been a persistent issue in Victoria, Australia, with numerous fatalities and injuries reported over the years. The State of Victoria has accumulated data from 2015 to 2020, detailing various aspects of these accidents. However, the raw data, while extensive, doesn't provide immediate insights or patterns that can be used for preventive measures or policymaking. There's a need for a tool that can analyse, visualise, and provide insights from this data to various stakeholders, including accident commissions, insurance companies, and the public.

## System Overview

The proposed system will be a data analysis and visualization tool tailored for the road crash statistics dataset of Victoria. This tool will offer a user-friendly graphical interface, allowing users to filter and understand specific aspects of the data, such as crash types, locations, conditions, and more. The software will not only address the predefined analysis tasks but will also introduce an additional unique insight feature, derived from the dataset, to provide a comprehensive understanding of the road safety situation in Victoria. 

## Potential Benefits

**Informed Decision Making:** Policymakers can use the insights from the tool to make informed decisions regarding road safety measures, infrastructure development, and public awareness campaigns.

**Insurance Insights:** Insurance companies can gain a better understanding of high-risk areas, types of accidents, and other relevant data points to adjust their policies and premiums accordingly.

**Public Awareness:** The general public can access and understand the data, leading to increased awareness about high-risk areas, times, and other factors. This can potentially lead to safer driving habits.

**Resource Allocation:** By identifying high-risk areas and times, resources such as ambulances, police, and emergency services can be allocated more efficiently.

**Continuous Improvement:** As the tool will be continuously updated with new data, it will evolve and provide more accurate and timely insights, leading to a dynamic approach to road safety in Victoria.

# Requirements

## User Requirements

In this section you detail how a user is supposed to interact with or use your program. What do they ***need*** to be able to do? This should all be from the end users perspective. Can be a combination of narrative text and listing of needs.

**Assignment note: You have not been given a client/user, so you can make one up. Who do you think would be using your software?**

## Software Requirements

In this section you detail what the requirements for the software are. What functionality will it provide? This is usually a formal listing, with requirements often using the word ‘Shall’. IE:

R1.1 The program shall accept multiple file names as arguments from the command line.

R1.2 Each file name can be a simple file name or include the full path of the file with one or more levels.

etc …

Can be primarily functional requirements, though you may include other types if you think of them.

## Use Cases & Use Case Diagrams

In this section you provide some use cases showing how people may use your software.

# 3.0 Software Design and System Components

# 3.1 Software Design

A diagram of a computer process

Description automatically generated

The application functions as a basic database-style utility. It commences by presenting the initial dataset and has the capability to extend further. It can incorporate filters and search phrases, or even specifications for graphical representation, subsequently modifying how the data is exhibited. The filter options can subsequently be reset, or the swift display of data can be activated and deactivated at will. The transitions between these various states are fluid, enabling seamless movement between them as required.

# 3.2 System Components

# 3.2.1 Functions

Here is an initial compilation of software functions. Each function's details encompass a concise overview, a roster of input parameters, a listing of resultant influences, and an elucidation of the function's output.

The subsequent functions are covered:

Load Data:

• The load Data function is triggered during program initiation, orchestrating the integration of the primary data array into the program, and priming it for presentation.

• This function necessitates no user inputs and triggers automatically upon program launch.

• It furnishes the data sourced from the database as its output.

Display Data:

• The Display Data function is executed whenever data is loaded or filters undergo modifications, facilitating the exhibition of presently chosen datasets.

• This function operates automatically without the need for user inputs.

• It showcases the presently filtered data on the program's screen.

Filter Data:

• The Filter Data function is responsible for modifying the displayed data to harmonize with an array of chosen filters provided by the user, permitting data filtration based on factors like date or location.

• It necessitates keywords in the form of strings, which effectuate the transformation of variables to activate pre-established filters.

• Filters that undergo modifications will amend the data returned for display through the manipulation of variables.

• This function yields a Boolean value of 'true' if the filter is currently active.

Search Data:

• The Search Data function is invoked when a user initiates a data search using particular keywords. It will systematically scan through the dataset and identify instances of the specified keywords.

• The function relies on keywords, expressed as strings, which guide its search parameters. • The function creates duplicates of dataset objects that encompass the identified keywords and assembles them into a fresh array for subsequent presentation.

• Its outcome is a novel array of datasets earmarked for display.

Graph Data:

• The Graph Data function undertakes the conversion of chosen data into graphical representations designed to furnish elucidation of the dataset.

• The preferred graph format is fed into the function as a sequence of keywords.

• The function reconfigures the way the data is exhibited to the user.

• Its yield consists of methodically structured and graphically depicted data derived from the main data array, contingent on user-provided input.

Clear Filters:

• The Clear Filters function is designed to eradicate all currently active filters.

• It requires input in the shape of a command, which is a string.

• The function's operation entails the complete elimination of all filters influencing the data, thereby restoring the data to its unaltered presentation sourced from the primary data array. • Upon execution of the specified command, the function yields a Boolean value of 'true'.

HitAndRunToggle:

• The HitAndRunToggle function operates by activating or deactivating the incorporation of data associated with hit-and-run incidents.

• It accepts a Boolean input that determines whether the hit-and-run filter is in an activated or deactivated state.

• This function induces modifications in the displayed data. When the filter is off, all data, irrespective of hit-and-run status, is showcased. Conversely, when the filter is toggled on, data linked to hit-and-run accidents is concealed.

• The outcome of activating the toggle returns a Boolean value of 'true'.

3.2.2 Data Structures / Data Sources

Data:

• The Data component consists of an array.

• This array serves as the primary compilation of all accident-related data. It holds the status of being the master array from which the displayed data is extracted after undergoing filtration.

• Data members within the array encompass all datasets pertaining to accidents.

• The search, filter, graph, and hit-and-run toggle functions collectively draw data from this array for the purpose of relaying it to the display data array.

Dataset:

• The Dataset is conceptualized as an object.

• It embodies distinct sets of accident-related data, each existing within the overarching data array. These individual datasets are duplicated into the display array in alignment with the preferences articulated by the user.

• The Dataset object is characterized by its constituents, representing the attributes and properties associated with accidents.

• While no dedicated functions explicitly leverage this dataset, it serves as the quintessential data encapsulated within both the display and overall data arrays. Its role is to document the particulars of accidents.

Display Data:

• Display Data is conceived as an array.

• It houses the existing data that is being showcased within the program.

• Membership in this array is reserved for datasets that have successfully navigated through the processes of search and filtration.

• While no specific functions are tailored to this array, its essence lies in featuring the data post the application of various filters and functions. It represents the ultimate data display after all other transformations have taken place.

Filters:

• Filters are conceptualized as an array.

• They exert influence over the data display process by dictating which filters are to be applied to the data.

• The constituents of this array comprise the filter variables that function as determinants for the presence or absence of diverse filters upon the data.

• The filter function relies on the data contained within this array to execute its tasks.

### Detailed Design

Pseudocode for all non-standard / non-trivial algorithms that operate on data structures

# User Interface Design

This is your initial interface design. Describe the tools you used for this design stage and any key findings that informed your design. This introduction is descriptive and should explain what you have completed for the actual design work you will present in the sub-sections below.

## Structural Design

Structural design refers to the navigational and information structure of your product – the structure that supports the interface layout. How will you structure your product? How will you group your information? How will you navigate through your product? Why? This can take the form of a diagram showing structure and hierarchy, supported by a discussion and justification of your choices. Why have you made these design choices? Describe and outline the structure of your interface and of your information.

## Visual Design

Detail your visual design: Layout, visual elements, icons, graphics, style, colour, fonts general screen designs. This can be sketches, wireframes, mockups etc, supported by a discussion, explanation, and justification of your choices.