



Food Loss and Waste Data Viewer

Developed by Jensen and Kritin - Group 170

Overview – How does our Web Application address the social challenge?

The social challenge outlined is Investigating food loss and waste. That is, to "help various key parties in the food supply chain (including consumers and policy makers) explore unbiased information on the sources of food loss and waste over an extended period time."

Our application – the **Food Loss and Waste Data Viewer** addresses this challenge by providing a site where users can view data on this topic according to their own specifications such as:

- Loss and waste by food group/commodity.
- Loss and waste by location(Country and Region)

And allows the user to gather a '**Surface-level**' view of the data, which displays the data in a table, and an '**In-depth**' view which displays similar Countries or Food Commodities to the one selected by the user.

These two different views on the data allows us to enable our **Personas** to satisfy their **Needs and Goals**.



Name: Marc Sampson

Age: 41

Gender: Male

Ethnicity: Caucasian

Background: Member of the Australian Parliament, his key role is to create and propose legislation in hopes of getting it passed. Is a member of the Australian Greens political party.

Needs and Goals: Marc is developing a new piece of legislation which is aimed at reducing Food loss and Waste in Australia. For this, he needs to view and assess accurate data about food loss. Marc aims to present this information to parliament, so he also requires visual representations of

the data such as charts and diagrams. A key pain point for Marc is verifying the sources of data presented. Much information is provided without a source or with outdated sources. Marc is looking to view information both in and beyond the surface level, such as general data on the percentage of food loss across the country, and highly specific data such the type of food and industry contributing to this issue the most.

Skills and Experience: Marc has intermediate computer skills and is proficient with tools like Word and Excel. Marc has experience utilising statistical data to inform policy making.



Name: Sandra Ellison

Age: 45

Gender: Female

Ethnicity: Caucasian

Background: Sandra is a Sustainability Manager for a Supermarket chain. Her role involves assuring that the company is complying with legal and company-set sustainability practices and working towards sustainability goals.

Needs and Goals: Sandra is looking to present in a company meeting the supermarket chains statistics on food loss and waste in comparison with the statistics nationwide. To achieve this,

Sandra needs to find data relevant to the company and its associated industries. This is a part of Sandra's goal of contributing to the company's ongoing effort to comply with sustainability practices. A key pain point of previous presentations is trying to explain in depth complex statistics to a less knowledgeable audience. To combat this, Sandra needs to find surface level and in-depth data on food loss and waste to present to a range of audiences.

Skills and Experience: Sandra has intermediate Computer skills and is experienced in creating digital presentations. Sandra has limited experience working with statistical data and has little to no skill with the associated tools used to view manipulate said data such as Excel.



Personas



Name: David Reiner

Age: 45

Gender: Male

Ethnicity: German-Australian

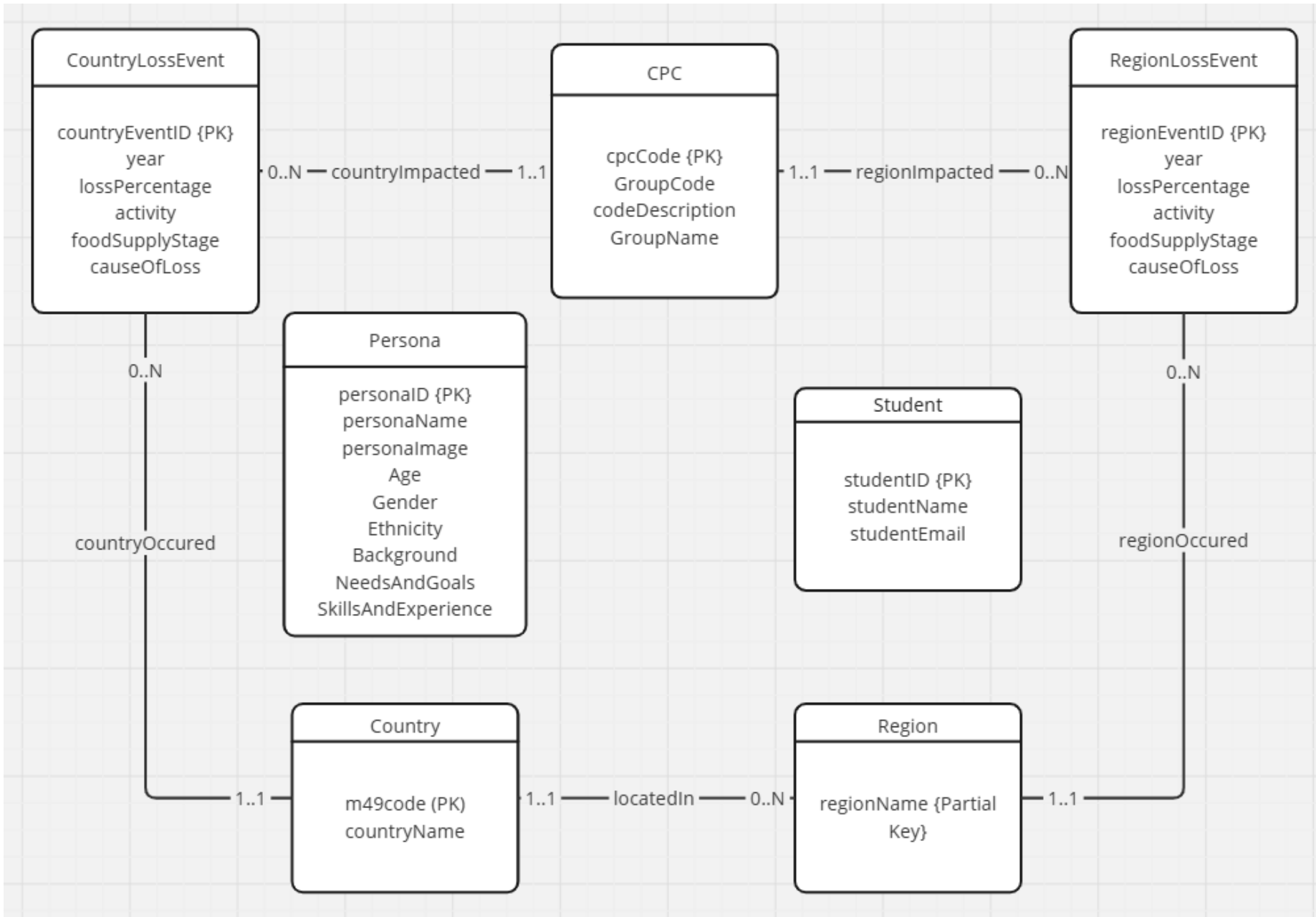
Background: David is a manager in a retail company. He is well educated, has a family of 2 kids (Jane and John) and a wife (Megan). Although he is not good at technology, he is willing to learn new things if it is beneficial for his workplace and company. David also wants to spend more time with his family as he is usually busy with work.

Needs and Goals: David's company is facing a huge loss of food as many of it is spoiled during the storing process and he is trying to locate which storage is having problems to resolve the issue. David needs a reliable recently updated source of information where he can use to find out which area is having problems so that he can work on from that. Besides minimising the loss, David also aims to increase the profits of the company. Having an easy-to-use and informative website would also help David to finish his work earlier so that he has more time to spend with his beloved family.

Skills and Experience: He knows how to read statistical data and graphs. Although he is not very proficient in technology, David is willing to learn new things so a consistent and easy to understand UI design is preferred.



ERD:



Database Schema

- **CPC** (cpcCode, GroupCode, codeDescription, GroupName)
- **CountryLossEvent** (countryEventID, year, lossPercentage, activity, foodSupplyStage, causeOfLoss, m49code*, cpcCode*)
- **RegionLossEvent** (regionEventID, year, lossPercentage, activity, foodSupplyStage, causeOfLoss, cpcCode*)
- **Country** (m49code, countryName)
- **Region** (regionEventID*, m49code*, regionName)
- **Persona** (personalID, personaName, personalImage, Age, Gender, Ethnicity, Background, NeedsAndGoals, SkillsAndExperience)
- **Student** (studentID, studentName, studentEmail)

Implemented Database - 3rd Normal Form

Our Implemented Database is normalised to **3rd Normal Form** as:

- Every table in our database is in 2NF
- In every table, all non-key values are directly dependent on the primary key, and not transitively dependent on the primary key.

Functional Dependencies

CpcCode ---> GroupCode, codeDescription, GroupName

countryEventID --> year, lossPercentage, activity, foodSupplyStage, causeOfLoss, cpcCode]

regionEventID --> year, lossPercentage, activity, foodSupplyStage, causeOfLoss, cpcCode

m49code --> countryName

regionEventID --> m49code, regionName

personalID -> personaName, personalImage, Age, Gender, Ethnicity, Background, NeedsAndGoals, SkillsAndExperience

studentID --> studentName, studentEmail



View Food Loss and Waste data 1966 - 2022

All Time Data 1966 - 2022 (Global)

Maximum Loss: 2013

65%

Vegetables - Australia

Minimum Loss: 2017

0.0005%

Cereals - Burkina Faso

[View Instructions](#)

Page 1A

'BIG PICTURE' CONTENT

Level 1A - Landing Page

The Landing Page of our website aims to:

- Immediately capture the attention of the user
- Provide a **snapshot** of the data provided by our site
- Direct the user to a **tutorial** on how to use the site

The way we achieve this:

- Background Image
- Table Snapshot of Data
- 'View Instructions' button takes user to 'About Us' page



Level 1A - UX & UI

The UI of the homepage displays simplicity, which is necessary to cater to the differing levels of technological proficiency within our Personas.



The Navigation Bar above displays this - with an escape hatch at the top left which will bring the user to the homepage. All the pages on the left of the nav bar are displayed with simple labels, and the page that the user is currently on is coloured green. This is done to satisfy the Recognition rather than Recall heuristic. This bar is consistent throughout the whole application.




The landing page aims to present a minimalist design, avoiding unnecessary elements so that users immediately understand the purpose of the website and are naturally directed to the instructions page.

The snapshot gives aims to give the user an idea of what kind of data is accessible through the other pages.

Level 1B - UX & UI

The Side Bar on the left of the mission page helps users navigating throughout the page more fluidly and efficiently by automatically scroll to the selected section, satisfying UX Flexibility and Efficiency Design Heuristic.

Purpose
Instruction
Personas
About Us



Name: Marc Sampson
Age: 41
Gender: Male
Ethnicity: Caucasian

Background: Member of the Australian Parliament, his key role is to create and propose legislation in hopes of getting it passed. Is a member of the Australian Greens political party.

Needs and Goals: Marc is developing a new piece of legislation which is aimed at reducing Food loss and Waste in Australia. For this, he needs to view and assess accurate data about food loss. Marc aims to present this information to parliament, so he also requires visual representations of the data such as charts and diagrams. A key pain point for Marc is verifying the sources of data presented. Much information is provided without a source or with outdated sources. Marc is looking to view information both in and beyond the surface level, such as general data on the percentage of food loss across the country, and highly specific data such the type of food and industry contributing to this issue the most.

Skills and Experience: Marc has intermediate computer skills and is proficient with tools like Word and Excel. Marc has experience utilising statistical data to inform policy making.

● ● ●

The mission page also have a "Persona" section containing the information of our Personas. Each persona have their own "panel" dedicated to each of them. User can view different personas in multiple ways, by clicking at the three dots on the bottom of the section or using the horizontal scroll bar.



HomeSurface DataIn-depth DataAbout Us

CountryFood Group

Enter Country

Enter Country ▼

Enter Years

Start YearEnd Year

Select Fields

☒ Activity☒ Food supply stage☒ Cause of food loss/waste

Select Food Commodities

☐ Animal fats☐ Bakery products☐ Cereals

PLEASE INPUT DATA INTO THE MENU
ON THE LEFT HAND SIDE OF THE PAGE

Page 2A

'SHALLOW GLANCE' OF DATA


Level 2A - Focused view of Loss/Waste by Country

Our **level 2A** page aims to:

- Present food loss/waste data for a user selected Country
- Allow the user to specify the year range of the data
- Allow the user to select the food groups which are included in the calculation
- Allow users to select the fields and the sorting type of the output

The way we achieve this:

- Output a table, each row representing a year and avg loss
- Sidemenu
- Dropdown menu (Country)
- Checkboxes (Fields + Commodities)



Home

Surface Data

In-depth Data

About Us

Country

Food Group

Enter Country

Enter Country ▼

Enter Years

Start Year

End Year

Select Fields

☒ Activity

☒ Food supply stage

☒ Cause of food loss/waste

Select Food Commodities

☐ Animal fats

☐ Bakery products

☐ Cereals

Year	AVG Food Loss(%)	Activity	Supply Stage	Cause of Loss/Waste
1995	15.73%	Consumption	Households	
2008	15.0%	Consumption	Households	
2014	25.0%		Whole supply chain	

Level 2A - UX & UI

The input fields in the side menu are immediately highlighted when loading the page.

Enter Country

Enter Years

Fields are also all selected by default, as users usually selected all of them anyway.

Select Fields

☒ Activity

☒ Food supply stage

☒ Cause of food loss/waste

Select Food Commodities

☐ Reproductive materials of animals

☐ Soft drinks; bottled mineral waters

☐ Starches and starch products; sugars and sugar syrups n.e.c.

☐ Stimulant, spice and aromatic crops

☐ Sugar and molasses

Food Commodity Checkboxes have their own scrollable menu to decrease the amount of space side menu takes up.

Sort by Food Loss

☐ Ascending

☐ Descending

☒ Chronological

Sorting Radio Buttons and Search button to get results

[Country](#)[Food Group](#)

Choose Food Group

- ☐ Animal fats
- ☐ Bakery products
- ☐ Cereals
- ☐ Cocoa, chocolate and sugar confectionery
- ☐ Cotton linters
- ☐ Edible roots and tubers with high starch or inulin content

Enter Year

! Please fill in this field.

Filter options

- ☐ Activity
- ☐ Food supply stage
- ☐ Cause of food loss/waste

Secondary topnav to hop between different pages within the same category

The big text in the middle to when first loaded into the page to tell the users that they need to input data.

PLEASE INPUT DATA INTO THE MENU ON THE LEFT HAND SIDE OF THE PAGE

! Value must be greater than or equal to 1966.

! Value must be less than or equal to 2022.

Should look like this when user enter a year outside of searching range

Swap start and end year when start is larger than end year

Alert when field is empty.

Page 2B

FOCUSED VIEW OF LOSS/WASTE BY FOOD GROUP



Country

Food Group

confectionery

☐ Cotton linters☐ Edible roots and tubers with
high starch or inulin content

Enter Year

Start Year

End Year

Filter options

☐ Activity☐ Food supply stage☐ Cause of food loss/waste

Sort by difference in %

☒ Ascending☐ Descending

Search

- Showing data from year 1994 to 2015
- Sort by the difference in loss percentage: Ascending
- 1 selected food group(s):

- Cereals

A list that
display selected
options

Table Data

FoodType	1994 loss percentage	2015 loss percentage	Difference	Food Supply Stage	Activity	Cause of food loss / waste
Cereals	1.90%	2.50%	0.60%		Harvest	Traditional Hand Cutting
Cereals	1.87%	2.50%	0.63%	Drying	Farm	Paddy Drying
Cereals	2.25%	3.00%	0.75%		Storage	Storage weight losses in public sector stores
Cereals	1.60%	2.50%	0.90%	Harvesting	Harvest	Combine-Harvester
Cereals	1.45%	2.50%	1.05%		Harvest	Too Mature, Leading To Breakage

Page 2B

FOCUSED VIEW OF LOSS/WASTE BY FOOD GROUP


Subtask 2B

Query Used:

For getting data for the table:

```
SELECT DISTINCT t1.GroupName, t1.year, AVG(t1.lossPercentage) AS startPercentage, t2.year,  
AVG(t2.lossPercentage) AS endPercentage, ABS(AVG(t2.lossPercentage) - AVG(t1.lossPercentage) )  
AS diff, t1.foodSupplyStage, t1.activity, t1.causeOfLoss  
FROM (CPC JOIN CountryLossEvent ON CPC.cpcCode = CountryLossEvent.cpcCode) AS t1  
INNER JOIN CountryLossEvent AS t2 ON t1.cpcCode = t2.cpcCode  
WHERE t1.year = 1994 AND  
         t2.year = 2015 AND  
         t1.GroupName = 'Cereals' AND  
         t1.causeOfLoss != ''  
GROUP BY t1.causeOfLoss  
ORDER BY diff ASC;
```

Note: Filters priority: Cause Of Loss > Activity > Food Supply Stage



HomeSurface DataIn-depth DataAbout Us

LocationFood Commodity

Enter Country

Enter Country ▼

Select Year and No. Results

YearNo. Results

Select Similarity Combination

☐ Common Food Products

☐ Overall Food Loss/Waste %

Select Similarity Method

☒ Absolute Values

☐ Level of Overlap

localhost:7001/page3B.html

Search Results

Displaying 3 results

Country/Region: New Zealand 2000

1. Fiji - 37.20% Similarity ▼

Data used to determine similarity

Difference in Average Loss Percentage: 3.40%

Selected Country Average Loss: 8.83%

2. United States of America - 36.26% Similarity ▼

Data used to determine similarity

Difference in Average Loss Percentage: 3.59%

Page 3A

'DEEP-DIVE' OF THE DATA

Level 3A - Locations with similar loss/waste percentages

In our level 3A page we aimed to:

- Allow users to select a country, year and number of results
- Select a similarity combination and method
- Display the most similar countries and a similarity rating

The way we achieve this:

- An 'Accordion' style display to select each similar country and other info
- Input fields for Country (dropdown), year and results
- Checkboxes for combination
- Radio buttons for method

The screenshot displays a web application interface for finding locations with similar loss/waste percentages. The interface is divided into a left sidebar and a main content area.

Left Sidebar:

- Enter Country:** A dropdown menu with the placeholder text "Enter Country".
- Select Year and No. Results:** Two input fields labeled "Year" and "No. Results".
- Select Similarity Combination:** Two checkboxes: "Common Food Products" and "Overall Food Loss/Waste %".
- Select Similarity Method:** Two radio buttons: "Absolute Values" (selected) and "Level of Overlap".

Main Content Area:

- Search Results:** A section header with the text "Displaying 3 results".
- Country/Region: New Zealand 2000:** A section header for the current search results.
- 1. Fiji - 37.20% Similarity:** A result entry with a dropdown arrow. Below it, the data used to determine similarity is shown: "Difference in Average Loss Percentage: 3.40%" and "Selected Country Average Loss: 8.83%".
- 2. United States of America - 36.26% Similarity:** A result entry with a dropdown arrow. Below it, the data used to determine similarity is shown: "Difference in Average Loss Percentage: 3.59%".

The browser address bar at the bottom shows "localhost:7001/page3B.html".

Level 3A - UX & UI

By displaying the number of results retrieved, we help the user by reducing their memory load.

Country/Region: New Zealand 2000

1. Fiji - 37.20% Similarity ▼

Data used to determine similarity

Difference in Average Loss Percentage: 3.40%

Selected Country Average Loss: 8.83%

2. United States of America - 36.26% Similarity ▼

3. Nepal - 4.42% Similarity ▼

Data used to determine similarity

Difference in Average Loss Percentage: 9.88%

Selected Country Average Loss: 8.83%

Search Results

Displaying 3 results

Similarly, we display the country and the year that the results are being compared to.

Each Accordion display is expandable providing users to have a simple or detailed view of the data, depending on their needs. The un-expanded view displays the country, its ranking and the similarity score. The expanded view displays the data used to determine the similarity

This is done to satisfy the flexibility and efficiency of use heuristic.

[Location](#)[Food Commodity](#)

Enter name of a Food

Wheat

Similarity Type

- ☒ By Ratio (loss : waste)
- ☐ Highest % of loss/waste
- ☐ Lowest % of loss/waste

-1

! Value must be greater than or equal to 1.

Sort by Similarity

- ☒ Least Similar
- ☐ Most Similar

Search

Saved personal info

Wheat

Wheat, seed

Wheat, other

Maize (corn)

Maize (corn), seed

Maize (corn), other

Rice

Manage personal info in Wallet

A drop down list
to show
available
options

**PLEASE INPUT DATA INTO THE MENU ON THE
LEFT HAND SIDE OF THE PAGE**

Alert when the
value is out of
range

Page 3B

FOCUSED VIEW OF LOSS/WASTE BY FOOD - COMMODITY

[Location](#)[Food Commodity](#)

Enter name of a Food

Similarity Type

- ☒ By Ratio (loss : waste)
- ☐ Highest % of loss/waste
- ☐ Lowest % of loss/waste

Sort by Similarity

- ☒ Least Similar
- ☐ Most Similar

- **Selected commodity:** Wheat **from Group:** Cereals
- **Similarity Type:** By Ratio (loss : waste)
- **Requested number of groups:** 10
- **Sort:** Least Similar
- **Search Result:** 10 results found

A list that
display selected
options

1. Group: Other animal products ▼

Average loss percentage: 50.000%

Similarity Score (Difference): 46.887%

Expandable
Accordions

2. Group: Prepared and preserved vegetables, pulses and potatoes ▼

3. Group: Prepared and preserved fruit and nuts ▼

Average loss percentage: 31.773%

Similarity Score (Difference): 28.660%

4. Group: Macaroni, noodles, couscous and similar farinaceous products ▼

Page 3B

FOCUSED VIEW OF LOSS/WASTE BY FOOD - COMMODITY

Subtask 3B

Query Used:

For getting data for the accordion

- The red underlines indicates which line will be changed based on user's input.
- $ABS(gs.avg_loss_percentage - sg.avg_loss_percentage)$ can be also be **max_loss_percentage** or **min_losspercentage** instead of **avg_loss_percentage** based on selected similarity type

```
WITH CommodityGroup AS (
  SELECT c.GroupCode, c.GroupName, f.cpcCode, c.codeDescription
  FROM CountryLossEvent f
  JOIN CPC c ON f.cpcCode = c.cpcCode
  WHERE c.codeDescription = 'Wheat'
  LIMIT 1
),
GroupStatistics AS (
  SELECT c.GroupCode, c.GroupName,
    MAX(f.lossPercentage) AS max_loss_percentage,
    MIN(f.lossPercentage) AS min_loss_percentage,
    AVG(f.lossPercentage) AS avg_loss_percentage,
    MAX(f.cpcCode) AS max_loss_cpc_code,
    MIN(f.cpcCode) AS min_loss_cpc_code
  FROM CountryLossEvent f
  JOIN CPC c ON f.cpcCode = c.cpcCode
  GROUP BY c.GroupCode, c.GroupName
),
GroupStatisticsWithDetails AS (
  SELECT gs.*,
    (SELECT cp.codeDescription
     FROM CPC cp
     WHERE cp.cpcCode = gs.max_loss_cpc_code) AS max_loss_commodity,
    (SELECT cp.codeDescription
     FROM CPC cp
     WHERE cp.cpcCode = gs.min_loss_cpc_code) AS min_loss_commodity
  FROM GroupStatistics gs
),
SelectedGroupStatistics AS (
  SELECT * FROM GroupStatisticsWithDetails
  WHERE GroupCode = (SELECT GroupCode FROM CommodityGroup)
)
SELECT gs.GroupCode, gs.GroupName,
  gs.max_loss_percentage, gs.min_loss_percentage, gs.avg_loss_percentage,
  gs.max_loss_commodity, gs.min_loss_commodity,
  ABS(gs.avg_loss_percentage - sg.avg_loss_percentage) AS similarity_score
FROM GroupStatisticsWithDetails gs
JOIN SelectedGroupStatistics sg
ORDER BY similarity_score DESC
LIMIT 10;
```

Queries - 3A

Ranking each Country:

```
AVG(ABS(P.lossPercentage - sc.lossPercentage)) AS avg_loss_diff
```

Normalising difference:

```
(1 - (o.avg_loss_diff / (SELECT MAX(avg_loss_diff) FROM OtherCountriesLoss)))
```

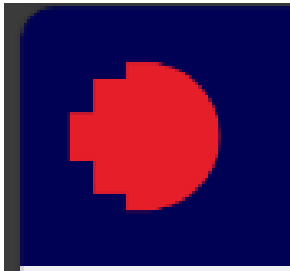
Similarity Score:

```
(n.normalized_avg_loss_diff * 0.5 + (n.selected_country_avg_loss / 100) * 0.5)
```

A Significant change

"The RMIT logo looks boring and not relevant to the topic"

Before



After



"There shouldn't be gaps between the buttons, the buttons should be larger in size"

Before



After



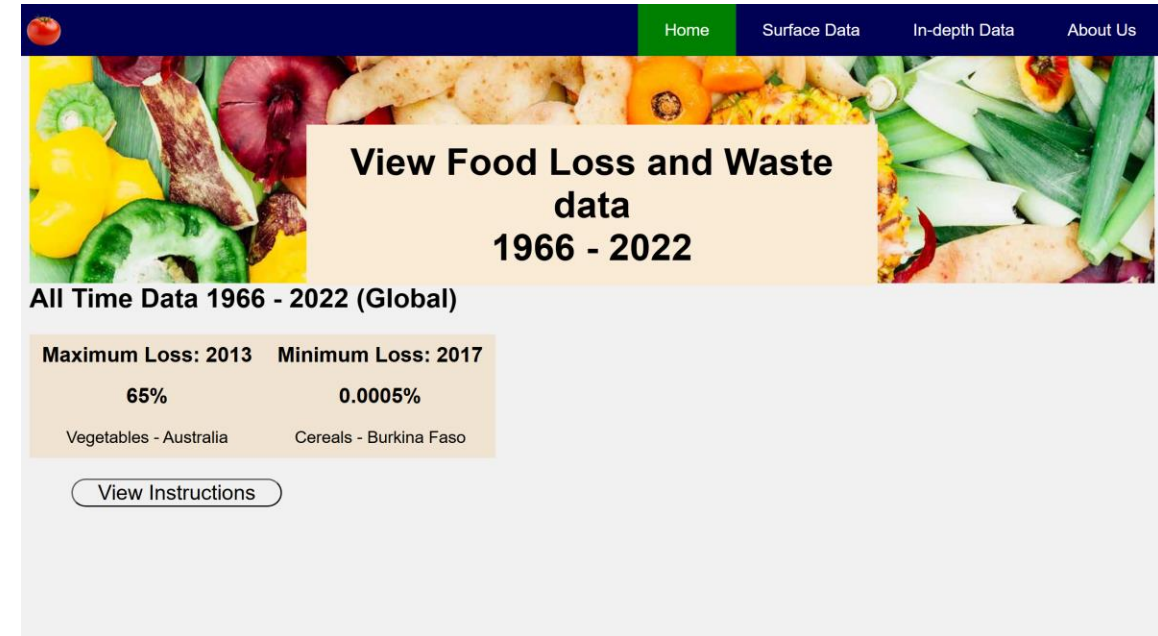
Changes made on 1A

"The homepage looks very different to the other pages"

"I don't find the homepage visually appealing"

"Page feels empty"

BEFORE:



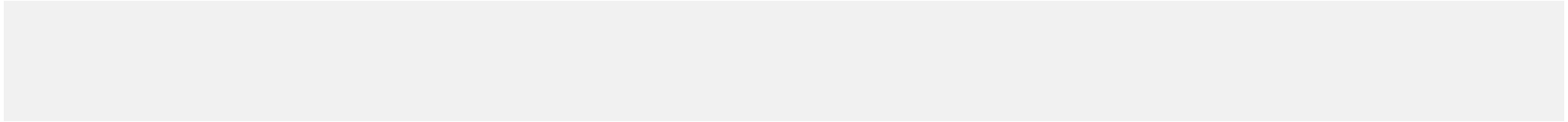
AFTER:



Changes made on Level 2 and 3

"This page feels empty when we haven't made a search, put something in the middle of the page"

Before



(Yes, it was literally blank, there was nothing)

After

**PLEASE INPUT DATA INTO THE MENU ON THE LEFT HAND
SIDE OF THE PAGE**

Changes made on 2B

"The selected option should be in a list, because it is hard to read if put in one line"

Before

Showing data from year 1994 to 2015 | 1 selected food group(s): | Ascending

- Cereals

After

- Showing data from year 1994 to 2015
- Sort by the difference in loss percentage: Ascending
- 1 selected food group(s):

- Cereals

Changes made on 3B

"The selected option should be in a list, because it is hard to read if put in one line"

Before

Selected commodity: Wheat from **Group:** Cereals | **Similarity Type:** By Ratio (loss : waste) | **Requested number of groups:** 10 | **Sort:** Least Similar

Search Result: 10 results found

After

- **Selected commodity:** Wheat from **Group:** Cereals
- **Similarity Type:** By Ratio (loss : waste)
- **Requested number of groups:** 10
- **Sort:** Least Similar
- **Search Result:** 10 results found

Changes made on 3B

"Too many numbers!!!"

Before

1. Group: Other animal products ▼

Average loss percentage: 50.0%

Similarity Score (Difference): 46.88709141659761%

After

1. Group: Other animal products ▼

Average loss percentage: 50.000%

Similarity Score (Difference): 46.887%

END OF PRESENTATION

Any Questions?