University of the Witwatersrand
Data Visualisation
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DATA VISUALISATION EXAM PROJECT STYLE GUIDE

A REPRESENTATION OF HUMAN IMPACT ON THE OCEANS

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1. INTRODUCTION

This document will aim to describe the concept behind the Data Visualisation that has been chosen for the 2019 Data Visualisation Exam Project, as well as detailing the visual and interactive design choices that will be constructed for the project. The project will temporarily be titled; “A representation of human impact on the oceans.” This document aims to explore the front end development of the project, with some minor facets of the backend development being explained.

2. CONCEPT

The idea behind the project is to address the destruction of coral reefs (particularly in the great coral reef) due to human influence. The project will also address the consequences of overfishing, as these two issues are closely related to one another. The way this will be done is by allowing the viewer/user of the data visualisation to take control of a school of fish. These school of fish will survive based on energy/food produced by the coral within the virtual visualisation. The amount of coral on the screen at any given time will be proportional to yearly quantities of coral reef coverage that exist in the ocean (between 1986 - 'Future'). As the years progress, and coral reefs coverage (%) subsequently decrease, it will become harder and harder to progress while staying alive in the game. The number of fish the player controls is also directly proportional to the loss of sea-life in the ocean as a result of human influence (overfishing). Hopefully this visualisation will serve as a tool to convey the message of the harm humans are causing on the oceans.

3. INTERACTIVITY

The ability for the user to control the fishes' movements is currently the only planned main feature of interactivity, but also the most crucial part of the visualisation. By making the user take part in the visualisation, they are being made to take part in the ecosystem created using the sourced data. By allowing them to interact with the system, on a mechanical level, they are able to experience the plight of the fish they are controlling. Typically in data visualisation, the interactivity is used as a tool to alter the configurement of the data, e.g. sorting the data differently, re-arranging elements, changing layouts, etc. However, in my visualisation, interactivity is used to facilitate the intent of the data visualisation. The interactivity is not merely a tool to change the way the data is displayed, but rather a tool to bring the user closer to the message of the data by engaging them in the story of the data. Simply put, the mechanics (interactivity of controlling the fish) and the narrative (degradation of ocean life) are enhanced by one another instead of only coexisting within the space.

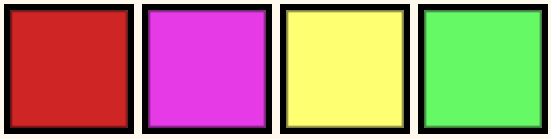
This type of interactivity is also something that I would like to address in my research project, and I am seeing how I can elicit a deeper connection with a data-set through the use of interaction.

4. STYLE GUIDE

This section aims to describe the visual design choices of the data visualisation.

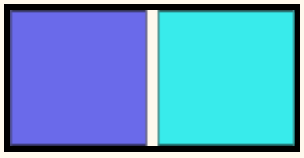
1. Colour Palette

Coral:

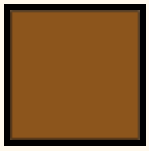


Fish:

Ocean:



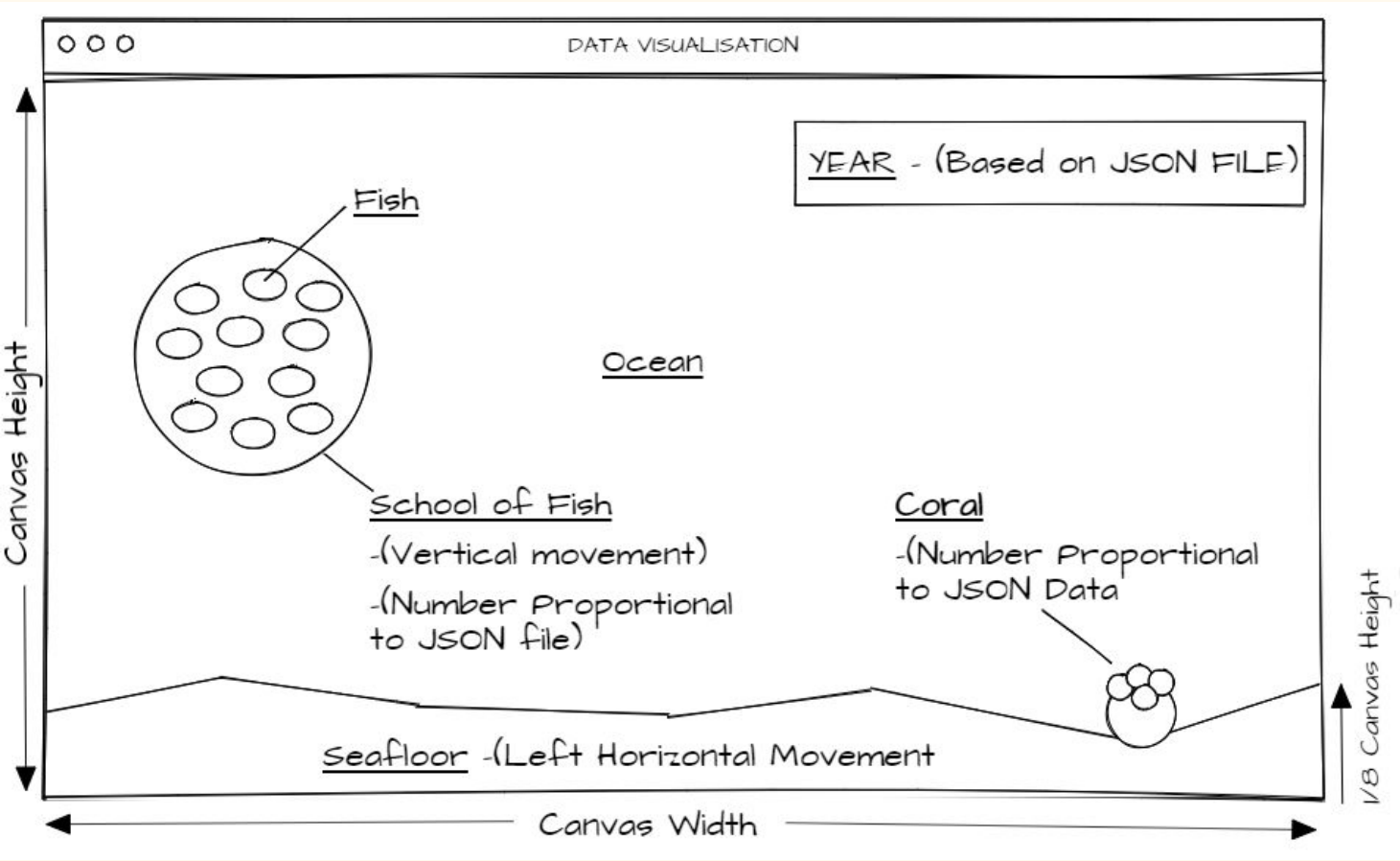
Sea-floor:



The choices of colour were typically chosen for the real world colours of the objects they are representing. But more importantly, the objects on the canvas that are less important (not the focus of the data visualisation), will be more monotonous and less bright. However, when looking at the fish and the coral, they will have the most vibrant colours that catch the viewer's eye, so that the users attention will tend to be drawn towards these elements. Not only will they be the focus, but the use of colour will be chosen specifically so that the canvas is filled with vibrant colors when the game initially begins, and as the years progress, the canvas will become more dull, to emulate the fact that the ocean is less filled with the wondrous entities that is; corals and fish. An important task will be to incorporate all these colours without any of them clashing or the screen feeling too cluttered.

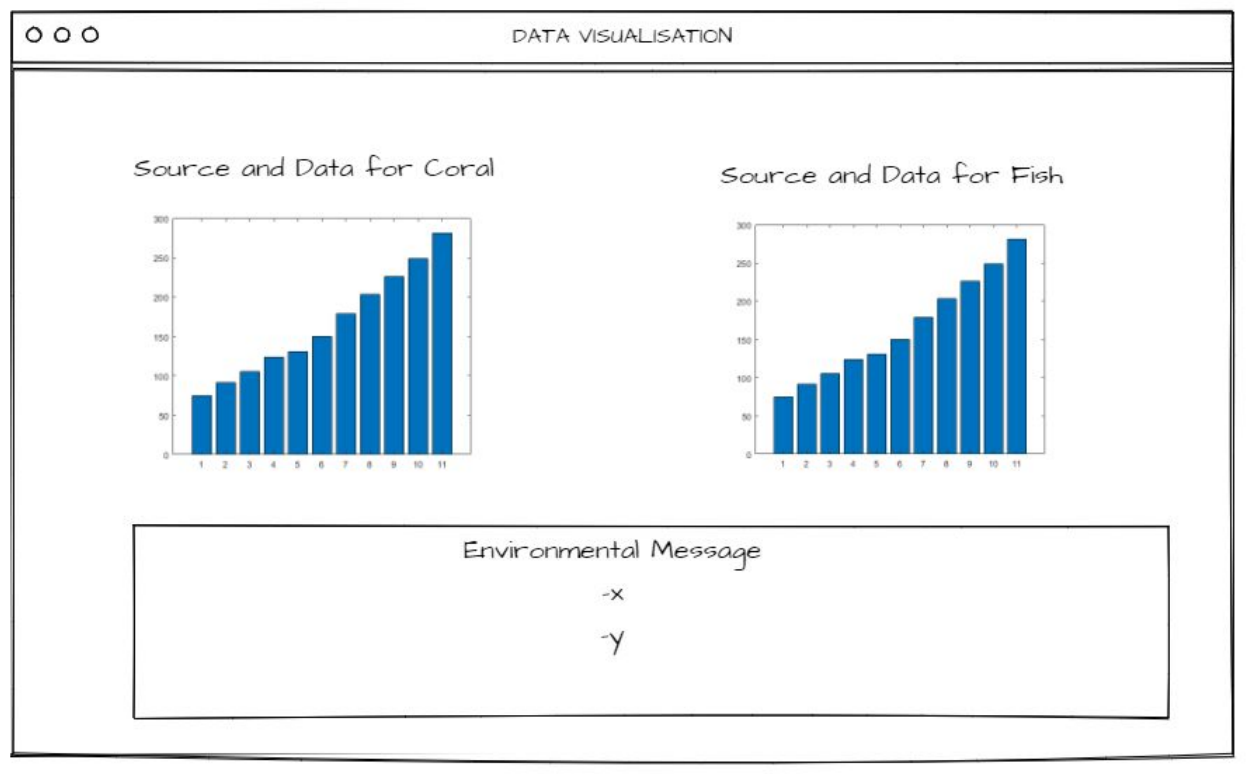
2. Ocean Wireframe

This is what the main view of the data visualisation will look like, where the user is in control of the fish.



3. After-Screen Wireframe

This screen will be implemented if there is sufficient time to allow it. This screen is mainly used to allow the user to see the data presented in traditional ways (bar graphs, pie charts, etc.). The addition of this screen is beneficial because the main data visualisation is meant to elicit an emotional response towards the injustice on the oceans, while this screen is meant to inform and educate the user using exact numbers that correspond to the data source.



5. DATA-SET

The data-set will be compiled by myself as I was unable to find a JSON file encapsulating all the necessary information. The percentage of coral reef coverage is taken from a scientific article entitled "The 27–year decline of coral cover on the Great Barrier Reef and its causes," by Glenn De'ath et al, which has done extensive research on the great coral reef's decline and causes. The source of fish population decline will be taken from a scientific journal publication entitled "Global Loss of Biodiversity Harming Ocean Bounty," by Erik Stokstad. Both these sources have been deemed reputably to the standards of this project, while also being the most extensively mined dataset that was found during research. For future records in the dataset past the current year, the dataset will be extrapolated and projections will be made. This artistic liberty is necessary in conveying the message of coral reef and fish population decline, in order to construct a narrative.

Based on these factors, the JSON data file will consist of 3 parameters for each object: Year, % of Coral Cover, and % of fish species collapsed. Some of the data may be scaled in order to create the best experience for the user and also for readability purposes.

6. MECHANICAL EXPLANATION

The environment (seafloor and coral) is going to be procedurally draw on the canvas. The seafloor will consists of borderless rects that instantiate with random angles to give the feel of a jaggedy floor. The coral will then be instantiated from a pool of possible coral shapes and colours onto this floor (with the number spawning proportional to the dataset). This environment will translate on the x-axis opposite the direction of the fish's movement. From each coral particles of "energy/flood" will be instantiated that float upwards that the fish can collect. Relevant coral will sway side to side, so the environment doesn't feel static. In the same vein, semi-transparent bubbles will float around the water as simple 2D ellipses.

The fish will be instantiated in the left part of the screen, with its x-translation locked and it's y-translation being affected by the users input. As a result of the environment moving, the fish will be seen to be going in the right direction. The number of fish spawned will be proportional to the dataset. The fish's idle movements will be based on a y-scaled sin( ) cycle to simulate them swimming in water. This dynamic idle movement will allow the canvas to feel more alive. The fish will eventually, hopefully, rotate when they move from player input.

7. POSSIBLE ISSUES

These are possible issues that may arise with the proposed plan of action

7.1. Drawing shapes

Given the limitations on the primitive 2D shapes P5.js is able to draw from its library, being able to draw complex shapes such as fish and coral elements will be very time consuming and might not come out as aesthetically pleasing. A solution to this might be to use graphic images instead of a composition of 2D primitive shapes, if allowed.

7.2. Colour Balance

As mentioned before, balancing the colours between all the coral elements and fish may be tricky as there will be a vast colour pallette which will hopefully be randomly generated.