

Monash University
FIT5147 Data Exploration and Visualisation
Semester 1, 2023

Programming Exercise 3: D3 (5%)

Programming Exercise 3: D3

Please carefully review all the requirements below to ensure you have a good understanding of what is required for your assessment.

1. [Due Date](#)
2. **Instructions & Brief**
3. **Assessment Resources**
4. **Assessment Criteria**
5. **How to Submit**
6. [Late Penalty](#)

1. Due Date

Monday, 15 May 2023, 9:30 AM

2. Instructions & Brief

In this assignment you are required to create an interactive visualisation using D3.

Relevant learning outcomes for FIT5147:

6. Implement interactive data visualisations using R and other tools

Details of the task:

The task is to use D3 to create a network visualisation using the provided HTML template.

The visualisation should identify levels of the scientific taxonomy of frogs, their preferred habitats and the months in which they were actually heard. You are to create this using the two provided datasets:

1. *frog_hierarchy.json*: For each type of frog, this contains the scientific taxonomy, the common name, the preferred habitat, a transcript of the frog's sound and the months in which it is expected to be heard. The dataset is accessed via the `hierarchyDataPath` constant in the template.

2. *frog_census.json*: For each type of frog, this contains the common name and the number of actual observations that were recorded of the sound of the frog. The value has already been averaged out per month during the data collection. The dataset is accessed via the `censusDataPath` constant in the template.

You must use the provided template to complete the programming exercise. The template contains a SVG canvas and sidebar element. The code draws on the canvas the lines of an unlabelled network diagram that represents the scientific taxonomy, including each recorded type of frog. It also displays the text and monthly segments of a timeline representing when each frog was actually heard in the census. There are also two legends. You are **not** expected to remove any aspect of this template.

Using the provided HTML template, the assignment task is to do the following:

1) Add nodes to the network visualisation

1. Each node represents a level in the hierarchical frog taxonomy in the *frog_hierarchy.json* dataset.
2. In the template, nodes are stored as `<g>` SVG containers in the `node` object. Their positions are automatically generated and stored as parameters `x` and `y`, which can be read from any callback function.
3. These containers are automatically moved to `(y, x)` because the tree is **pivoted** (i.e. the `y` coordinate refers to the horizontal position and `x` to the vertical one). Nonetheless, any SVG element added to a container will be automatically moved as well. Therefore, your task is to:
 - a. Add a symbol to represent each node.
 - b. To the left of the node, but not on it, add text to label the node. This will need to indicate each level in the network hierarchy and the name of the level (the *name* property).
 - c. For all leaf (or end) nodes, use a visual variable for the node to indicate the preferred habitat for the frog (the *habitat* property). We have included some code in the template for relevant textures that may help you, but any other viable visual variable can be used.
 - d. For all parent nodes (nodes with children), use a visual variable so they are distinctly different from the leaf nodes.
4. Update the Habitat legend to explain your use of visual variable.

2) Add bars to the timeline plots

1. Each row in the timeline represents in which months a certain type of frog was actually heard during the census, as recorded in the *frog_census.json* dataset.
 - a. Read the frog census data from the *frog_census.json* dataset (via the `censusDataPath` constant in the template).

- b. Map the data value to a scale range using a logarithmic scale (the *month* property). Do not hardcode the range of values.
- c. Map the value scale to a colour scale using the *d3.interpolateBlues* colour palette. The values should resemble the range shown in the legend. Note: The legend in the template is hardcoded rather than dynamically linked to the data because we would like you to work out how to map the scale yourself.
- d. For each relevant month, colour code the horizontal bar according to the scaled value based on the dataset's entries for the frog for that month. The colours should correspond to those seen in the legend.

3) Add interactivity to the visualisation

1. **Create a simple tooltip** that is triggered when the mouse is hovering over a node or timeline segment. Implement two or more of the following (a-c):
 - a. When hovering over a leaf node, the tooltip's text should show the preferred habitat (the *habitat* property)
 - b. When hovering over a node with children, the tooltip's text should show the number of children (the *children* property).
 - c. When hovering over a timeline segment for a month, the tooltip's text should show the average number of observations for that month and type of frog (the *month* property).

The building blocks for this tooltip (i.e., div element and CSS rules) have already been provided in the template. Each tooltip should follow these conventions:

- i. The tooltip should be positioned close to the mouse cursor, but not be overlapping directly on top of it.
 - ii. The tooltip should disappear when the mouse is moved away from the node or timeline segment.
2. **Implement hover highlighting** when the mouse is hovered over your chosen interaction element (node or timeline segment):
 - a. Appropriate styling should be used for the highlighting of nodes and segments when hovered over.
 - b. The node or segments should revert back its original state when the mouse exits it.

Note: It is possible to place the tooltip based on the mouse cursor's (*x*, *y*) coordinates or the position of the nodes and timeline segments. If selecting the latter option, remember that the tree coordinates are pivoted.

General Help Notes:

- The template uses D3 v7. This is important when referencing online resources which may use older versions of D3.
- You are allowed to make changes to the template, such as to add your own CSS rules, and adjust fonts and styling. However, any issues which arise from this (e.g., network graph or timeline no longer working, poor visual changes to the visualisation) may result in marks being deducted, even if not part of the given task.

- The datasets are stored on an online repository and are referenced via URL in the template (suffixed with "...DataPath"). You must NOT change these paths, nor should you download and use a local copy in your submission.
- Your code will be run through similarity detection software during the marking process. Be sure to acknowledge any sources in your code comments to avoid breaching academic integrity.
- Generative Artificial Intelligence (Generative AI) software or systems cannot be used for any part of this assessment task, including (but not limited to) generating written or visual components of your submitted work.

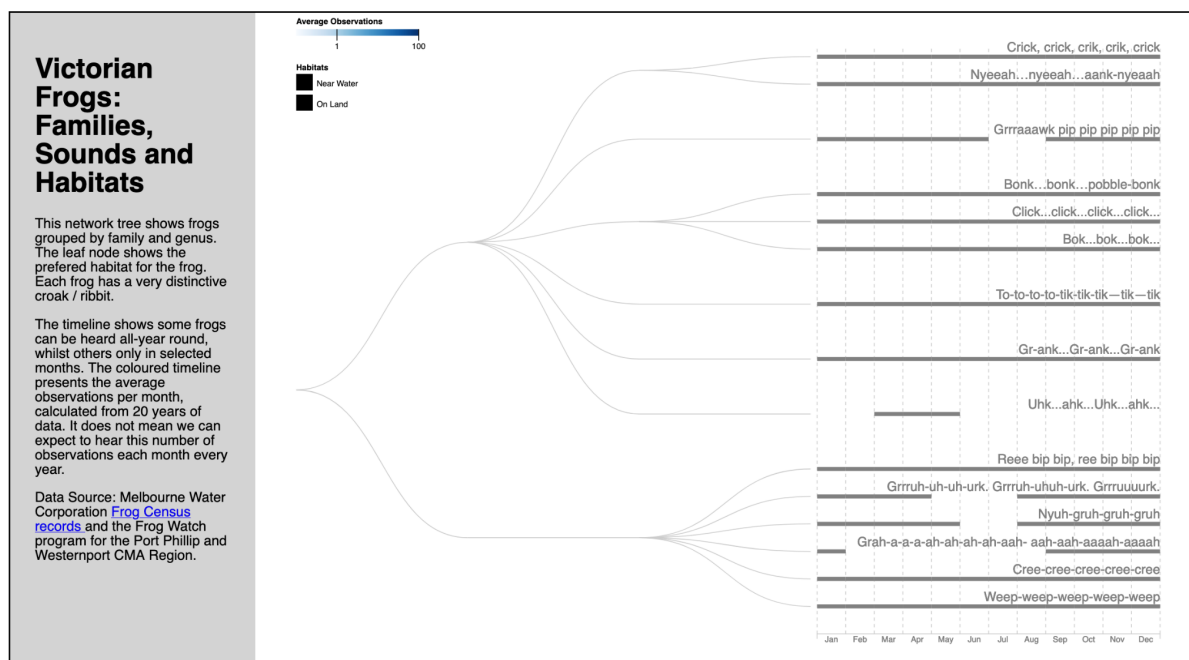
3. Assessment Resources

- [HTML Template:](#)

Note:

- The html file is zipped to ensure it is downloaded in the correct format from Moodle.
- The datasets are stored online and the paths are provided in the template.

The following is a screenshot of the template. Your nodes will be overlaid on top of the SVG canvas for the network graph in the middle. You need to colour code the horizontal segments on the timelines to the right. The information on the left provides a description of the data visualisation. You can amend or add to this text.



4. Assessment Criteria

The following outlines the criteria which you will be assessed against.

- Ability to create simple static visualisations using D3 [3%]

- Demonstrated ability to create basic SVG elements using D3 (nodes and timeline bars) [1%]
 - Demonstrated ability to link data to visual properties [1%]
 - Demonstrated ability to choose appropriate visual variables to encode data [1%]
- Ability to create interactive visualisations using D3 [2%]
 - Demonstrated ability to create an interactive visualisation in D3: tooltip [1%]
 - Demonstrated ability to create an interactive visualisation in D3: highlight on mouse over [1%]

Please note that marks will be deducted if the provided template is not used, or if your submission uses modified and/or local copies of the datasets. Remember that you are allowed to improve on the template with improved aesthetics (e.g., CSS) and more advanced interactions and/or layouts if you wish, but this is not required for full marks.

5. How to Submit

The code for the final interactive visualisation should be submitted through Moodle. Ensure that all necessary files for the visualisation are included. The code's components (i.e., HTML, CSS, JS) can either be in the same file or separated into individual files. Data files **should not be included** as these should be accessed via the URLs provided in the template.

Submit a zip file containing all files required to run your work. Name the zip file in this format: **[STUDENT ID]_[FIRST NAME]_[LAST NAME].zip**

6. Late penalty

See the late penalty guidelines in the Assessments section on Moodle.