Project Plan:

UI implementation for Victoria state accident dataset

Manish Saily s5236772

Edward Winston s5133176

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# Project Overview

## Background

In this project we are tasked with designing a graphical user interface which will visualise the Victorian state accident dataset. The data set contains the road crash statistics from 2015 to 2020. This data allows users to analyse the injury and fatal car crashes in Victoria within the five years. The data set can be analysed by date, time, location, conditions, and crash types. The current dataset is very large and hard to analyse by itself. Through the implementation of the GUI, we aim to achieve ease of analysis for the user and provide easy access for the user chosen time periods for better and easier analysis of the dataset. Currently there are over 70,000 unique values which are hard to analysis in their base excel format. With the implementation of the UI, we aim to provide an easy access for the users selected period of time for a better visualisation of the dataset. This time frame will be within 2015 and 2020. Providing readable graphs and trends for the dataset will also be a functionality of the GUI which will allow users to better understand the accident conditions and analysis of the accidents.

## Scope

The aim of this project is to visualise data set with relevant information which can be chosen by the user. This visualisation data set tool will be a software that will be used by governments and insurance companies for Accident data analysis.

## Requirements

The requirement of this project is to develop a simple data visualisation and analysis tool for the Victoria state accident data set. When designing the user interface there are five required features that need to be functional in the UI:

* The user must be able to select a period of time and display all accidents in that period.
* The user selected period must also produce a chart that will display the number of accidents (on average) in each hour of the day.
* Retrieve accidents by keywords (collisions, etc) for the selected period of time.
* Allow users to analyse the impact of alcohol in accidents.
* Having a search for total crashed for each speed zone within a period of time.

## Implementation tools

The UI will be implemented using python for backend and streamlit for the graphical user interface. This project plan will be providing all the required processes of planning the UI. Using the work breakdown structure, we aim to provide a realistic schedule of the activities required for the designing of the UI. The WBS will project the work into smaller and manageable components for the schedule. The report aims to provide an overview of the project to better understand the processes used in the design development of the UI.

## Deliverables

Upon completion of this project the deliverables will include a graphical user interface that meets the requirements outlined above. The estimated project time will be 51 days. This time is taking into considerations the planning, designing, and creation (frontend, backend) of the UI. The final software product will allow users to visualise the data set with only relevant information chosen by the user. A user guide document will also be provided with the software.

## Document contents

This document will contain the background and scope of the project, the work breakdown structure, the activity, activity definition, and Gantt chart for the WBS. The work breakdown structure is the breakdown of the project into smaller components. This is done to better visualise the scope of the project and all the activities to better understand the required deliverables for completion of the project. The activity definition will focus on scheduling all the events and activities for the project completion. With this, a time estimation will also be provided for the project completion. The Gantt chart will also provide a better visualisation of the activity definition and providing a more readable timeline of the project completion and managing time during the project.

# Work Breakdown Structure

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| **Level 0: Project creation and vision** |
| Creating a graphical user interface to visualise the data set for Victoria State accidents |

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| **Level 1: Planning the Project** |
| **Meeting Clients**   * + Defining client time requirements   + Defining clients UI requirements |
| **Defining Team roles:**   * + Providing team members with roles |
| **Team Requirements:**   * + Teams require computers.   + GitHub account   + A git repository for all team member to access.   + Team communication (outlook, teams) |
| **Defining the project:**   * + Provide a project background. (Developing a data visualisation tool)   + Provide a Scope for the project. Requirements, implementation tools, and deliverables. |
| **Scheduling the work and time:**   * + Creating work breakdown structure     - Outlining the requirement of the project   + Creating activity definitions and time estimation   + Creating Gantt timeline for project completion     - Using the excel sheet provided display all activities and time estimations. |

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| **Level 2: Defining design requirements for the project** |
| **Defining graphical UI design requirements:**   * + Create a drop down for time periods.     - User must be able to choose a time for the data.   + Display the numbers of accident.     - Create a table to display the accidents for a chosen time.   + Display the accidents through keywords.     - Create a visualisation (table or graph) which displays the accidents through key words such as (pedestrians, collision).   + Display a data visualisation of alcohol. (update)     - Create a table with a percentage of accident types affected by alcohol.     - This was the initial plan for alcohol impacts but was changed for a table and a pie chart. This was because it better illustrated the data for the researchers. |
| **Dropdown table requirements:**   * + Create buttons for years.     - More options once the year buttons are created.       * Accidents per speed zone       * Accidents per hour       * Search by keywords       * Alcohol impacts       * Show data for year(update) |
| **Defining software design requirements:**   * + Using python and importing pandas for file readability software:     - must be able to read a .csv file.     - must be able to accept user input.     - Sort by user input year function.     - Allow user input for accident type.     - must display relevant information for user selected times.   + Using streamlit for the software UI:     - Must display all relevant buttons.     - Display relevant search types.     - Display relevant graphs for user selected options such as alcohol or accident types.     - Display/create a table for relevant data. |

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| **Level 3: Code creation and GUI creation** |
| **Creating the Code:**   * + Create .py file for data reading in python program (pyCharm).     - Import pandas and import streamlit     - User upload CSV files(update)     - User input     - Sort by user input year function.     - Allow user input and function to display accident type.     - Create required software requirements. Form the design requirements.   + Using streamlit:     - Create UI pages for each menu.     - Create buttons form the UI requirements.     - Display charts from the UI requirements     - Display relevant and updated charts from user selection and inputs. |
| **Program testing:**   * + Code testing once each function is complete.     - Testing function for user error     - Testing functions for code error     - Creating software testing report |
| **Program Support:**   * + Provide an instruction guide (.doc) file for the user detailing all functionality and usability.     - What all the buttons do in the UI     - How to navigate through the UI |

# Activity Definition & Estimation

1. **Level 1 Planning the project (Time estimation 9 days):**

* The planning of the project is the starting stage of the project in which the project manager will meet with the stake holders, define all the project requirements, and define team roles. The project planning also consists of outlining the problem background and creating all the required steps towards completing the project.
  1. **Meeting Clients** (**Time estimation 2 day**):
  + Meeting the stake holders of the project and determining what the project requirements are and what the stakeholders are expecting out of the project.
    1. **Defining time requirements**:
  + Ensure that the project team members and the stakeholders are both aware of the time required to complete the project and the time expected by the stakeholder.
    1. **Defining UI requirements**:
  + In the meeting with the stakeholders ensure that the project requirements are outlined by the stakeholders.
  1. **Defining team roles** (**Time estimation 1 day**):
  + Defining the team roles means that each team members of the group has a dedicated role, and everyone understands what their contribution is to the project. Team roles can include project manager, programmer, tester, planner etc.
  1. **Team requirements** (**Time estimation 1 day**):
  + The team requirements are all the hardware and software the project team will need to create the project and communicate with each other. Setting up all required accounts and hardware such as computer should take one day.
  1. **Defining the project** (**Time estimation 2 days**):
  + Defining the project is the creation of a document that will list all the activity required and done towards the completion of the project. Defining the project is an important part of the early stages as it will outline the project in a document to be revised by the team.
    1. **Provide a project background**:
  + The project background is a detailed outline of what the problem is the project team is trying to solve.
    1. **Provide a scope for the project**:
  + The scope of the project will outline all the requirements of the project and all the deliverables and tools that are required such as the software or any documentations.
  1. **Scheduling the work** (**Time estimation 3 days**):
  + Scheduling the work is the creation of a work breakdown structure, activity definition & time estimation, and a Gantt chart with all activities for the project.
    1. **Creating the work breakdown structure**:
  + The WBS is the hierarchical decomposition of all the work and activates required in the completion of the project.
    1. **Creating activity definition and time estimation**:
  + The activity definition is a detailed description of all the work outlines in the WBS with a time estimation of the completing each task.
    1. **Creating Gantt chart for the project**:
  + Creating the WBS in Gantt chart will provide a visualisation of all the task and the timeline of the project. This will be done with the given excel sheet.

1. **Level 2 Defining design requirements of the project (Time estimation 16 days)**:
   * The design requirements of the project are about creating the initial plan for how the project will end. The design requirements have all the relevant software and hardware implementation of the project that will need to be created and planned.
   1. **Defining graphical user interface design requirements (Time estimation 6 days)**:
   * Defining the design requirements of the GUI is the main part of the project. The designing of the GUI will have to have the required features that the stakeholders want. The project team will need to come together and create a software design document which will outline all the design features of the project and the code implementation of the front end and backend.
     1. **Creating the drop down for the time periods**:
   * One of the design features of the GUI is having a dropdown table which will display all the selectable years for the user. These will be buttons when the drop down is opened which will be label as the year the buttons represent. When the users select one of the years buttons the UI will display all the accidents from the chosen year.
     1. **Display the number of accidents**:
   * Once the year has been chosen another feature of the graphical user interface is to display all the number accidents that have happened every hour on average.
     1. **Display the accidents through key words**:
   * The UI must have the ability to display accidents using key words. In the dataset provided all the accidents have a cell which displays accident types. The accident types can be keywords such as collision or pedestrian. Once the user has selected the year of data to display the UI must also have the option to display accidents with user chosen keywords. This means that the accidents that do not have the keywords involved will not be displayed and only the accidents with the keyword will be shown.
     1. **Display a data visualisation of alcohol(update), (no effect on time period)**:
   * The UI will also allow for a data visualisation of the effects of alcohol. This will be in the form of a pie chart as well as a table.

**2.15 show data for year (update), (no effect on time period):**

* The ui will also display data of all the accidents that occurred within the user selected time period. This will be a button and will generate a table.
  1. **Dropdown Table requirements** (**Time estimation 2 days**):
  + the dropdown table is one of the main design features of the UI. When users interact with the drop-down table, they will be given all the options that is available withing the UI. This activity is to outline all the features and functionality of the UI design.
    1. **Creating buttons for the time periods**:
  + There will be a total of five buttons that will have each year available from 2015 to 2020. When the year buttons are chosen the UI will display all the accidents that occurs within the chosen year.
    1. **Accidents per speed zone**:
  + This button is to display the most accidents caused depending on the speed zone. We would calculate the average accident per speed zone and display it on a bar chart.
    1. **Accidents per hour**:
  + For the selected period of time the UI will display a chart which will show the number of accidents in each hour of the day on average.
    1. **Search by keyword**:
  + Once the user has selected the year and the data is displayed, they will have the option to further filter the accidents shown by the keywords. This will be available through a search bar in the UI where users will be able to input data.
    1. **Alcohol impacts**:
  + Display the impacts of alcohol in accidents. This could be types of accidents that involve alcohol. Alcohol impacts will have a separate button which once selected will display the relevant information.

2.2.6 **show data for year(update), (no effect on time period):**

* Once the user has selected a period of time; display data of all the accidents that occurred within the user selected time period. This will be a button and will generate a table of data.
  1. **Defining software design requirements** (**Time estimation 8 days**):
  + The software design requirements are the coding/programming components of the project. The software design requirements will outline all the programming functionality of the project. This will include what programming language is used, what functionality the code requires for the UI creation and how the program will read the dataset.
    1. **Python**:
  + The code and programming will be done using python. The software will be using pandas in python to be able to read the dataset which is in a .csv format. One of the. Main functions of the code will be to read the .csv file and output the correct data from the selected year. Pandas allows the .csv file to be readable and is designed for data set such as the ones we will be dealing with. User input is also a required function of the software. The user must be able to input a keyword string and get the relevant dataset through the keywords.
    1. **Streamlit**:
  + Streamlit will be used to create the graphical user interface. This software is easy to integrate with python and its commands. Creating all the relevant buttons and display options will be made in this software.

1. **Level 3 Code creation and GUI creation (Time estimation 26 days)**:
   * The code and GUI creation is the final step of the project. This step contains the actual developing and creation of the software.
   1. **Creating the python code and Streamlit UI** (**Time estimation 20 days**):
   * Creating the code for the software requires implementation of the design requirements and software design documentation. The main backend software that will be used to create the backend of the software is python through PyCharm. The code needs to be able to read the .csv file that has all the relevant Victoria state accident data. The code must also allow the user to upload the csv file. Using pandas, the code must be able to sort through the dataset and display the relevant accident information based on the user selected time period 2015 to 2020. User input is also required which will display the dataset in order of the keyword typed by the user. This means that if the user types the key word collision, then all accidents within the chosen period that have the accident type collision are to be displayed. The code must have a function that is able to do the calculation for the number of accidents per hour on average for the chosen time of year (see software design documentation for more information). The main functions that will be needed in the code for the development of the software are user inputs, data filter, loops and sum functions for chart data and functions that will import data into streamlit (see software design documents for more detail).
   * Using streamlit the UI will be created. Streamlit provides an easy integration of python and the software to create a readable and easy access user interface. The UI will contain a dropdown which will have buttons that each represent a year between 2015 and 2020. Once one of the buttons is selected the UI will display all the accidents for the chosen year. The data structure of the data is in the software design document. A UI page needs to be created for each selectable button and search option. The UI page should also have buttons that will display the required charts for number of accidents per hour on average of the chosen year, alcohol impacts, and total crashed per speed zone. The user interface must also be visually appealing. Having contrasting background and fonts for better readability and button position and chart positioning will also need to be considered (more detail in the software design document).
   1. **Software testing (Time Estimation 4 days):**
   * With the completion of each software function in the front and backend the team will conduct a software test. This is to ensure that any user or code error are spotted and fixed before delivering the end software.
   1. **Program support (Time estimation 2 days)**:
   * Once the front and backend of the software UI are complete a user document will be created. This document will outline the UI features and how they are used by the user.

**Updates and Justification**

There have been some changes from the original project plan. These being a different visualisation of the data for the impacts of alcohol, user uploading the csv file and the new button show data for year. None of these three changes have had or will have an effect on the timeline as these were quite minor in terms of workload. For the user upload it required four lines of code to enable thus not effecting the greater timeline. For the changes to alcohol impacts it was identified early into development and because of that no time was wasted. The new data visualization required close if not the same amount of time to develop as the originally planned visualisation thus not effecting the greater timeline. For the creation of the new button, it will not effect the greater timeline because its creation is similar to the creation of the button accident types. Because of this the code could be transferred over and with little editing was able to function as intended. Therefore the schedule will not be effected.

# Gantt Chart

