

**Applied Computing 1&2**

Unit 1 AOS 1 - Data Analysis

Outcome 1

### Project

This project requires you to interpret teacher-provided solution requirements and designs; collect and manipulate data using Microsoft Excel and Microsoft Access; analyse patterns and relationships; and develop data visualisations using Microsoft Power BI and other visualisation software tools to present your findings.

### Assessment

This project will be assessed in accordance with the rubric provided in this document.

You will have approximately 10 periods (500 mins) of class time allocated to working on this task. You may also work on it outside of class for homework.

### Checklist

Use the checklist below to monitor your progress throughout this project.

|  |  |  |
| --- | --- | --- |
| Task | Completed (✓) | Date completed |
| 1. Identify the functional and non-functional requirements | y |  |
| 1. Identify the constraints and scope | y |  |
| 1. Identify the data required to meet the requirements | y |  |
| 1. Identify primary/secondary sources of data | y |  |
| 1. Identify any legal/ethical considerations | y |  |
| 1. Choose methods of collecting and protecting data | y |  |
| 1. Create data collection resources | y |  |
| 1. Collect and reference data | y |  |
| 1. Validate data using spreadsheet | y |  |
| 1. Manipulate data using spreadsheet and database software | y |  |
| 1. Analyse data to identify patterns and trends | y |  |
| 1. Choose a design option | y |  |
| 1. Choose appropriate visualisations for each finding | y |  |
| 1. Create visualisations using visualisation software | y |  |
| 1. Create poster/dashboard to present findings | y |  |

# Solution requirements

## Scenario

You work for Datacore, a large data analytics company with offices in Melbourne and Sydney. The company specialises in conducting research and analysing datasets to identify patterns/trends and help their clients to answer key questions or solve problems. The company has a large number of clients from various industries and last year reported revenue of $50 million.

Following the devastating bushfires in the summer of 2019/20, the Federal Government contracted Datacore to provide them with insights into the public’s view on the state of climate change. The government will use the findings to develop a policy around climate change and the effects it has on the community.

Your manager has assigned you to exclusively work on this project. The agreement with the federal government requires you to collect primary and secondary data; manipulate and analyse the data to identify patterns/trends; and provide them with insights on the following:

* Community attitudes
  + Whether climate change is real
  + What is the biggest cause of climate change?
  + The level of concern about climate change and what those concerns might be
  + The biggest impact of climate change
  + What Australia should do to reduce climate change
  + What personal contributions individuals can make?
* Climate change evidence
  + Environmental trends (e.g. temperature, rainfall, sea levels, ice sheets, snow fall, natural disasters, ocean acidity, etc)
  + Global greenhouse gas emissions or atmospheric carbon dioxide trends

The findings must be presented through a set of visualisations that are easy to use and can be easily updated/maintained each year as the data changes.

### Design

The Department of Agriculture, Water and the Environment has provided two design options for presenting the visualisations. The wireframes specify the type of solution and a rough layout of the key elements. You are not required to use the exact visualisations depicted.

They have agreed to let you decide which option would be more effective.

#### Poster

Heading centred on the page and surrounded by visualisations.

The State of Climate Change

93%

VS

45%

25%

10%

#### Webpage/animated dashboard

Heading aligned top left with visualisations grouped by community attitudes and climate change evidence.

The State of Climate Change

93%

VS

45%

25%

10%

Community attitudes

Evidence

# Analysing the problem

1. Identify the functional and non-functional requirements

|  |
| --- |
| Functional:   * Needs to identify patterns and trends about the public opinion and climate change * Must be a poster with data visualisations * It must have community attitudes towards climate change and evidence of climate change   Non-Functional:   * Needs to be visually pleasing and easy to read and understand |

1. Identify the constraints and scope

|  |
| --- |
| The visualisation must be submitted by 15/3/2020  The visualisation only has to answer these questions:   * Community attitudes * Climate change evidence   The visualisations must be in the form of a poster or a website  Excel, Access and Power BI are the tools available  The focus will be on the city of Melbourne specifically the MELBOURNE (OLYMPIC PARK) station as it is closest to the centre of the city. |

1. Identify the data required to meet the requirements

|  |
| --- |
| The community opinions on:   * + Whether climate change is real   + What is the biggest cause of climate change?   + The level of concern about climate change and what those concerns might be   + The biggest impact of climate change   + What Australia should do to reduce climate change   + What personal contributions individuals can make?   Data and information supporting climate change, including:   * temperature, rainfall, sea levels, ice sheets, snow fall, natural disasters, ocean acidity changes * CO2 Emissions |

1. Identify primary/secondary sources of data

|  |  |
| --- | --- |
| Primary sources | Secondary sources |
| The people that are taking the survey | BOM |
| BOM | The World Bank |
|  |  |

1. Identify any legal/ethical considerations

|  |
| --- |
| * Disclosure of survey data * Obtaining consent from survey respondents |

# Collecting the data

1. Choose methods of collecting (min 2) and protecting data

|  |  |
| --- | --- |
| Data collection method | Data source |
| Survey | The community/family |
| Research | BOM |
| Research | Carbon Dioxide Information Analysis Center, Environmental Sciences Division, Oak Ridge National Laboratory, Tennessee, United States. |
|  |  |

|  |
| --- |
| Protection strategies |
| * Access control – only allow me to manipulate the survey data * Backup – save the file to OneDrive so that it can always be recovered. |

1. Create data collection resources

|  |
| --- |
| Resources (e.g. online survey, interview questions, etc) |
| Online survey |
| BOM – tables and data |
| Carbon Dioxide Information Analysis Centre, Environmental Sciences Division, Oak Ridge National Laboratory, Tennessee, United States. |
|  |

1. Collect and reference data

|  |  |
| --- | --- |
| Data collected | APA Reference |
| Data from BoM | Bureau of Meteorology, 2020. *Climate Data Online*. [online] Bom.gov.au. Available at: <http://www.bom.gov.au/climate/data/> [Accessed 4 March 2020]. |
| CO2 data from | World Bank, 2020. *CO2 Emissions (Metric Tons Per Capita) | Data*. [online] Data.worldbank.org. Available at: <https://data.worldbank.org/indicator/EN.ATM.CO2E.PC?end=2014&start=1960> [Accessed 9 March 2020]. |

# Manipulating and analysing the data

1. Validate data

|  |  |  |
| --- | --- | --- |
| Software tool | Functions used to validate | File name |
| Manual validation | Grouped by topic. Of government action, concerns and individual action. | computingData.xls |

1. Manipulate data

|  |  |  |
| --- | --- | --- |
| Software tool | Functions used to manipulate | File name |
| Total emissions per capita | Sum | computingData.xls |
| Average concern of community | Average | computingData.xls |
| Number of specific responses | CountIf | computingData.xls |

Provide an example of one spreadsheet manipulation you plan to perform using the IPO chart below:

|  |  |  |
| --- | --- | --- |
| Input | Process | Output |
| Survey data  Climate data | Find patterns and relationships within the data to represent as a visualisation. | Data visualisation poster depicting community views and evidence on climate change. |

Provide an example of one query you plan to use to retrieve data from a database using the query design below:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name: qryConcernsAndGovAction | | | | |
| Included tables: tblResponses | | | | |
| Table | tblResponses | tblResponses |  |  |
| Field | Concerns | Government actions needed |  |  |
| Total | Group By | Group By |  |  |
| Sort |  |  |  |  |
| Show | Yes | Yes |  |  |
| Criteria | Like “\*Environment\*” or “\*Rising Temperatures\*” | Like “\*Renewables\*” |  |  |

1. Analyse data to identify patterns and trends

|  |
| --- |
| Findings |
| All people surveyed think climate change is real |
| People think power/fuel usage is the area that we need to change to reduce emissions |

# Designing and developing visualisations

1. Choose a design option (bold your choice)

* Poster
* Webpage/animated dashboard

1. Choose appropriate visualisations for each finding

|  |  |
| --- | --- |
| Visualisation | Finding represented |
| Line Graph | To show the overall CO2 emissions of the planet per capita |
| Line Graph | To show the decrease in rainfall from 1960 |
| Line Graph | To show the slight increase in max temperature |
| Pie Graph | To show what people think is the biggest impact of climate change. |
| Pie Graph | To show what people think individuals can do to combat climate change |
| Pie Graph | To show what people think the government can do to combat climate change |
| Text | Show to how many people believe in climate change |
| Text | To show the relation between overall concerns about climate change and what governments should do to combat climate change. |

1. Create visualisations using visualisation software

|  |  |
| --- | --- |
| Filename | computingVisualisations.pbix |

1. Create poster/dashboard to present findings

|  |  |
| --- | --- |
| Filename | computingAssesment.zip |

If there is more than one file, zip them together and provide the zip name.

# Rubric

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Criteria | | Very Low | Low | Medium | High | Very High |
| 1. Analysis of problem | | Limited analysis of the problem. | Some analysis of the problem by identifying requirements. | A range of analysis is performed with reasonable depth. | A range of analysis is performed with good depth in most items. | The problem has been fully analysed demonstrating a complete understanding of the requirements for the solution. |
| Mark allocation | 15 | 0-3 | 4-6 | 7-9 | 10-12 | 13-15 |
| 1. Collection of data | | Limited data is collected and referenced. | Some data is collected and referenced. | A range of relevant data is collected using some appropriate methods and is referenced. | Most relevant data is collected using a range of appropriate methods and is referenced. | All relevant data is collected using a wide range of appropriate methods and is accurately referenced. |
| Mark allocation | 25 | 0-5 | 6-10 | 11-15 | 16-20 | 21-25 |
| 1. Manipulation and analysis of data | | Limited validation and manipulation provided. | Some validation and manipulation provided. | A range of validation and manipulation techniques used. | A wide range of validation and manipulation techniques used to identify some patterns/trends. | A comprehensive range of validation and manipulation techniques used to clearly identify patterns/trends. |
| Mark allocation | 30 | 0-6 | 7-13 | 14-20 | 21-25 | 26-30 |
| 1. Designing and developing visualisations | | Limited visualisations provided. | Some relevant visualisations provided. | A range of appropriate visualisations provided that conform to conventions. | A range of appropriate visualisations provided that follow conventions, are visually appealing and convey findings. | A wide range of appropriate visualisations provided that are easy to interpret and communicate accurate findings required by the solution. |
| Mark allocation | 30 | 0-6 | 7-13 | 14-20 | 21-25 | 26-30 |