ARTG 6900 Week 8

Canvas Rendering

A Review of Basics

Setting up a canvas drawing environment

```
//Append a <canvas> element
var canvas = document.appendChild('canvas');
var canvas1 = document.createElement('canvas');
var canvas2 = d3.select(...)
    .append('canvas').attr('width',...)
    .node();

//Get drawing context
var ctx = canvas2.getContext('2d');
```

Drawing shapes

Only two primitive shapes in canvas: rect and path (+ text)

```
//Rect
ctx.fillRect(); ctx.strokeRect(); ctx.clearRect();

//Path
ctx.beginPath();
[path commands]
ctx.closePath();
ctx.fill();
ctx.stroke();

//Text
ctx.fillText('string', x, y);
```

Styles

```
//Fill and stroke
ctx.fillStyle = ‘rgba(255,255,255,.5)’;
ctx.strokeStyle = ...
ctx.lineWidth = 2;
ctx.setLineDash([4,2]);
```

Other cool effects include gradients, composite effects etc.

Path Commands

Path commands:
https://developer.mozilla.org/en-US/docs/Web/API/CanvasRenderingContext2D

Path commands can be stored as part of a Path2D object

```
var path1 = new Path2D();
path1.moveTo(0,0);
path1.arc(10,10,5,0,Math.PI*2);
...
ctx.stroke(path1);
```

Draw images

You can draw images into any canvas (even other canvases!)

```
ctx.drawImage(canvas,0,0);
```

Path Generators and Canvas

Path Generators

d3's path generators such as `line, area, arc, chord, geoPath` etc. all have the same function: they convert data into `<svg>` geometry attribute '`d`'.

```
var line = d3.line().x(...).y(...);

selection.append('path')
    .datum(array)
    .attr('d',line);
```

which produces a similar result as

```
selection.append('path')
    .attr('d',line(array));
```

Path Generators + Canvas

Canvas's Path2D() can convert <svg> 'd' attribute into canvas path commands:

```
var line = d3.line().x(...).y(...);
var path = new Path2D();

path( line(array) );
    --> converts into path commands
ctx.stroke(path);
```

Animation

Animation in Canvas

4 step process (in a loop)

1. Clear the canvas
2. Save canvas state
3. Redraw the canvas with updated shapes (you get to define the logic for how scenes get updated)
4. Restore canvas state

Additional Resources

Lots of examples on the course website. Please review!