**Application requirement:**

Any text editing software (recommended: Sublime Text <http://www.sublimetext.com>)

Any browser (recommended firefox or chrome)

**Basics:**

1. **HTML (Hypertext Markup Language):** structure content for web browsers
   * **DOM (Document Object Model):** the hierarchical structure of HTML
   * **More html tags:** http://www.w3schools.com/tags/

lab1.html

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| --- |
| <HTML>  <HEAD>  </HEAD>  <BODY>  I love Dr. Hsiao!  </BODY>  </HTML > |

1. **CSS (Cascading Style Sheets):** style the visual presentation of HTML pages

* File extension is \*.css (For example: **lab1.css)**
* Two ways to style your webpages.

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| --- |
| <HTML>  <HEAD>  <style type="text/css">  body {  color: white;  background-color: purple;  }  </style>  </HEAD>  <BODY>  I love Data Visualization!  </BODY>  </ HTML > |
| <HTML>  <HEAD>  <link rel="stylesheet" type="text/css" href="css/**lab1.css**">  </HEAD>  <BODY>  I love Data Visualization!  </BODY>  </HTML>  Create **lab2.css** separately:  body {  color: white;  background-color: purple;  } |

1. **JavaScript (dynamic scripting language): tell our browsers to make changes to a page after it has already loaded**

* File extension is \*.js (For example: [http://d3js.org/**d3.v3.min.js**](http://d3js.org/d3.v3.min.js)**)**
* Two ways to incorporate javascripts to your webpages.

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| <HTML>  <HEAD>  <link rel="stylesheet" type="text/css" href="css/lab2.css">  <script language="JavaScript">  function processClick() {  var buttonValue = document.getElementById('clickButton1').value;  alert(buttonValue);  }  </script>  </HEAD>  <BODY>  I love Data Visualization!  <FORM NAME="myForm">  <INPUT TYPE="button" id="clickButton1" VALUE="this button is clicked!" onClick="processClick();">  </FORM>  </BODY>  </HTML> |
| <HTML>  <HEAD>  <link rel="stylesheet" type="text/css" href="lab1.css">  <script src="js/lab1.js"></script>  <script src="http://d3js.org/d3.v3.min.js"></script>  </HEAD>  <BODY>  I love Data Visualization!  <FORM NAME="myForm">  <INPUT TYPE="button" id="clickButton1" VALUE="this button is clicked!" onClick="processClick();">  </FORM>  </BODY>  </HTML> |

1. **SVG (Scalable Vector Graphics)**

More shapes and <http://www.w3schools.com/svg/>

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| <BODY>  …  <svg >  <line x1="50" y1="50" x2="100" y2="100" stroke-width="10" stroke="red" />  <line x1="100" y1="100" x2="200" y2="0" stroke-width="10" stroke="black" />  </svg>  …  </BODY> |
| Q1: Can you draw a smiley face in SVG ?  Q2: Can you draw a ASU logo in SVG? (submit it with assignment#1 for 2 pt bonus)  Macintosh HD:Users:Sharonpova:Desktop:Screen Shot 2013-09-17 at 11.39.34 PM.png MacOS:Users:ihsiao1:Documents:2Courses:CSE591_DataVis:2018Spring:lab:lab_d31:asu_logo.gif |

**Finally…**

1. **D3 (Data Driven Documents)**

* Basic web (programming)
* Graph basics
* **Data binding**

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| --- |
| <HEAD>  …  <script src="http://d3js.org/d3.v3.min.js"></script> //include d3 javascript before lab1.js  <script src="lab2.js"></script>  …  </HEAD> |
| **Control a document object by d3 selector:** when the button is clicked, change background color (modify lab1.js)  d3.select("body").style("background-color","#FFFFCC"); |
| **Simple interaction:** mouse over effect  <BODY>  <div id="viz"></div>  <script type="text/javascript">  var svgCircle = d3.select("#viz")  .append("svg")  .attr("width", 200)  .attr("height", 200);  svgCircle.append("circle")  .style("stroke", "gray")  .style("fill", "white")  .attr("r", 40)  .attr("cx", 50)  .attr("cy", 50)  .on("mouseover", function(){d3.select(this).style("fill", "blue");} )  .on("mouseout", function(){d3.select(this).style("fill", "white");} );  </script>  </BODY> |

* **Try to use d3 selector to manipulate other html attributes**

https://github.com/mbostock/d3/wiki/Selections#wiki-d3\_select

* + mouseover with same color, but opacity set to 0.2
  + mouseover show some text (tooltip)

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| //draw another circle, mouseover show the tooltip  var svgCircle2 = d3.select("#viz")  .append("svg")  .attr("width", 200)  .attr("height", 200);    svgCircle2.append("circle")  .style("stroke", "yellow")  .style("fill", "white")  .style("fill-opacity","0.2")  .attr("r", 40)  .attr("cx", 50)  .attr("cy", 50)  .on("mouseover", function(){return tooltip.style("visibility", "visible");} )  .on("mouseout", function(){return tooltip.style("visibility", "hidden");}) ;  //tooltip object  var tooltip = d3.select("body")  .append("div")  .style("position", "relative")  .style("visibility", "hidden")  .text("I drew something"); |



Ref: <http://prcweb.co.uk/lab/what-makes-us-happy/>

**Plot Roger Federer’s 5years us open winning streak (winners & errors ratio)**

(create a new html page named: Roger.html)

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| <HTML>  <head>  <title>lab1 - interactive viz</title>  <link rel="stylesheet" type="text/css" href="css/Roger.css">  <script type="text/javascript" src="http://d3js.org/d3.v3.min.js"></script>  </head>  <BODY>  <div class='content'></div>  <script>  //Roger’s Winners vs. Errors stats  **var data = [[40,26],[69,37],[69,19],[42,34],[36,33]];**  //Opponent’s winners/errors stats  **var data2 = [[12,23],[34,28],[33,23],[32,40],[16,28]];**  **/**/Opponent’s winners/errors stats, and image path  **//var data2 = [[12,23,"images/roddick.png"],[34,28,"images/roddick.png"],[33,23,"images/novak.png"],[32,40,"images/roddick.png"],[16,28,"images/roddick.png"]];**  var margin = {top: 20, right: 20, bottom: 60, left: 60}  , width = 760 - margin.left - margin.right  , height = 500 - margin.top - margin.bottom;    var x = d3.scale.linear()  .domain([0, d3.max(data, function(d) { return d[0]; })])  .range([ 0, width ]);    var y = d3.scale.linear()  .domain([0, d3.max(data2, function(d) { return d[1]; })])  .range([ height, 0 ]);    var chart = d3.select('body')  .append('svg:svg')  .attr('width', width + margin.right + margin.left)  .attr('height', height + margin.top + margin.bottom)  .attr('class', 'chart')  var main = chart.append('g')  .attr('transform', 'translate(' + margin.left + ',' + margin.top + ')')  .attr('width', width)  .attr('height', height)  .attr('class', 'main')    **// draw the x axis**  var xAxis = d3.svg.axis().scale(x).orient('bottom');  main.append('g')  .attr('transform', 'translate(0,' + height + ')')  .attr('class', 'main axis date')  .call(xAxis);  **// draw the y axis**  var yAxis = d3.svg.axis().scale(y).orient('left');  main.append('g')  .attr('transform', 'translate(0,0)')  .attr('class', 'main axis date')  .call(yAxis);  **//start appending data as svg to page**  var g = main.append("svg:g");    g.selectAll("dots")  **.data(data)**  .enter().append("svg:circle")  .attr("cx", function (d) { return x(d[0]); } )  .attr("cy", function (d) { return y(d[1]); } )  .attr("r", 10);  var red = d3.rgb(255, 0, 0);  g.selectAll("dots")  .data(data2)  .enter().append("svg:circle")  .attr("cx", function (d) { return x(d[0]); } )  .attr("cy", function (d) { return y(d[1]); } )  .attr("r", 10)  .style("fill", red.darker(1))  .style("opacity", 0.6) // opacity of circle  .on("mouseover", function(d) {  d3.select(this).style("fill", "orange");  d3.select(this).attr("r", 20);  //mouseover opponent  /\*  main.append("svg").append("image")  .attr('xlink:href',d[2])  .attr('transform', 'translate(' + 50 + ',' + 160 + ')')  .attr("width",250)  .attr("height",300)  .attr("opacity","0.1")  .style("display","inline")  .transition()  .delay(400)  .remove();  \*/  })  .on("mouseout", function(d) {  d3.select(this).style("fill", red.darker(1));  d3.select(this).attr("r", 10);  });  **// text label for the x axis**  g.append("text")  .attr("x", 330 ).attr("y", 460 ).style("text-anchor", "middle").text("Winners");  **// text label for the y axis**  g.append("text")  .attr("x", -45 ).attr("y", 230 ).style("text-anchor", "middle").text("Errors");  //6-1. animation  //d3.selectAll("circle").transition().duration(1500).style("fill", "green");  //6-2. display image  /\*  main.append("svg").append("image")  .attr('xlink:href',"roger.png")  .attr('transform', 'translate(' + 350 + ',' + margin.top + ')')  .attr("width",350)  .attr("height",400)  .attr("opacity","0.1");  \*/  </script>  </BODY></HTML> |

* 1. Try transition() for animation <http://bost.ocks.org/mike/transition/>
  2. How to display an image?

6.3 Mouseover data point and display different images?

7. More tutorials

* d3 tutorial <http://alignedleft.com/tutorials/d3>
* d3 tutorial <https://www.dashingd3js.com/table-of-contents>
* Using JSON to simplify code
  + convert csv to json <http://www.convertcsv.com/csv-to-json.htm>
* Advanced:
  + <http://raphaeljs.com/reference.html> another powerful animation javascript library
  + <http://code.shutterstock.com/rickshaw/>

**After class:**

* [**https://github.com/mbostock/d3/wiki/Gallery**](https://github.com/mbostock/d3/wiki/Gallery)

**Select a d3 datavis example as template, plug in your datasets.**

[**Steal like an Artist**](http://www.amazon.com/Steal-Like-Artist-Things-Creative/dp/0761169253) **(Kleon, 2012)**

* explore **tableau** <http://www.tableausoftware.com>