Face of the War

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Contents

Summary

The cultural institutions around the world are increasingly creating interactive digital visualisations to provide access to digitised archives. Few examples of such visualisations are interactive maps, timelines and Advanced Visualisation and Interaction Environments (AVIE). At the same time, in this era of data, where people are bombarded with information every second, the collective memory of historical events and contributions of individuals in the past can be easily forgotten if they do not constantly reappear. With an aim to put forward the cycle of reappearing history and continuing on the interactive visualisation initiatives, this project presents a web-based interactive visualisation of photographs of soldiers who took part in the Great War. While presenting the portraits of soldiers along with their record, the visualisation manifests the question, who is the real face of the war? The items preserved in tens of thousands of Museums, Libraries and other types of cultural institutes embody and carry the historical objectivity of their creation, this visualisation represents collective memory through individual histories.

The rest of the report is organised as follows. The first chapter describes the thematic background of the visualisation and the next chapter describes the archive chosen for this project summarising the data available in it. Chapter 3 introduces the data visualisation intention and the intended audience. Chapter 4 details the concept map of the work followed by the storyboard, while Chapter 5 describes the technical data processing and harvesting methods. Chapter 6 elucidates the process of creation in *Cables* [8]. The future directions for the development of the visualisation are presented in the last chapter and acknowledgements are provided at the end.

Chapter 1

Introduction

Imagine you are walking in an archive room, encircled by shelves that are 3 times your size and full of documents. You are walking through the tens of kilometres of the archive, and therefore through centuries of our history. All this knowledge is here, at the reach of your hand. But what are you looking for? Even if you know, where do you start looking? You may as well look for a needle in a haystack. Through the years, archival documents and publications have documented people's history, including their culture and development. The shape, format and quantity of these archives have also been subject to change. Of these documents, photographs are the witnesses of many historical events, of a time period as a whole, and each of them has its own story to tell. In an effort to conserve the history going further, the public and private archives got involved in the digital transformation process, digitised the old photos using sophisticated digitisation tools and made them available online. However, making them available online does not solve the problem. While part of the reason could be that these cultural objects of the past are not known to many, the other reason is that they cannot speak for themselves. Thus digitising the collections is not nearly the last step in re-imagining and re-presenting the cultural heritage data. To expose this knowledge to a broad audience, one has to design and produce new means of communication that combines history and aesthetics.

The creation of digital cultural spaces has its own pace and it has evolved to provide immersion, interaction and participation and makes the participants to questions their notions [6]. This project allows the participants to re-examine the idea of Nation. In the developed and developing countries of the 21st century, people talk about the economy, jobs, technology, health when thinking about a nation. But not long ago, in the last 100 years, the world has seen two of the worst wars in the history of humankind. However devastating they were, they formed a crucial part of the nation-building process that is seen today. Reflecting on wars, only huge personalities are remembered. For instance, when thinking about World War 2, most probably people shall remember Churchill, Hitler, Roosevelt, Hirohito, Mussolini, Stalin [1, 2]. Going further back and thinking about World War 1, very few can remember the leaders at that time such as Geoge V, Woodrow Wilson or Kaiser Wilhelm II to name a few [7]. However, they were not the real face of the war.

Each country has a leader as its "face". However, this face is made of small faces of the soldiers who fight on her behalf and they are the brick and mortar of the nation-building process. During the 20^{th} century, all countries were involved in one or the other war, the men and women of these nations have offered themselves to defend their nation. Irrespective of the ideology for which they were fighting, it is necessary to recognise them as part of this building process. This project visualises the small pictures that create the big picture.

Chapter 2

Archive

This project used the portraits of World War 1 soldiers available in Queensland – an Australian state - open data portal (Figure 2.1) [4]. The portal contains more than 2700 data sets of text and images published by state and local government agencies, and most of them are available under creative commons license. The World War 1 soldier portraits archive contains portraits and records of 28,000 Queensland soldiers whose portraits were published in The Queenslander newspaper before embarking on World War 1 or the Great War (Figure 2.2) [5]. These portraits were digitised and made available to the public through the open data portal. The data can be accessed as a CSV file, and it contains details on the soldiers and their service records, as well as the URLs to pictures and the publication date in the Queenslander newspaper. The digitised photos were available in thumbnail, medium, and high-resolution formats.

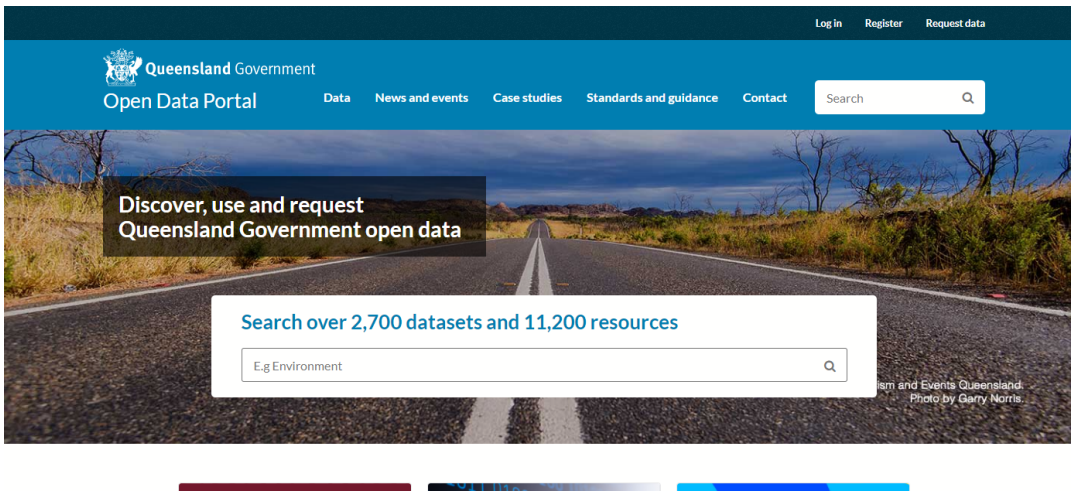

Figure 2.1: Home page of Queensland Open Data Portal

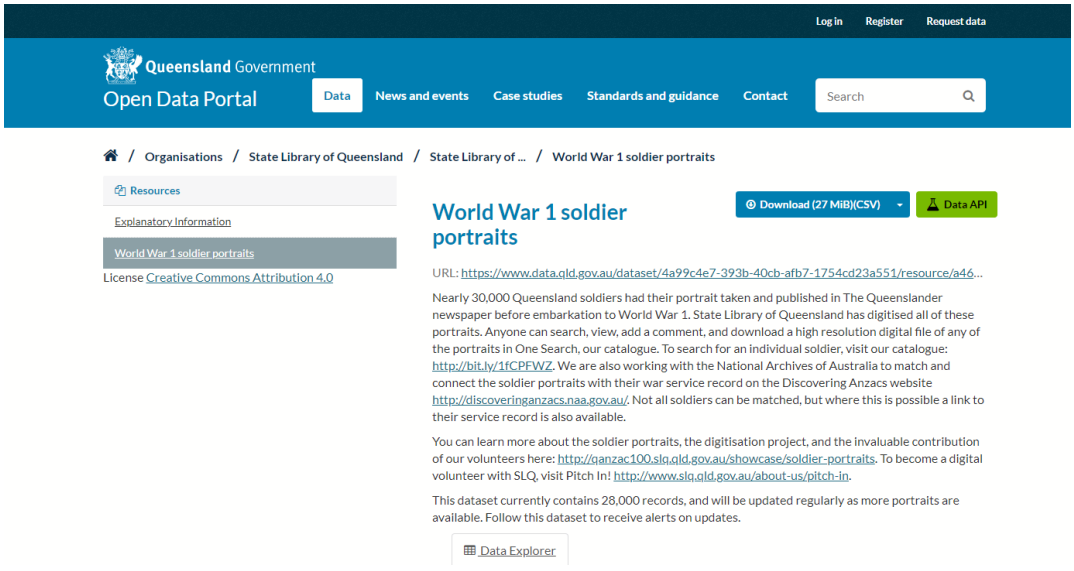

Figure 2.2: Web page of the World War 1 soldier portraits dataset

Chapter 3

Data Visualization Intention

The design of this visualisation stems from the metaphorical idea of presenting and questioning the idea of the face of war. Thus, the sketch is to manifest each voxel (volumetric pixel) of a face - that represents the country - through the portraits of the soldiers to symbolise the viewpoint of the idea of a nation. The face is presented in an empty infinite space with a twofold reason. One is to convey the idea that the contribution of individual's that are part of this face has been part of a large infinite space and secondly to inform the audience that any number of works will never fill the space of their contribution. To provide the viewers with a chance to interact with the work and make it participatory, spatial modes of interaction along with a click to view mode were included. Hence, the users can view the face from different distances and learn about the individual portraits that make up the face, making it a self-contained tour. This paradigm is not only a scheme to involve the viewer but to produce the understanding and build the thought presented earlier, through the engagement of the faces.

Intended Audience

This visualisation serves as a window to have a peek at the human aspect of the historical events and could be served to audiences of any age. However, this work was primarily intended for children. As time passes by and with an ability to know events in real-time, the children might never hear or understand the effects felt by these wars. Thus, a playful and educative environment that enables them to learn about the past was also part of the design.

Chapter 4

Visualisation Schema

The visualisation was created by juxtaposing the two views of the face. The next section provides a concept map of the visualisation and the section after it sketches the storyboard for the same.

4.1 Concept Map

The concept map in Figure 4.1 gives the details of the two views in the visualisation. The first one is a distant view of the full face in space. In this view, a complete human-looking face made with images of the emperors reigning during World War 1 is shown along with the title and brief description of the work. In addition, instructions are provided on how to view and engage with it. The second view allows one to latch on to the details of individual portraits of the soldiers. On further interaction with these portraits, the portrait and the personal details such as the name of the soldier, the military unit he belonged to and the date on which the portrait was published in The Queenslander newspapers are shown.

4.2 Visual Storyboard

From the concept map, the planned visualisation is sketched in three steps. Although the storyboard is in two dimensions, the visualisation was created in three dimensions. The first image in Figure 4.2, shows the High-level view as mentioned in the concept map. The second image in the same figure shows the Deep View and the third image shows the last step in Deep View where individual portrait can be accessed.

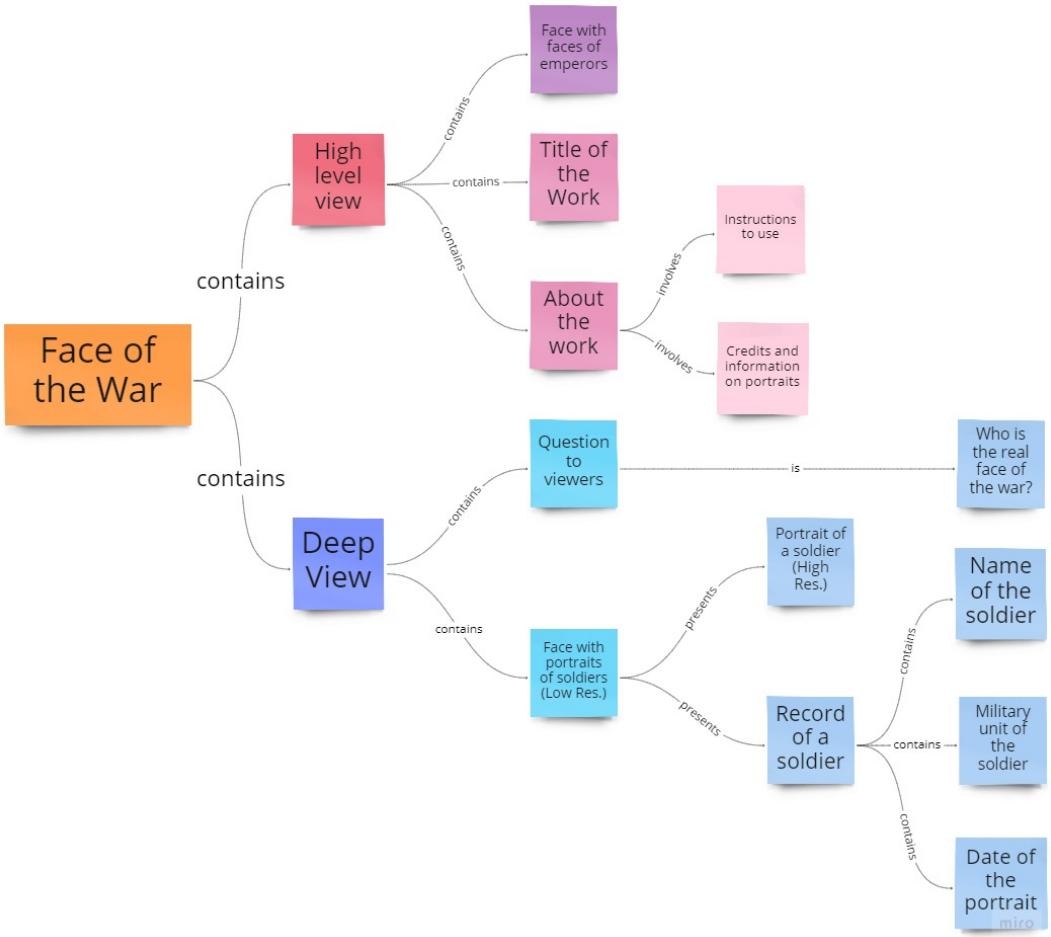

Figure 4.1: Concept map

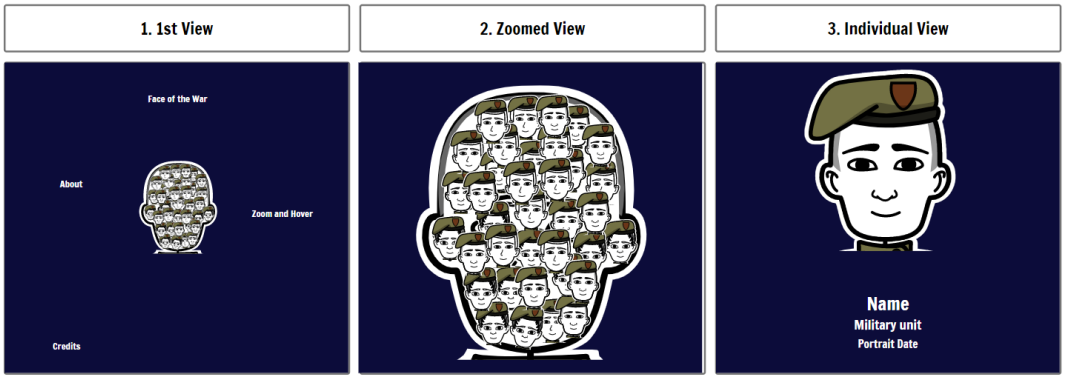

Figure 4.2: Story board

Chapter 5

Data Harvesting

This project requires two data sets. The first one is a dataset of portraits of the soldiers and the second one is a 3D face to place the portraits. The 3D face was already available in *Cables* and hence not discussed in this section. The portraits dataset with 22 columns was available in the open data portal as a CSV file as described in the Chapter 2. Most of the columns in this dataset were either empty or contain information redundant for this project such as a unique ID in the Queensland library database, a copyright column that mentions if the image is out of copyright or not (All the images were out of copyright), source and publisher which had the same values for all the entries. Hence after eliminating the columns with inessential information, the data features used in this project along with their description are summarised in Table 5.1.

Pre Processing

The aim of the pre-processing of the portraits data was to create a dataset to be able to use in *Cables* to create the visualisation. The data was already structured and did not require collection and cleaning. However, some pre-processing was performed to store selected and optimum information in JSON file to able to directly download and use it in the *Cables*. The steps performed in the same order using a python script are described below. The python

Feature	Description
Temporal	Date of publication of image in the Queenslander newspaper. Format: DD-MM-YYYY
Title	Title of image (Contains name of the soldier)
Military details	Military details transcribed from the Queenslander
Thumbnail image	URL to the digital image (150 pixels square)
High resolution image	URL to the digital image (1000 pixels along the longest side)

Table 5.1: Features of data used in the visualisation

script is made available on GitHub[1].

5.0.1 Date Conversion

In the first step, the date of the portrait was converted to 20^{th} century formats i.e., start with 19 (1914 or 1915 etc) as Python automatically converts them to 21^{st} century dates.

5.0.2 Soldier Name Extraction

The names of the soldiers were not provided separately for entries in the dataset but were part of the title of the image. The title of the image contained the name and a description of the image separated by a comma (,). The text was split into a comma and a new column with the name is added.

5.0.3 Name Cleaning

As the names of the soldiers were transcribed from the Newspaper through a scan, some non-alphanumeric characters would appear. In this step, such special characters were replaced by space.

5.0.4 Image URL Extraction

As the URLs of thumbnail and high-resolution image contain a similar scheme and domain, only the unique parts were extracted. Before storing the URLs, they were checked if they contained a valid image or not and only those that contained a valid image were stored. This step helped to reduce the size of the file.

5.0.5 Saving Data

The data per soldier was stored in a JSON file where each object contains a unique id, name, military unit, date, thumbnail image and high-resolution image URLs.

As the visualisation was designed on the web, it was difficult to design a system to handle all the 28,000 images at once. Hence, only one soldier per military units was considered. This resulted in 150 unique objects that were saved as JSON file on the disk and ready to be used in *Cables*.

[1] https://github.com/ravinitheshreddy/face_of_the_war

Chapter 6

Cables Development

The three key steps in the development are the creation of a high-level view, a deep view and an individual view. To shift between the high-level view and the deep view, the concept of zoom was used and to shift between the deep view and individual view, the idea of mouse hovering was used. The visualisation starts with the title page as shown in Figure 6.1. The interaction happens through the mouse especially with scroll to zoom in and out of the face and left button to pan the face to the left or the right. On reaching a threshold of a zoom level, a close look of the portraits is seen i.e., the deep view (Figure 6.2). From here on, the directedness of the work ends and the viewer can explore freely. On hovering the mouse on a portrait, a high-resolution image and containing the name, military details and the date the portrait was published in The Queenslander newspaper are displayed as shown in Figure 6.3.

Figure 6.1: Home page of the visualisation

Figure 6.2: Deep view

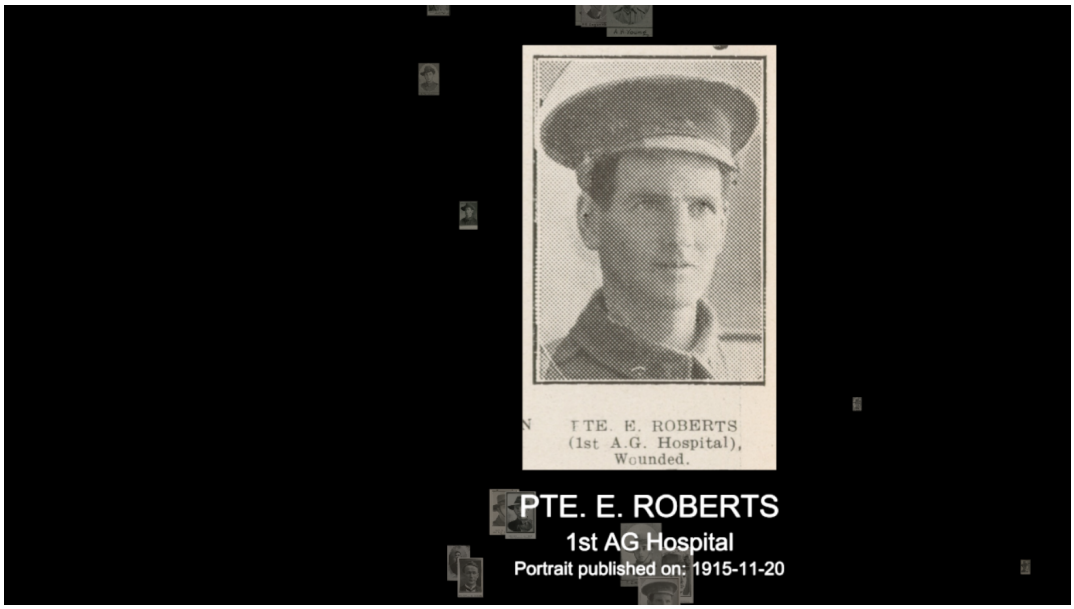

Figure 6.3: Example of an individual view

Figure 6.4: The Nine Sovereigns at Windsor for the funeral of King Edward VII

As mentioned in the previous chapter, the set of 28,000 images cannot be loaded and displayed at once on the web. Hence, in the high-level view, one image was used to create the entire face and it was the image of "The Nine Sovereigns at Windsor for the funeral of King Edward VII" that was taken in 1910 (Figure 6.4) [3]. Only in the deep view, the 150 unique portraits are displayed. The process of creating the visualisation in *Cables* involved 5 phases and the steps in each phase are explained below.

6.1 Main Loop

The main loop of the code patch controls which of the two views is seen by the viewer. The main loop (Figure 6.5), creates a black background using the ClearColor[1] op. The variable *num_photos_inside* was used to indicate the number of portraits to be used in the deep view (currently set to 150). The code captures the left and right drag of the mouse using MouseDrag[2] op and the change in the drag is obtained as the output, which is in turn used as input to the Transform[3] op that moves the objects in 3D space. An additional input to

[1] https://cables.gl/op/Ops.Gl.ClearColor
[2] https://cables.gl/op/Ops.Devices.Mouse.MouseDrag
[3] https://cables.gl/op/Ops.Gl.Matrix.Transform

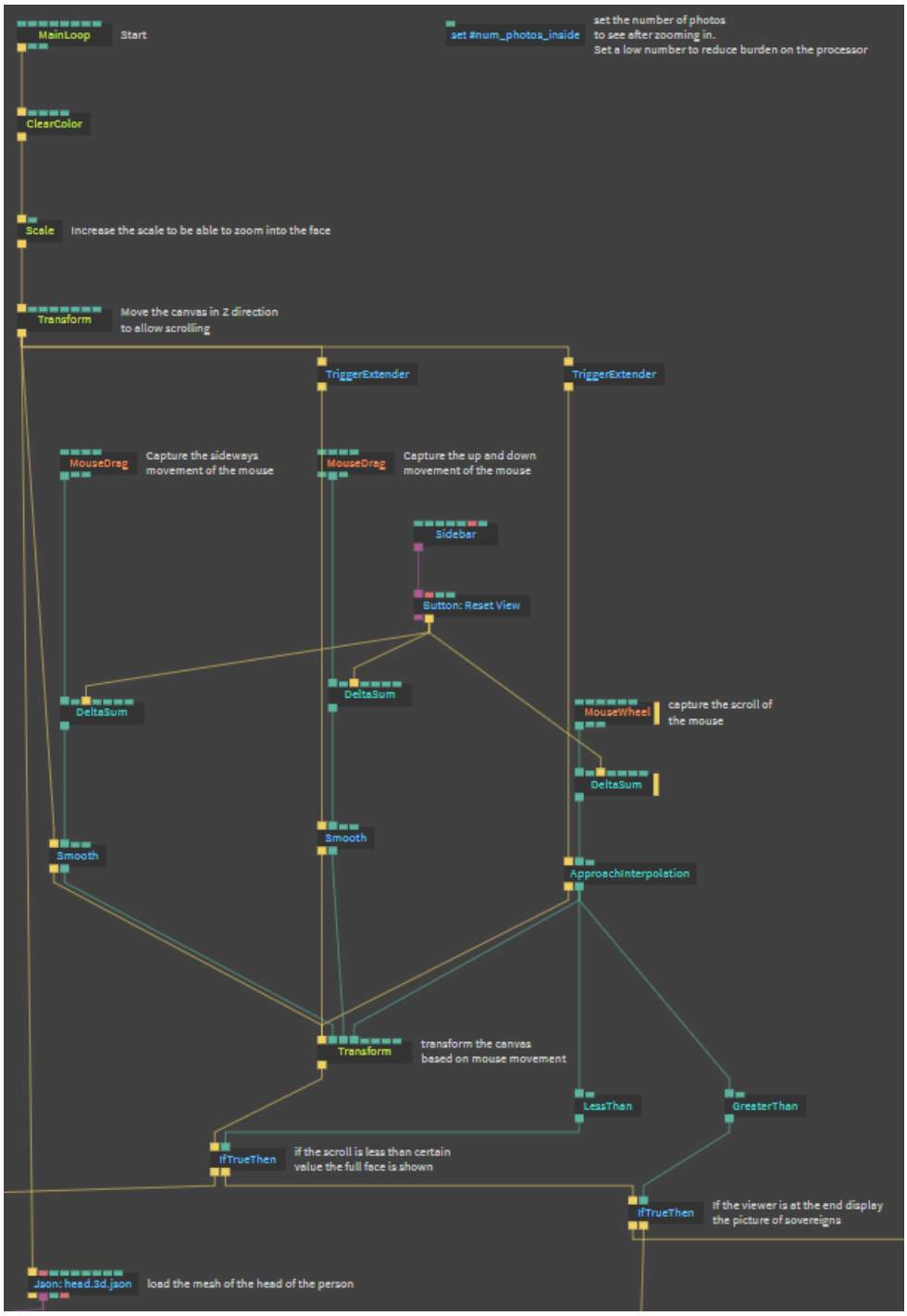

Figure 6.5: Main loop patch

Figure 6.6: Last screen

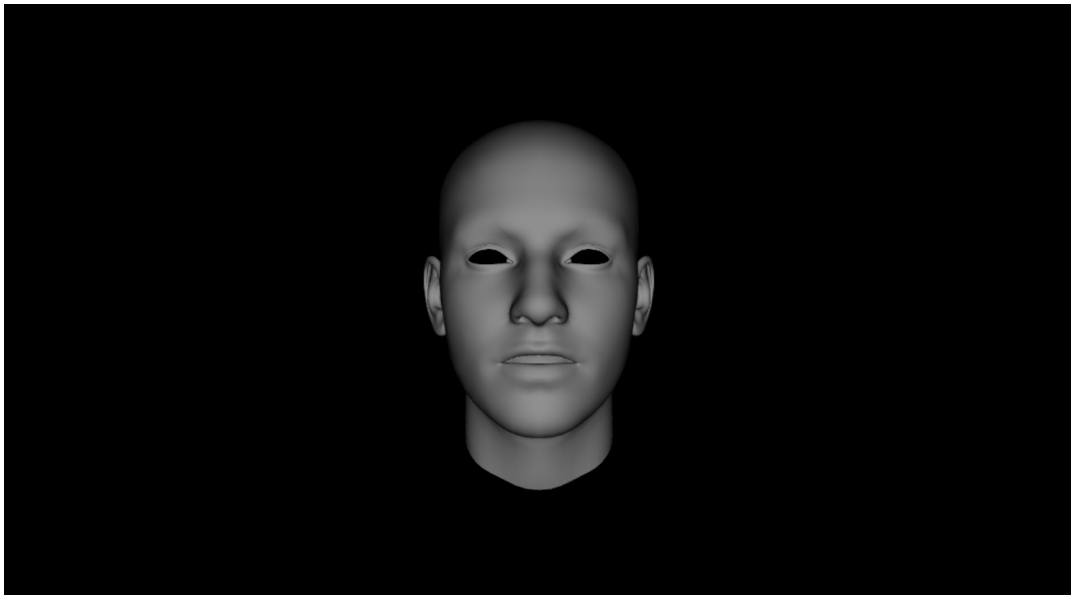

Figure 6.7: 3D face

the Transform op is the change in the scroll of the mouse obtained using MouseWheel[4] op. The IfTrueThen[5] op triggers the high-level view if the scroll is less than a threshold and a deep view in the opposite case. On zooming in further, the viewers encounter the screen with the question as shown in Figure 6.6. At the bottom of Figure 6.5, the Mesh3D[6] op loads a 3D face as seen in Figure 6.7. Lastly, the Sidebar[7] op was used to create a button that allows the viewers to reset the view to Figure 6.1.

6.2 High Level View

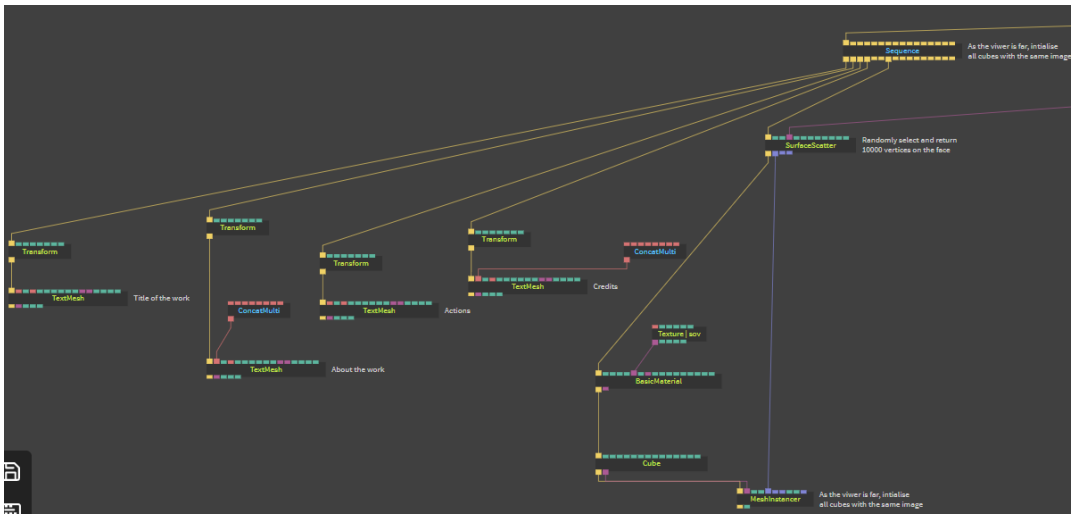

Figure 6.8: High level view patch

The code patch for the high-level view contains 2 main components. The first one is involved in the creation and selection of points in the mesh of a 3D face to place the cubes and add the images on those cubes (right side of Figure 6.8). To achieve this, first, the 3D face that was loaded earlier is passed as an input to the SurfaceScatter[8] op that provides various distribution methods to place many instances of geometry along the surface of a mesh. The op also takes the inputs on the number of points to output and the distribution type such as vertex of triangles in the mesh or their centres and outputs the 3D coordinates. For this project, the number of points were set at 10000 and the distribution of mesh vertices was selected. A Cube[9] geometry with a texture of the image in Figure 6.4 along with 3D coordinates was provided as input to the MeshInstancer[10] that draws the same cube multiple

[4] https://cables.gl/op/Ops.Devices.Mouse.MouseWheel_v2
[5] https://cables.gl/op/Ops.Boolean.IfTrueThen_v2
[6] https://cables.gl/op/Ops.Json3d.Mesh3d
[7] https://cables.gl/op/Ops.Sidebar.Sidebar
[8] https://cables.gl/op/Ops.Gl.SurfaceScatter_v2
[9] https://cables.gl/op/Ops.Gl.Meshes.Cube_v2
[10] https://cables.gl/op/Ops.Gl.MeshInstancer_v4

times on the GPU (if available).

The second component of this patch was to display the text. Four TextMesh[11] ops were used to draw the text relating to title, about, actions and the credits to the portraits. The position of these texts was adjusted using Transform op and multiple lines of text were concatenated together using ConcatMulti[12] op.

6.3 Load Portrait Data

The process of loading the data into *Cables* was asynchronous and the patch relating to this step is shown in Figure 6.9. The JSON file itself was loaded using the AjaxRequest[13] op which outputs the Data and a Boolean indicating if the data is loaded or not. This data is useful for creating the deep view and individual view. After loading the data, all the URLs to the thumbnail images were collected in an array using the GetValuesFromArrayOfObjects[14] op and *num_photos_inside* values are selected using ArrayChunk[15] op. As these URLs are not complete (Chapter 5) and are not on an HTTPS server, they are passed through a custom op called as CorsArray that produces the URLs that *Cables* can access to retrieve the images. The JavaScript code of the custom op is shown in Figure 6.10. It accepts an array of strings and prepends a proxy URL (https://cors.cables.gl/) and the actual prefix of the image URL (http://resources.slq.qld.gov.au/images/slq/pub/) to each of them. Then the extension of the image type (.jpg) was added to all the strings. These updated strings were returned as the output of the op. The URLs were then loaded as images using the TextureArrayLoaderFromArray[16] op that stores all the images in an array.

6.4 Deep View

The creation of a deep view follows steps that were similar to the high-level view expect for using a mesh instance. The code patch is shown in Figure 6.11. The same SurfaceScatter op was used to obtain the coordinates of the points on the mesh of the 3D face. However, in this case, only *num_photos_inside* number of points are only collected as output. Unlike the high-level, in deep view, rectangles were placed at each point and they contain different images. Hence the rectangles were placed in a loop using the Repeat[17] op. The output of the SurfaceScatter was looped over i.e., the 3D coordinates and for each set of coordinates, the point was transformed to that coordinate and a rectangle was placed there. At the same time, each rectangle was loaded with a texture that has the portrait of the soldier. The portrait was obtained using the ArrayGetTexture[18] op that accepts an array texture and the index as inputs and outputs the texture at the given index in the array. The array of textures was obtained from the data loading step and the index was obtained using the Repeat op.

[11] https://cables.gl/op/Ops.Gl.Meshes.TextMesh_v2
[12] https://cables.gl/op/Ops.String.ConcatMulti
[13] https://cables.gl/op/Ops.Json.AjaxRequest_v2
[14] https://cables.gl/op/Ops.Array.GetValuesFromArrayOfObjects
[15] https://cables.gl/op/Ops.Array.ArrayChunk
[16] https://cables.gl/op/Ops.Gl.TextureArrayLoaderFromArray
[17] https://cables.gl/op/Ops.Trigger.Repeat_v2
[18] https://cables.gl/op/Ops.Array.ArrayGetTexture

To maintain the aspect ratio of the portraits, the *aspect_ratio* output of the texture was multiplied by the height of the rectangle to obtain its width.

Additionally, to facilitate the individual view, the 3D coordinates were passed to the PhysicsBodiesArray[19] that adds the rectangles created about to the current world in the *Cables* patch and thereby allowing users to interact with them. The world in the *Cables* patch was created using the code patch shown in Figure 6.12. The steps involved in the creation were initialising a world with physics simulation using the World[20] op followed by a CastRay[21] op. It casts a ray on the bodies using the mouse pointer and tests if the ray intersects with anybody in the world. If the ray hits a body, then its name was given as the output along with other information.

6.5 Individual View

The individual view of a portrait is shown when a mouse hovers on one of the portraits in the deep view mode and it disappears if the mouse is moved away. The creation of an individual view contains two components, one retrieving the relevant data and two displaying the data. First, the portrait on which the mouse hovers was obtained as an output of the CastRay and is processed as shown in Figure 6.13. The name of the portrait is split to obtain the index of the portrait that corresponds to the index of the data in the JSON file. Using the index and the ArrayGetObject[22] op, the object that contains the data of an individual soldier was obtained. Using the keys, specifically date, unit, highres_image and name the values from the object are extracted. The high-resolution image URL is also not complete and accessible on a secure site, the URL is transformed using another custom op called *createimageurl*. This op is exactly the same as the previous *CorsArray* op except that this operates on an individual string and outputs a URL. This was used as an input to the Texture[23] op that loads the image in the URL as texture.

The second component uses the data retrieved in the previous step and places it on the screen. If the mouse hovers for more than 0.1 seconds on a portrait in the deep view, then a rectangle is placed at the centre of the screen whose coordinates were obtained using the CanvasInfo[24] op. The width of the rectangle was obtained by multiplying its height with the aspect ratio of the portrait and the texture from the previous step is placed on the rectangle. This was followed by placing the text below the image using Transform and TextMesh ops.

[19] https://cables.gl/op/Ops.Physics.PhysicsBodiesArray
[20] https://cables.gl/op/Ops.Physics.World
[21] https://cables.gl/op/Ops.Physics.CastRay
[22] https://cables.gl/op/Ops.Array.ArrayGetObject
[23] https://cables.gl/op/Ops.Gl.Texture_v2
[24] https://cables.gl/op/Ops.Gl.CanvasInfo

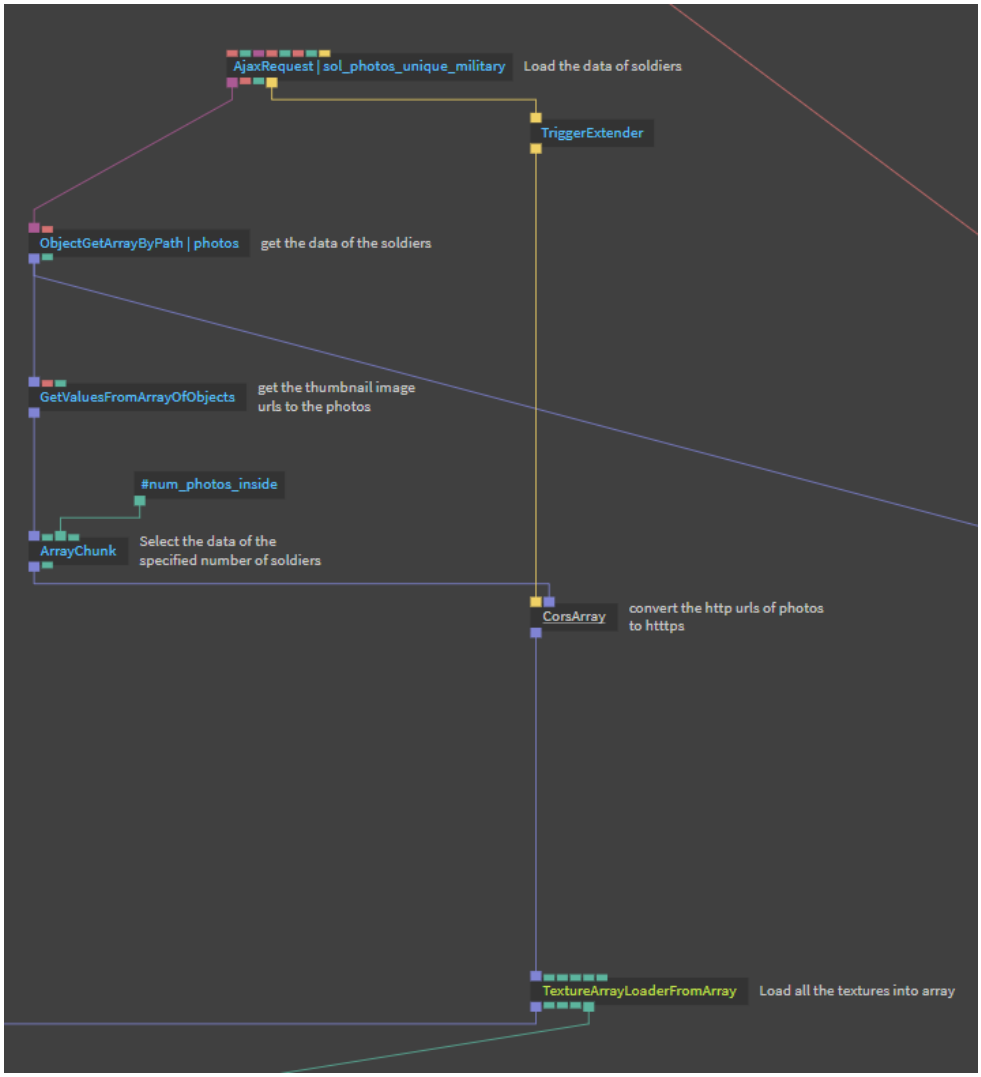

Figure 6.9: Data loading patch

```
const inTrig = op.inTrigger("Trigger in");

const inArrayPort = op.inArray("Input Array");
const outArrayPort = op.outArray("Output Array");

const CORS_CABLES_PROXY = "https://cors.cables.gl/";
const URL_prefix = "http://resources.slq.qld.gov.au/images/slq/pub/";
const URL_suffix = ".jpg";

inTrig.onTriggered = update;

function update()
{
    let arr1 = inArrayPort.get();

    const urlArray = arr1.map((item) => CORS_CABLES_PROXY + URL_prefix + item
+ URL_suffix);

    outArrayPort.set(urlArray);
}
```

Figure 6.10: Custom op (CorsArray) code

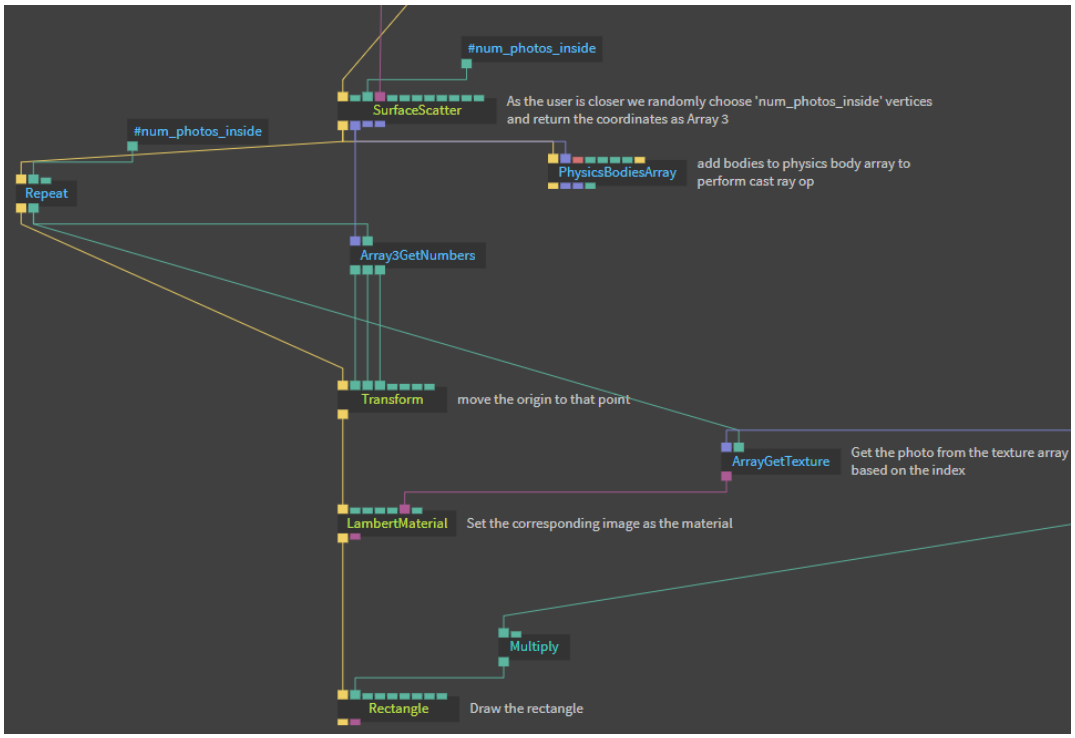

Figure 6.11: Deep view patch

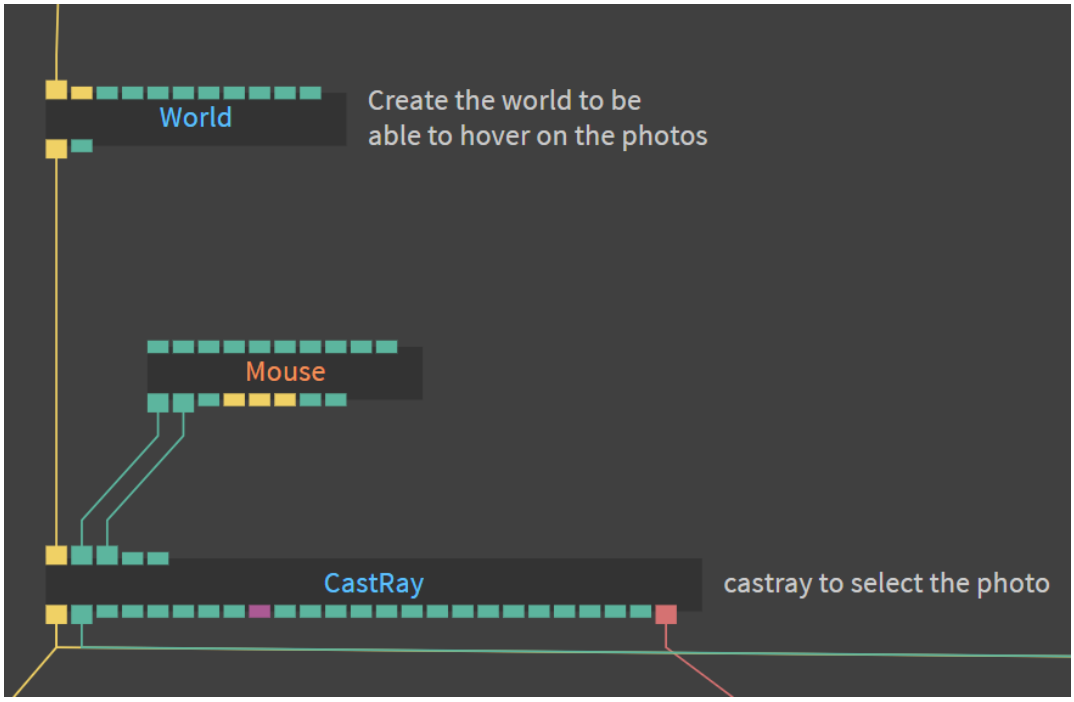

Figure 6.12: Physics world patch

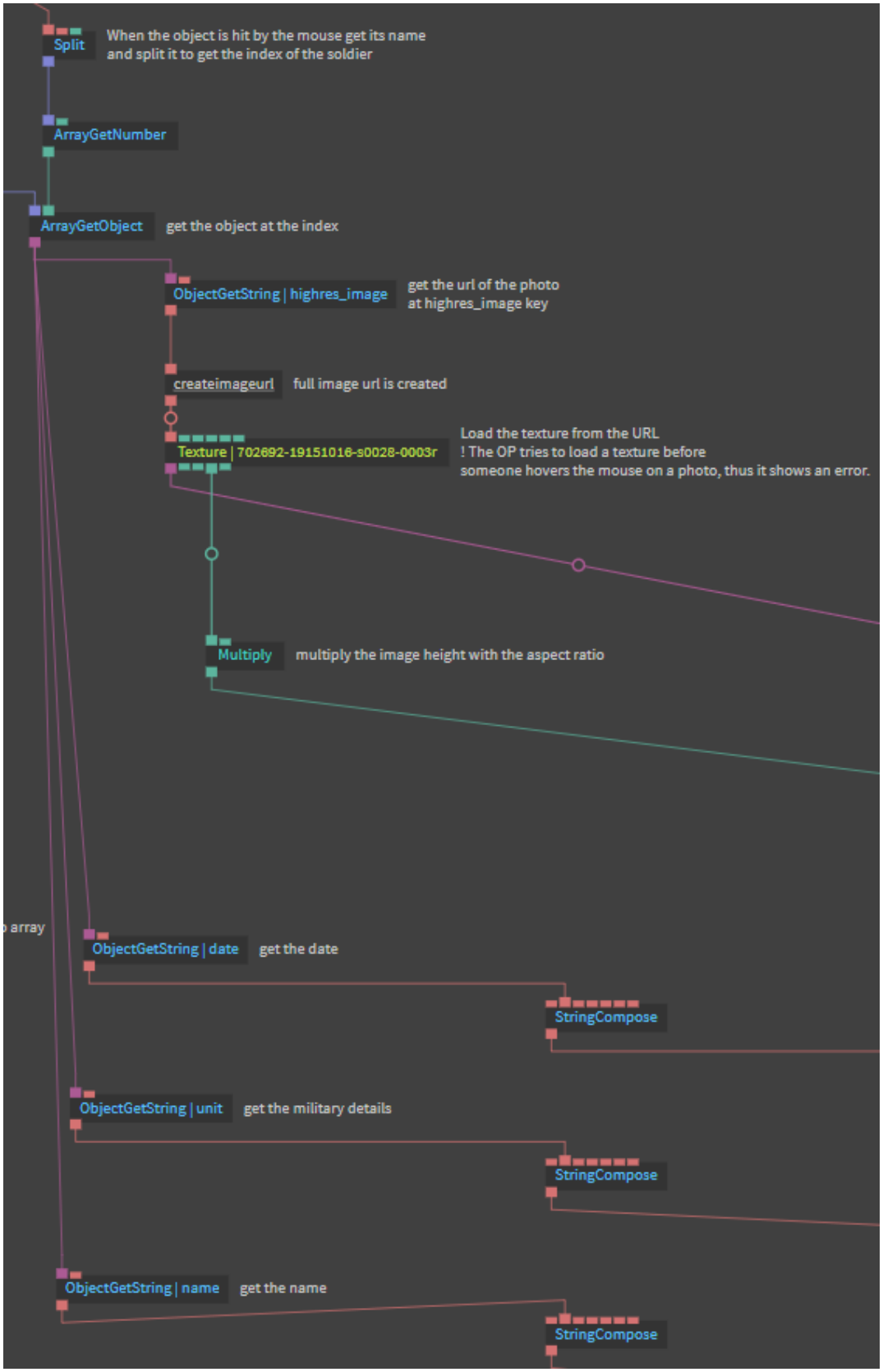

Figure 6.13: Individual view - Data retrieval

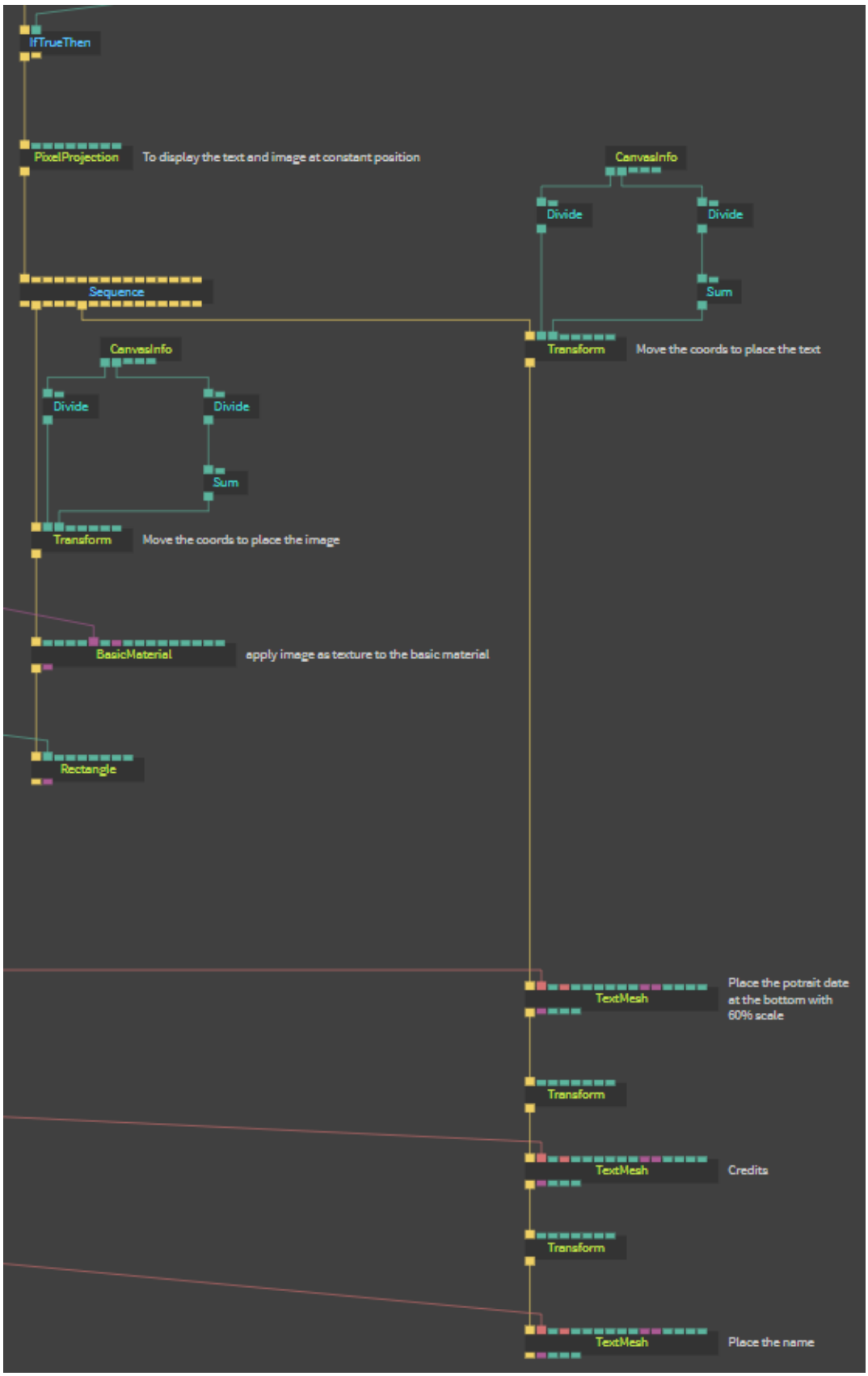

Figure 6.14: Individual view - Data display

Chapter 7

Future Directions

The current visualisation was created for the web due to the prevailing pandemic conditions. However, to create an immersive experience, this could be extended into a virtual reality mode. The conceptual idea is that the participants shall enter into a virtual room that is built as the face of the ruler during the war and it varies with each country. Then they can move around and pass through the portraits meaning that the viewers touch the lives of these lost men and using the tools such as Deep Nostalgia or the idea of Deep fakes, the soldier would introduce themselves and tell their war experiences to the viewer.

Chapter 8

Links

Cables visualisation URL: https://cables.gl/p/Qiub1B

GitHub Repository URL: https://github.com/ravinitheshreddy/face_of_the_war.git

Chapter 9

Credits & Acknowledgements

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[8] Undev. *Cables*. 2021. URL: https://cables.gl/.