

## **Comp 125 - Visual Information Processing**

---

Spring Semester 2018 - week 13 - monday

Dr Nick Hayward

## **Final Demo and Presentation**

---

### **Dates**

- Week 15 - Monday 23rd, Wednesday 25th, & Friday 27th April 2018
- Final report due 3rd May 2018 by 1pm

## Final Demo and Presentation

---

- group project - maximum 2 persons per group
- develop an app concept and prototype
- working app (as close as possible...)
  - *must use technologies outlined during the course*
- show and explain code used to develop the app
- explain design decisions
  - *describe patterns used in design of app*
  - *layout choices...*
- show and explain implemented differences
  - *where and why did you update the app?*
  - *perceived benefits of the updates?*

Further details on course website -

<https://csteach125.github.io/coursework/#assessment2>

## Video - Design

---

### Digital Prototyping



Rapid Prototyping 2 of 3: Digital Prototyping

Source: YouTube - Google

## HTML Canvas - draw arcs and circles

---

- not restricted to simply drawing shapes with straight lines or rectangles
- we might also need to draw a circle, or a custom arc
- to draw a circle or arc, start by specifying
  - *the centre point for the circle*
  - *its radius*
  - *extent of the circumference*
- to draw an arc we provide a value
  - *for the starting angle and end angle*
  - *use to define the arc to draw*

# HTML Canvas - draw arcs and circles

---

## radians

- required start and end angles for drawing an arc are defined in **radians**
- to measure a circle using radians, we begin at 0
  - **0** is equivalent to **3** on a clock
- relative to a standard circle as a clock
  - $12pm = 270^\circ$  or  $(\pi \times 3 / 2 \text{ radians})$
  - $3pm = 0^\circ$  (0 radians) &  $360^\circ$  ( $\pi \times 2 \text{ radians}$ )
  - $6pm = 90^\circ$  ( $\pi / 2 \text{ radians}$ )
  - $9pm = 180^\circ$  ( $\pi \text{ radians}$ )

# HTML Canvas - draw arcs and circles

---

## **arc() method**

- expected parameters for the arc method is as follows

```
arc(x, y, radius, startAngle, endAngle, anticlockwise);
```

- where anticlockwise is set to false by default

# HTML Canvas - draw arcs and circles

---

## full circle - part I

- using this pattern to draw a full circle
  - *start at 3pm and continue back round to 3pm*
- i.e. start at 0 radians and continue to ( $\pi \times 2$  radians)
- in JS, this may be represented as follows

```
// draw a full circle
context.beginPath();
context.arc(50, 100, 25, 0, Math.PI * 2, false);
context.stroke();
```



# HTML Canvas - draw arcs and circles

---

## full circle - part 2

```
// draw a full circle
context.beginPath();
context.arc(50, 100, 25, 0, Math.PI * 2, false);
context.stroke();
```

- call `arc()` method on the `context` object passing required arguments
  - `50, 100` = the centre of the circle as *x* and *y* coordinates
  - `25` = radius of circle
  - `0` =  $0$  radians for the start position of the circle ( $0^\circ$ )
  - `$\text{Math.PI} * 2$`  =  $(\pi \times 2)$  radians for the end position for the end of the circle ( $360^\circ$ )

# HTML Canvas - draw arcs and circles

---

## arcs - part I

- we can then create various arcs, including a semi-circle

```
// draw a semi-circle
context.beginPath();
context.arc(125, 100, 25, 0, Math.PI, false);
context.stroke();
```

- call `arc ( )` method on the `context` object passing required arguments
  - `125, 100` = *x & y centre of the circle*
  - `25` = *radius of circle*
  - `0` = *start position of arc ( $0^\circ$ )*
  - `Math.PI` = *end position of arc ( $180^\circ$ )*

# HTML Canvas - draw arcs and circles

---

## arcs - part 2

- we might also draw a quarter circle

```
// draw a quarter circle
context.beginPath();
context.arc(175, 100, 25, 0, Math.PI / 2, false);
context.stroke();
```

- **n.b.** false value in `arc()` method refers to anticlockwise parameter
  - by default, an arc will follow a clockwise path
- Example - arcs and circles
  - <http://linode4.cs.luc.edu/teaching/cs/demos/I25/drawing/basic8/>

# HTML Canvas - draw arcs and circles

---

## Bézier curves

- we can also draw more fluid, or organic, shapes using bézier curves
- use a couple of default methods
- support for **cubic** or **quadratic** varieties of bézier curves

[Bézier curves - Wikipedia](#)

# HTML Canvas - draw arcs and circles

---

## quadratic - part I

- we can draw a quadratic bézier curve from a defined start point
  - *i.e. current pen position on the canvas, using the following method*

```
quadraticCurveTo(cp1x, cp1y, x, y)
```

- cp1x & cp1y = controls points for curve
- x & y = standard x and y coordinates on the canvas
  - *defines end point from the current pen position*
- this type of curve has a defined start and end point with a single control point

# HTML Canvas - draw arcs and circles

---

## quadratic - part 2

- for example

```
// draw a quadratic bézier curve
context.beginPath();
context.moveTo(75, 25);
context.quadraticCurveTo(25, 25, 25, 62.5);
context.quadraticCurveTo(25, 100, 50, 100);
context.quadraticCurveTo(50, 120, 30, 125);
context.quadraticCurveTo(60, 120, 65, 100);
context.quadraticCurveTo(125, 100, 125, 62.5);
context.quadraticCurveTo(125, 25, 75, 25);
context.fill();
```

- Example - Bézier curves - quadratic
  - <http://linode4.cs.luc.edu/teaching/cs/demos/I25/drawing/basic9-quadratic/>
  - W3Schools - `quadraticCurveTo()`

# HTML Canvas - draw arcs and circles

---

## cubic - part I

- a cubic bézier curve, by contrast, has the following method and usage

```
bezierCurveTo(cp1x, cp1y, cp2x, cp2y, x, y)
```

- pattern is similar to a quadratic curve
  - *primary difference is use of two control points*
  - *potentially offers finer control over extent and nature of curve*

# HTML Canvas - draw arcs and circles

---

## cubic - part 2

- for example

```
// draw a cubic bézier curve
context.beginPath();
context.moveTo(75, 40);
context.bezierCurveTo(75, 37, 70, 25, 50, 25);
context.bezierCurveTo(20, 25, 20, 62.5, 20, 62.5);
context.bezierCurveTo(20, 80, 40, 102, 75, 120);
context.fill();
```

- Example - Bézier curves - cubic
  - <http://linode4.cs.luc.edu/teaching/cs/demos/I25/drawing/basic9-cubic/>
  - W3Schools - `bezierCurveTo()`



## References

---

- W3Schools - HTML5
- canvas element