Faculty of Science, Engineering and Technology

COS30045 Data Visualisation

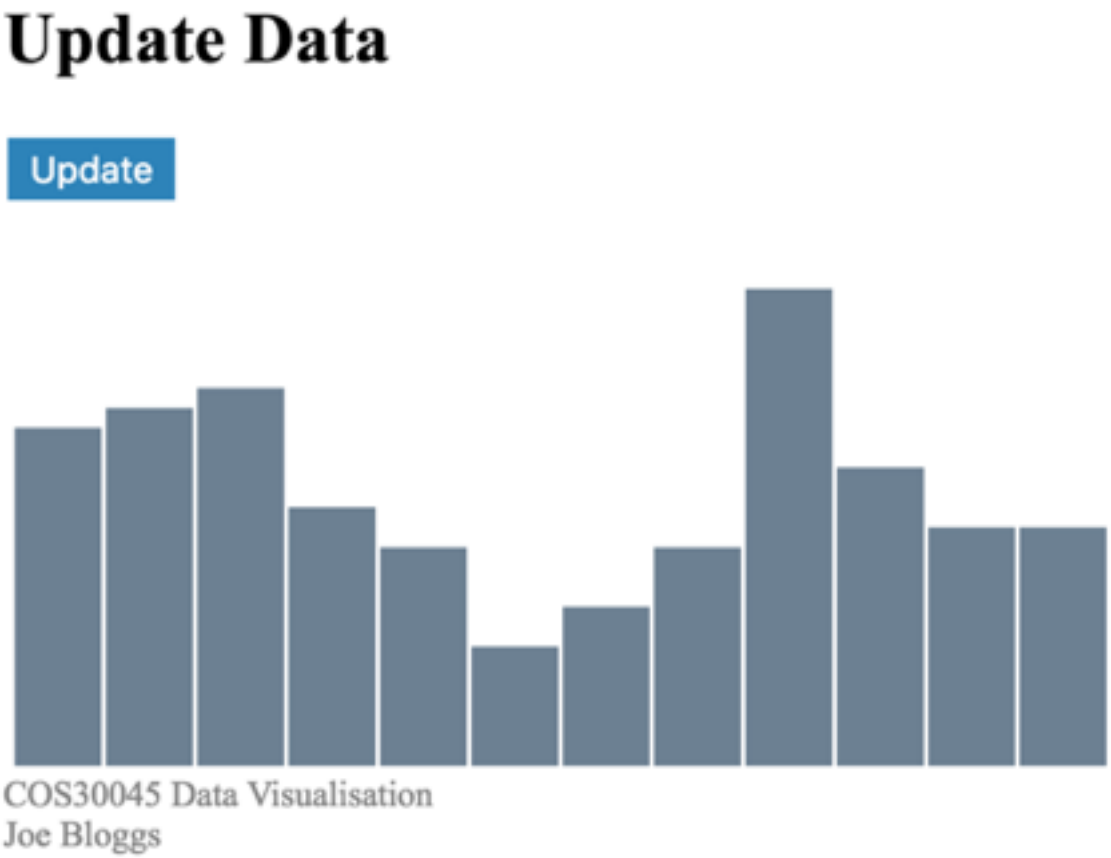
Task 5.1 D3 Updating the data

ILO	Create web-based interactive visualisations using real-world data sets.
Aim:	Use D3 to update your data.
Resources:	*Textbook:* Murray Ch 9 Murray on ProQuest Murray on Safari (Make sure you use v2 of Murray as per links above)
To be marked as Complete your submission must:	Submit working code that meets the requirements specified in document below. Demonstrate appropriate use of HTML, CSS and D3. Properly formatted code Well commented code with references to code sourced from web, stack overflow etc. where appropriate. Demonstrate and explain code to tutor in class.
Submission	Submit to Doubtfire • screenshot of final webpage demonstrating update feature • code Bring code to class to demonstrate to tutor

Note: The functions handling scale have changed between D3 v3 and D3 v4. This is something to be aware of if you are doing your on research into this topic. Make sure you use Murray Ed 2. Code examples from Ed 1 will not work.

Overview

In this tutorial we will start with your code from Task 2.2 (the bar chart). At the end of this Task you should end up with a bar chart that refreshes with random data (up to 25) every time you press the update button. It should look a bit like this:



Step 1: Start with the code from Task 2.2

We will start with the code from the previous bar chart task. Unlike your scatter plot from 3.1 and 3.2 this chart is not yet scalable. So our first job is to make it scaleable.

Step 3: Scaleable Ordinal Axis

In the scatter plot example we use `scaleLinear ()` to generate the scale for us. However, `scaleLinear()` is designed for use with continuous variables. Although the columns in this bar chart are also numbers, most bar charts we build will use categorial data. In this case we are going to pretend that our data is ordinal in nature (i.e. has some kind of order to it such as high, medium and low).

We can use `scaleBand()` to generate an ordinal scale. As per using scaleLinear() we need to specify the input domain and the output range. If you were using true ordinal data you could use the category labels to specify the domain input bands as in:

```
                .domain(["high", "medium", "low"])
```

However, because we are using a set if of numbers we can generate numbers from *0* to *range* for our bars using `d3.range()`. As before we also need to specify the out put range relative to the current size of our svg using `range()`. D3 will now calculate the width each 'band' needs to be in pixels to fit the length of the input domain.

Go ahead now and update the x attribute of our generated rectangles to be relative to our new `xScale(i)`.

```
        .attr("x", function(d, i) {
            return xScale(i);
        })
```

If you save and run this you will see that nothing has changed visually in the chart.

At the moment our width of our rectangles is determined by dividing the width of the svg canvas buy the data set length (minus a bit of padding).

```
            .attr("width", w / dataset.length - barPadding)
```

However, we can now make use of our scale to calculate the width of our bars using `bandwidth()`.

```
            .attr("width", xScale.bandwidth())
```

If you save and run this you will see that something has changed visually in the chart. Currently our scale does not specify any padding. So lets go back to the scale and add padding. This time we can use `paddingInner()` to calculate the padding rather than hard coding the padding as a variable.

```
var xScale = d3.scaleBand()
                .domain(d3.range(dataset.length))
                .range([0,w])
                .paddingInner(0.05);
```

generates a padding value of 5% of the band width.

Now save your file and note that the padding is back! However, the rectangles are a bit fuzzy. If you check the DOM you will see that the calculated values for the bandwidth are to many decimal places, and because this does not line up neatly with full pixels it looks a bit tragic.

```
▼<svg width="500" height="250">
    <rect x="0" y="194" width="39.7489539748954" height="56" fill="slategrey"></rect>
    <rect x="41.84100418410042" y="230" width="39.7489539748954" height="20" fill="slategrey"></rect>
    <rect x="83.68200836820084" y="146" width="39.7489539748954" height="104" fill="slategrey"></rect>
    <rect x="125.52301255230125" y="158" width="39.7489539748954" height="92" fill="slategrey"></rect>
```

So you can use `rangeRound()` instead of `range()` to round the bandwidths to whole numbers.

```
▼<svg width="500" height="250">
    <rect x="5" y="194" width="39" height="56" fill="slategrey"></rect>
    <rect x="46" y="230" width="39" height="20" fill="slategrey"></rect>
    <rect x="87" y="146" width="39" height="104" fill="slategrey"></rect>
    <rect x="128" y="158" width="39" height="92" fill="slategrey"></rect>
```

Now your bars will look crisp and clear.

Step 4: Add Scale for y-axis

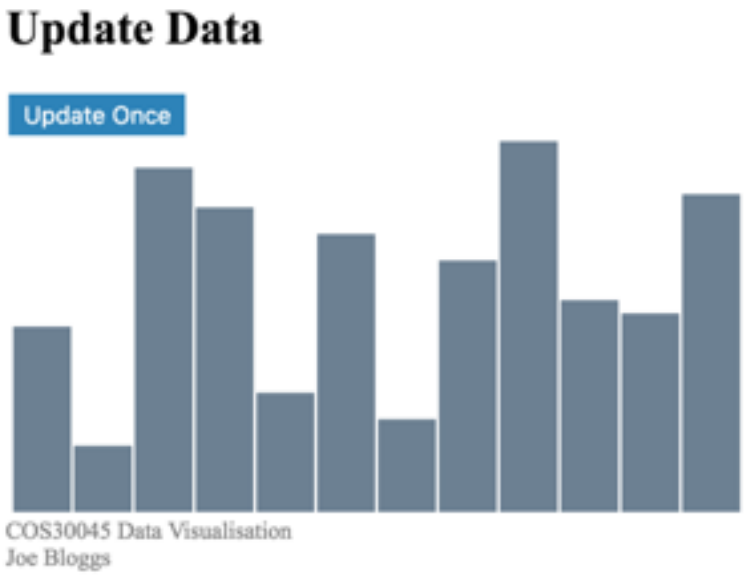
Now you have your x-axis scaleable, it's time to do the same for your y-axis. In constructing your yScale remember that:

- the y data is quantitative data
- the highest value in the data set domain can be found using `d3.max()`
- you need to use yScale in defining both the x position and the height of the rectangles.

Step 4: Updating the data: adding an event listener

A key aspect of using D3 is that we can make *interactive* charts, that is the user can make some change to their view of the data. In Task 1.2 we used a button to change the image file being displayed. Now we are going to use a button to update the data in our bar chart.

Go grab the code from 1.2 and add your button into this program (note you will need to modify it a bit). To start with we will be using the button to update the data once with a new static data set. When your button is added it should look something like this:



You can use D3 to listen for a click on your new button. Test that your button works with a pop up alert.

```
d3.select("button")
    .on("click", function() {
        alert("Hey, the button works!")
    });
```

Once your button is working, it's time to up make it do something more interesting, like update the data set. Firstly, add your new data set. Make the data different to the one start with.

```
var dataset = [24, 10, 29, 19, 8, 15, 20, 12, 9, 6, 21, 28];
```

Next you need to update rectangles with the data from the new data set and update the y and height values with the new data.

```
svg1.selectAll("rect")
    .data(dataset)
    .attr("y", function(d) {
        return h - yScale(d);
    })
    .attr("height", function(d) {
        return yScale(d);
    })
```

Step 5: Updating the data over and over again!

Instead of just having one hard coded set of data, lets add in a randomly generated data set.

Add in some code for randomly generating numbers when the button is pushed.

```
var numValues = dataset.length;

dataset = [];

for (var i = 0; i < numValues; i++) {
    var newNumber = Math.floor(Math.random()* maxValue);
    dataset.push(newNumber);
}
```

Make sure you remember to add in a new variable for maxValue. Set it to 25. Now you should be able to get a new set of data between 0 and 24 every time you click the update button.

If you added labels to your chart in 2.1, go to Murray Ch 9 (p 158) for some hints about how to make your labels move with your updated data.

Take a screenshot and be ready to demonstrate your code in class!