

CSE 564 - Visualization Assignment 1

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Dataset : U.S. News and World Report's College Data

(<https://vincentarelbundock.github.io/Rdatasets/csv/ISLR/College.csv>)

Question 1: pick a variable and bin it into a fixed range (equi-width) of your choice

Approach:

I have chosen the attribute, “Enroll” as my default option for the default bar-graph on screen load. Also a default bin size as 6. This bin size will be dynamically picked from the default value of the slider.

```
<br/>  
<input class="slider" id="binSize" type='range' min="2" max="150" value="6" style="width:500px">
```

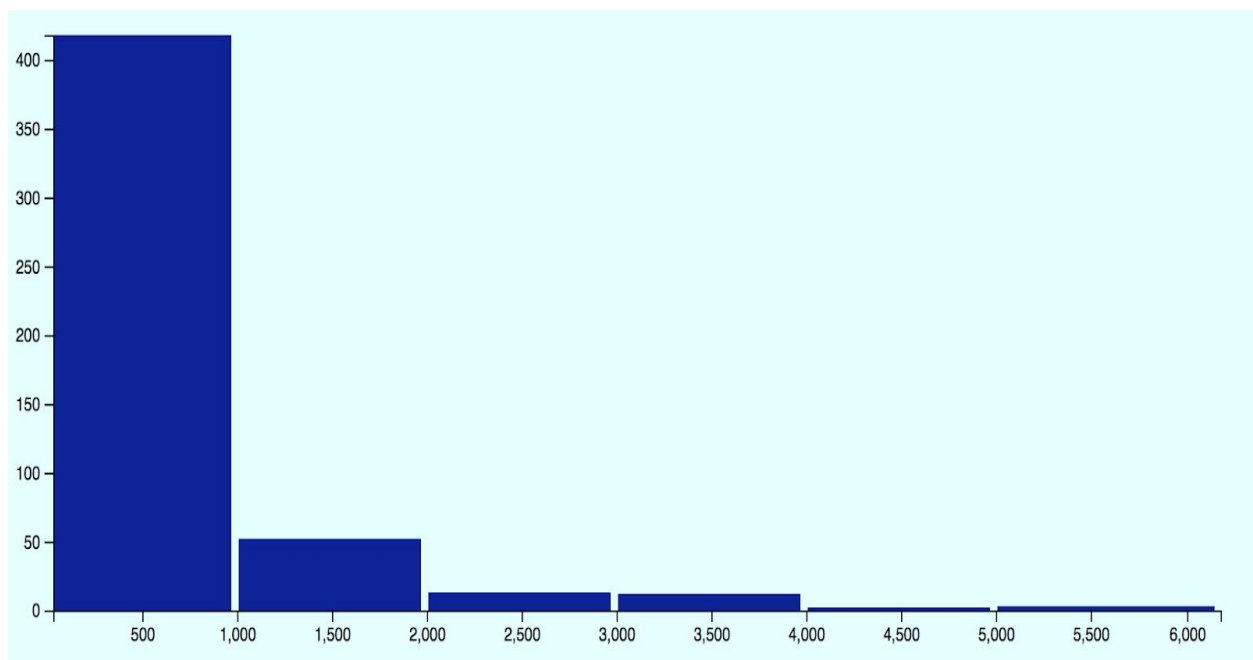
```
/* ASSIGN DEFAULT BIN COUNT TO 5 */  
var binsCount = parseInt(d3.select("#binSize").property("value"));
```

And this binsCount variable is given to the threshold() to create the bins.

```
/* CREATE BINS USING HISTOGRAMBAR-GRAPH OF D3 WHICH USED BINS COUNT FROM SLIDER */  
var bins = d3.histogram()  
  .domain(x.domain())  
  .thresholds(binsCount)(map);
```

Question 2: create a bar chart of the variable you picked in 1.

Graph:



Approach:

I am creating the data required to be visualized on a bar graph based on the attribute that i get from drop down. Here, that one variable would be “Enroll” column. I have created x and y axes with domains and ranges, and created the bin using d3.histogram() and the data that i have retrieved from csv file. I have scaled the axes and the bars accordingly to fit into the svg and center align on the html page. Basically the height of each bar would be the count of numbers of that variable that lie between the corresponding bins. Hence, I have returned d.length for y axis domain based on its data.

```
/* CREATE THE DATA THAT NEEDS TO BE BINNED WITHIN A RANGE */
map = data.map(function(d,i){ return (+d[column]); })
/* CREATE THE X AXIS DOMAIN */
x.domain([d3.min(map),d3.max(map)]);

/* CREATE BINS USING HISTOGRAM/BAR-GRAPH OF D3 WHICH USED BINS COUNT FROM SLIDER */
var bins = d3.histogram()
    .domain(x.domain())
    .thresholds(binsCount)(map);

/* CREATE THE X AXIS DOMAIN AND RANGE*/
y.domain([0, d3.max(bins, function(d) { return d.length; })))
    .range([height, 0]);

/* SCALE THE X AND Y AXIS TO FIT INTO THE SVG */
g.append("g")
    .attr("class", "axis axis--x")
    .call(d3.axisBottom().scale(x))
    .attr("transform", "translate(160," + 400 + ")");
g.append("g")
    .call(d3.axisLeft().scale(y))
    .attr("transform", "translate(160," + 100 + ")");

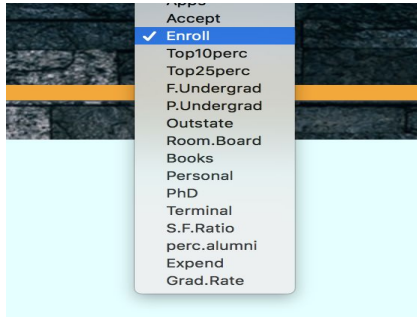
/* CREATE THE BAR GRAPH WITH ABOVE BINS */
var bar = g.selectAll(".bar")
    .data(bins)
    .enter().append("g")
    .attr("class", "bar")
    .attr("transform", function(d) {
        return "translate(" + x(d.x0) + "," + y(d.length) + ")";
    });

/* TRANSLATE THE BAR GRAPH TO FIT WITHIN THE AXES/SVG AND PROVIDE MOUSEOVER AND MOUSEOUT FEATURES */
bar.append("rect")
    .attr("width", function(d) { return (x(d.x1) - x(d.x0) - 5)}))
    .attr("height", function(d) { return height - y(d.length); })
    .attr("transform", "translate(161, 100)")
    .on("mouseover", onMouseOver)
    .on("mouseout", onMouseOut)
    .transition()
    .ease(d3.easeLinear)
    .duration(200)
    .delay(function(d, i){ return i*50; });
bar.transition().duration(300)
    .attr("y", function(d, i){ return y(d.length); })
    .attr("height",function(d, i){ return height - y(d.length); })
bar.exit().remove();
```

Question 3: using a menu, allow users to select a new variable and update chart

Approach:

I have created an html div tag to insert a select dropdown and fetch the value from there.



```
var change = d3.select("#button").on("click", changeend);
var selectfrom = d3.select("#drop")
    .insert("select", "svg")
    .on("change", updategraph);
var attributes = Object.keys(attrs);

/* DEFAULT VALUE OF THE DROP DOWN */
var optionName = "Enroll";
selectfrom.selectAll("drop")
    .data(attributes)
    .enter()
    .append("option")
    .attr("value", function(d){ return d; })
    .property("selected", function(d){ return d===optionName; })
    .text(function(d){ return d; })
```

I have set the default option to be “Enroll” variable. When the change of variable happens via the drop down, updategraph function will be called. Here, the specified function (bar/pie chart) will be called based on the “pi” toggle value.

```
/* UPDATEGRAPH FUNCTION CHANGES THE GRAPH BASED ON PIE OR BIN CHANGE */
function updategraph()
{
    // console.log(binsCount);
    d3.select("#piechart").remove();
    d3.select("#bargraph").remove();
    col = d3.select('select').property('value');

    if(pi === true)
    {
        piechart(col);
    }
    else
    {
        bargraph(col);
    }
}
```

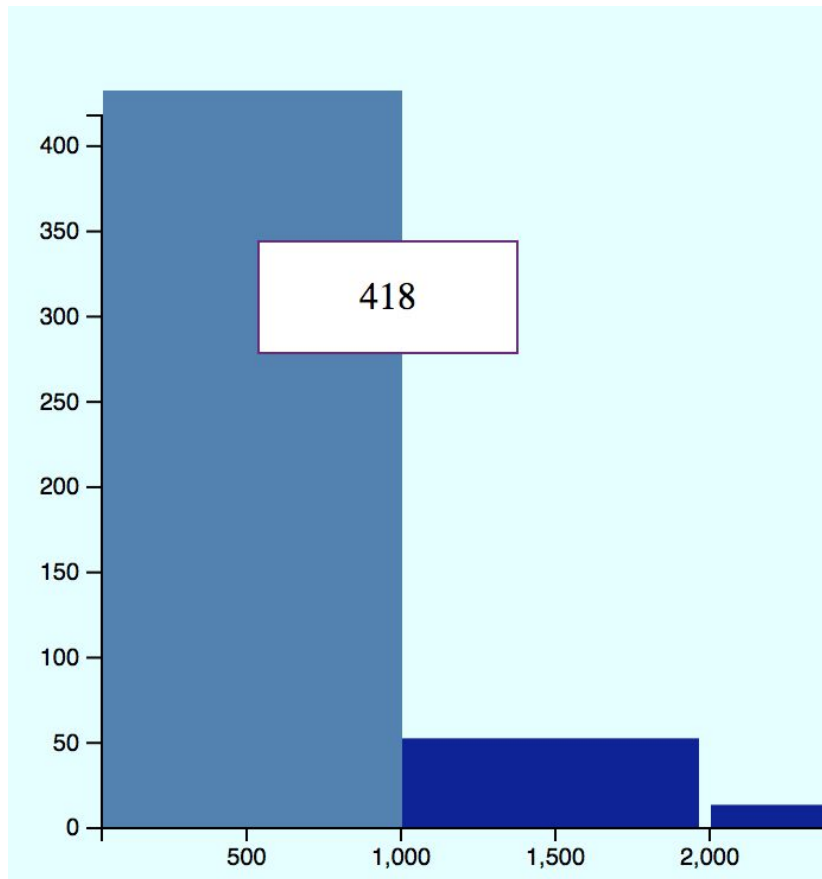
Question 4 & 5: only on mouse-over display the value of the bar on top of the bar (and on mouse-over make the bar wider and higher to focus on it

Approach: On Mouse over I have increased the width and height of the bar a little and magnified the graph accordingly. I used tooltip to display data on hover the bar chart.

```
/* BELOW FUNCTION IMPLEMENTS THE MOUSE_OVER LOGIC FOR BAR GRAPH */
function onMouseOver(d, i) {
    rect = d3.select(this).attr('class', 'hover');
    rect.transition()
        .duration(400)
        .attr("width", x(d.x1) - x(d.x0))
        .attr("height", function(d) { return height - y(d.length) + 10; })
        .attr("transform", "translate(161,90)");

    g.append("g").append("text")
        .attr('class', 'val')
        .attr('x', function() {
            console.log((i+1)*(x(d.x1) - x(d.x0) ) - 250);
            return (i+1)*(x(d.x1) - x(d.x0) ) + 50;
        })
        .attr('y', function() {
            console.log(y(d.length) + 10);
            return y(d.length) + 105;
        });
    tooltip
        .style("left", d3.event.pageX - 50 + "px")
        .style("top", d3.event.pageY - 70 + "px")
        .style("display", "inline-block")
        .html(d.length);
}

/* BELOW FUNCTION IMPLEMENTS THE MOUSE_OUT LOGIC FOR BAR GRAPH */
function onMouseOut(d, n){
    tooltip.style("display", "none");
    d3.select(this).attr('class', 'bar');
    d3.select(this).transition().duration(400)
    /* RETAIN THE ORIGINAL VALUES ON MOUSE OUT*/
    .attr('width', x(d.x1) - x(d.x0) -5)
    .attr("height", function(){ return height - y(d.length); })
    .attr("transform", "translate(161, 100)");
    d3.selectAll('.val').remove()
}
```

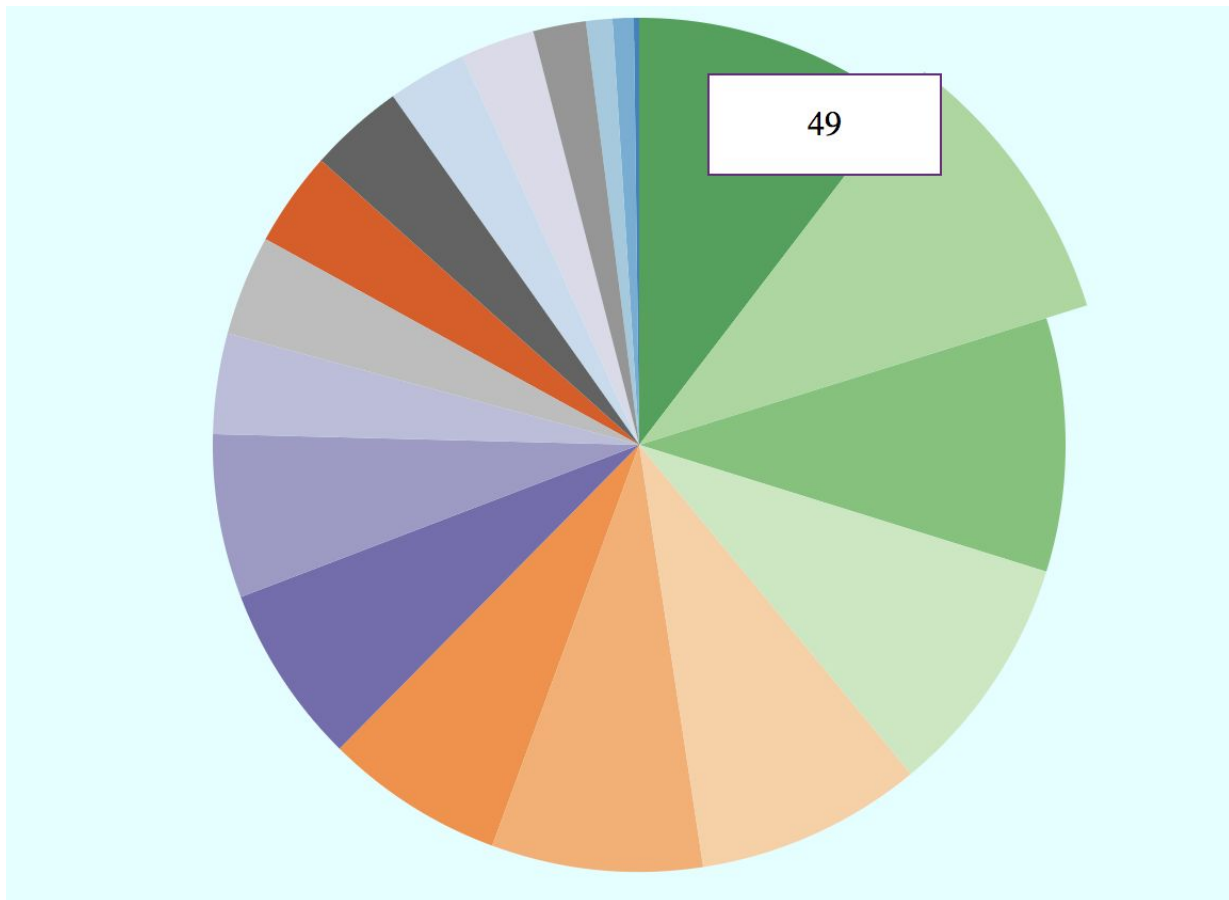


Question 6: on mouse-click transform the bar chart into a pie chart (and back)

Approach: I have added a button Change Chart that transforms the pie-chart svg to bar-graph and vice versa.

```
/* THIS FUNCTION GETS CALLED WHEN CHANGE CHART BUTTON IS CLICKED */  
function changeChart()  
{  
  /* CHANGES THE BOOLEAN VALUE OF PIE WHETHER TO SHOW OR NOT. BASIC  
  if(pi === true)  
  {  
    pi = false;  
  }  
  else  
  {  
    pi = true;  
  }  
  /* THEN CALL UPDATEGRAPH */  
  updategraph();  
}
```

changeChart function() basically just chages the value of pi from false to true and vice versa.



Code Snippet:

I have implemented pi chart using the d3.piw() function by giving bins as the input and defining couple of arcs, one for standard sectors of pie chart and the other to increase the radius on mouse hover and decrease back on mouse out.

```
/* PROVIDE THE COLOR FOR SVG AND TRANSLATE TO FIT IN THE CENTER OF THE SCREEN */
svg.append("rect")
  .attr("width", "100%")
  .attr("height", "100%")
  .attr("fill", "#E0FFFF")
  .attr("transform", "translate(240,20)");
svg.append("text")
  .attr("transform", "translate(300,0)")
  .attr("x", 10)
  .attr("y", 50)
  .attr("font-size", "24px")
  .text("U.S. News and World Report's College Data");
var g = svg.append("g")
  .attr("transform", "translate(" + width/2 + "," + height/2 + ")");

/* CREATE THE PIE CHART USING PIE() FUNCTION OF D3 */
pie = d3.pie()
  .value(function(d){
    return d.length;
  });

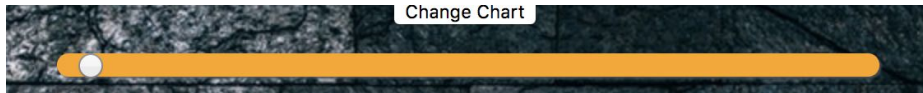
/* CREATE AN ARC VARIABLE USING INNER AND OUTER RADIUS */
cir = d3.arc().outerRadius(radius).innerRadius(0);
/* CREATE AN ARC VARIABLE USING INNER AND OUTER RADIUS FOR HIGHLIGHT OF THE SELECTED ARC*/
cir2 = d3.arc().outerRadius(radius+20).innerRadius(0);

/* CREATE ARCS USING THE BINS,cir FROM ABOVE */
/* HIGHLIGHT THE ARCS AND DISPLAY THE VALUE USING cir2 ARC LABEL */
arc = g.selectAll(".arc").data(pie(bins)).enter().append("g")
  .append("path").attr("d", cir).attr("transform", "translate(120, -10)")
  .attr("fill", function(d, i){ return color(i)})
  .on("mouseover", function(d){
    d3.select(this).transition()
      .duration(400)
      .attr("d", cir2);
    tooltip
      .style("left", d3.event.pageX - 50 + "px")
      .style("top", d3.event.pageY - 70 + "px")
      .style("display", "inline-block")
      .html(d.data.length);
  })
  .on("mouseout", function(d, i){
    tooltip.style("display", "none");
    d3.select(this).transition()
      .duration(400)
      .attr("d", cir);
  });
```


Question 7: mouse moves left (right) should decrease (increase) bin width/size

Approach:

I implemented a slider using `<input type="range">` of html. This takes min value as 2 and max value as 50. This value, I am passing to the `threshold()` function, which will create the bins accordingly.



```
/* GET THE VALUE FROM SLIDER AND POPULATE THE NUMBER OF BIN */
d3.select("#binSize").on("input", getBins);
function getBins()
{
    var sliderInput = d3.select(this).property("value");
    binsCount = parseInt(sliderInput);
    updategraph();
}
```

```
/* CREATE BINS USING HISTOGRAMBAR-0
var bins = d3.histogram()
    .domain(x.domain())
    .thresholds(binsCount)(map);
```

References (Used for code):

1. Histogram using d3 chart: <http://bl.ocks.org/nnattawat/8916402>
2. Simple d3.js tooltip: <http://bl.ocks.org/d3noob/a22c42db65eb00d4e369>
3. Simple Pie Chart in d3: <http://bl.ocks.org/enjalot/1203641>
4. Also I took help from `animated_bar.html` that was shared with us by the TA.