**DECLARATION:** I understand that this is an **individual** assessment and that collaboration is not permitted. I have read and I understand the plagiarism provisions in the General Regulations of the University Calendar for the current year, found at <http://www.tcd.ie/calendar>. I understand that by returning this declaration with my work, I am agreeing with the above statement.

# Introduction

The purpose of the template is mainly to standardise the length of the report for the class. Please note that the section titles used here are not suggested for your report. You should rename and add/delete sections as you see fit.

Small deviations from the template will be forgiven. Just try to stick to it as close as you can.

MS Word and Latex versions of this template are provided. There may be small differences in the two templates.2

# Tools/Technologies

For this project. I used P5.js [1], D3.js [2] and Plotly [3]. My initial intention was to use P5js for some state management of the dashboard and to use D3js for graphs within that dashboard. However, I found D3js to be very tedious to work with (working with the browser DOM and CSS can be time-consuming and frustrating), so I eventually switched to Plotly, which was drastically easier to work with and I found I could achieve meaningful results in much less time.

# Data Sources

In terms of dataset types, all of the below datasets are tables (with items and attributes), with the exception of the Ireland TopoJSON Map, which is a geometry dataset (with positional information).

**Homelessness Report: [8]**

Each month, from January 2019 to January 2022, is provided by the CSO as separate datasets. For pre-processing, I appended the relevant yearly quarter as a column to each file so that this information could be used in the application (as other datasets I used do not have monthly data).

The *Region* value is a nominal (categorical) string value. All other values from the original dataset (e.g. *Total Adults, Male Adults, Female Adults*) are quantitative measurements.

**Homeless by Age, Gender: [4]**

This was the latest dataset I could find with an age breakdown, split by age. Since the year of this data is outside of the range of the other datasets (2019-2022), I made it clear in the heading of the population pyramid graph that this is 2016 data, to prevent the reader being misled. No pre-processing was required.

The *Age Group* value is quantitative and discrete (can be ordered), they are a series of age ranges (represented as strings). *Sex* is a categorical value. *Year* is quantitative and sequential, and *Value* is a quantitative measurement.

**Population by County [5]**

This dataset included population breakdowns by county, but only included 2016 and 2022 data (census years). In terms of pre-processing, I needed population estimates for 2019, 2020 and 2021, I use a linear approximation calculation in Excel to get these values, and saved them to the CSV.

**Ireland TopoJSON Map: [6]**

This dataset includes county/boundary information for the Republic of Ireland, so that it could be drawn as a SVG (for my Choropleth map). The only preprocessing I needed to do to this file was to fix some county names to match my other datasets (some had Irish language county names).

**RTB Average Rent: [7]**

From this dataset, I collected the RTB Average Monthly Rent for (i) the aggregated result for each County in Ireland (i.e. ignoring towns, postal codes) (ii) each individual property type (and the “All property types” aggregate), and (iii) collected data from 2019 Quarter 1 to 2022 Quarter 2 (to match with the homelessness dataset). All other filters (e.g. breakdown of number of bedrooms per property) were ignored.

**Homeless Report, by Month [8]**

*If you are not using Latex or Word, try to heed the following basic format description.*

* *Text should be 10pt Helvetica and single spaced*
* *Headings should be between 10pt to 16pt.*
* *A space of at least 6pt should be left after every paragraph or heading.*
* *Margins should be 1 inch on all four sides.*
* *A small header should be included and must contain your Name and Student ID. You should also indicate the module code, module name, year and assignment number.*

# Citing third party resources

It is important that You provide a reference to where you got your data. You must also cite any third party sources for elements you have included in your project or report. This includes code-snippets, libraries, tools.

There is no need to cite the lecture notes. Avoid repeatedly (more than once) citing commonly used references in the module such as Munzner’s book [1] unless you are directly quoting something.

A basic example of a bibliography is provided but you may alternatively use BibTex (for latex users), Endnote orany other bibliography manager.

# Criticism

If I were to start this project over, I think I would have worked only with Dublin data (assuming that a TopoJSON dataset for Dublin boundaries is available). I think that the fact that homelessness is a more significant issue in Dublin (per region capita) than any other county/region meant that it would likely be more useful/interesting to apply the same idioms and visualizations with the Dublin postcodes/towns, as opposed to national statistical regions/counties.

The biggest issue (in my opinion) with my Choropleth map is that the quantitative value for each county is not immediately clear – while there is a legend that shows the scale (0% - 0.362% of regions population), it would have been ideal to also have a text descriptor over each region to show the percentage value, too. While I made attempts to implement this, I found D3 to be very difficult to work with (if I had the chance to start over, I definitely would have done this graph in Plotly.JS). I introduced the Donut Charts (on click) for this reason. Despite the fact that this was a workaround, I feel that the benefit of this is that the immediate view of the dashboard is not overbearing – if the user wants more specific information on this value, they are able to click on the region/county, and the granular data is visible. This lessens the immediate mental load of the visualization.

During development of the animation (on the Choropleth map and the Family Composition graphs), I began to worry that it was not an effective-enough method to convey temporal information, in this case. If the user wants to compare 2016 data with 2022 data, there is an element of memory required, which is not ideal. However, I made three changes to diminish the impact of this – (i) the y-axis scale of the Family Composition graph is kept the same across all time spans – this is drastically better than the scale adjusting each time, as an increase in the number of homeless is much more visually obvious, and there is no additional mental load of thinking about the range of the y-axis (ii) I added a text value to the top of each stacked bar chart, so that the true quantitative value was immediately clear, and (iii) the user can select specific times on the slider (at the top of the screen) and immediately switch between them which allows for very immediate comparison. Maybe an even more ideal approach would be if the user could select a time, then (with a dropdown) select a second timespan, and for each region on the x-axis, the two stacked bar-charts (for both times) would be side-by-side. I think I would do it this way if I were to start-over.

Another issue with the animation is that it is not fluid – ideally, the change of color over time for a region would be smooth, to lessen mental load. This was primarily the consequence of some overarching project mistakes I made early on (e.g. trying to combine P5 with D3), it was my initial intention for the animation to be smooth but it eventually became too hard to implement. Again, this would have been much easier to achieve if I had done the project entirely in Plotly.JS.

# References

[1] <https://p5js.org/>

[2] <https://d3js.org/>

[3] <https://plotly.com/>

[4] <https://data.cso.ie/table/E5003>

[5] <https://www.cso.ie/en/releasesandpublications/ep/p-cpr/censusofpopulation2022-preliminaryresults/geographicchanges/>

[6] <https://raw.githubusercontent.com/deldersveld/topojson/master/countries/ireland/ireland-counties.json>

[7] <https://data.cso.ie/table/RIQ02>

[8] <https://data.gov.ie/dataset/homelessness-report-june-2022?package_type=dataset> **Note: This link is just one month’s report. The full list of Homelessness Report datasets used (from Jan 2019 to June 2022) can be found here:** <https://pastebin.com/5ffRGgcW>