COMP4021
Internet Computing

Images in Browsers

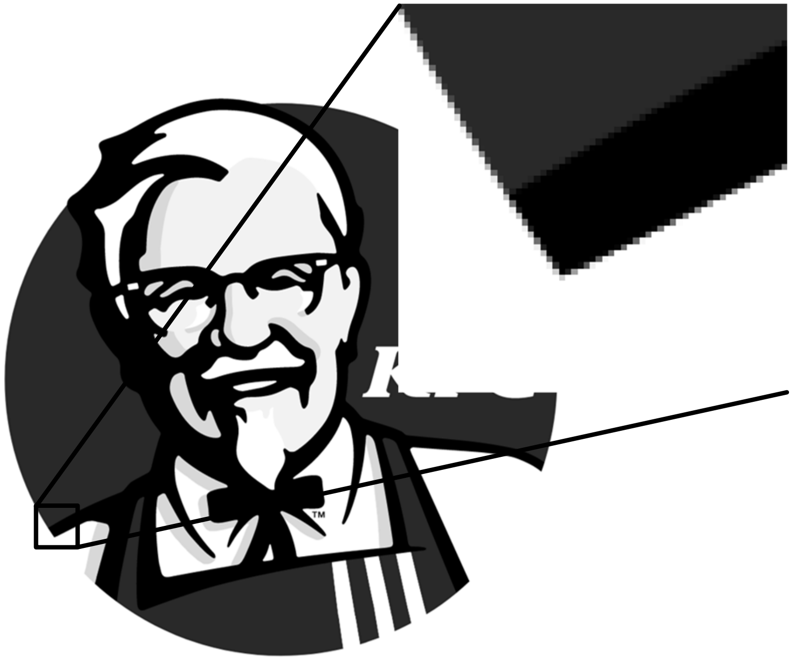
David Rossiter and Gibson Lam

Types of Image

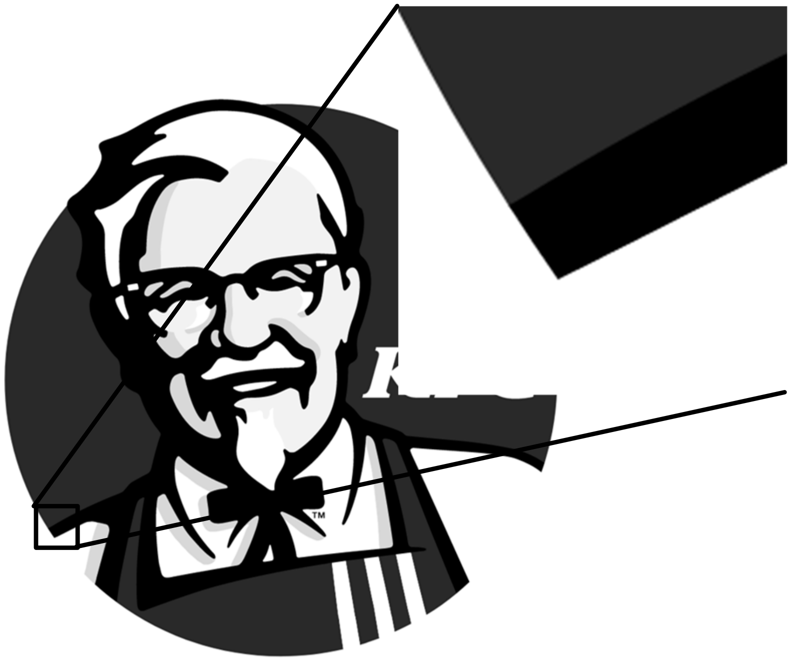
- If you want to display an image in a browser, there are two general approaches:

1. Bitmap images

2. Vector graphics



A bitmap image



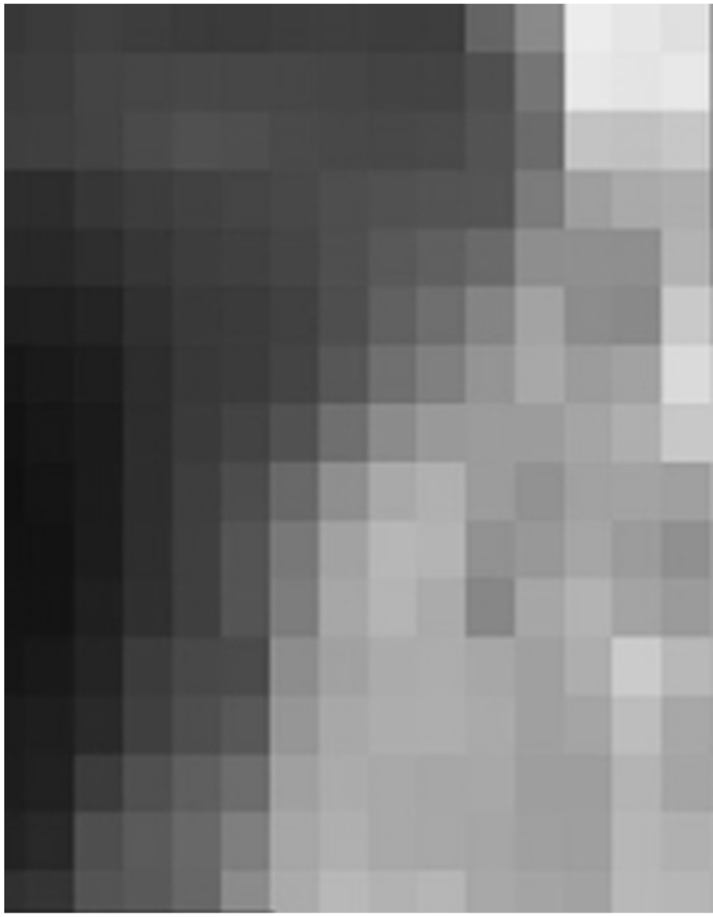
A vector image

Bitmap Image Formats

- Some common bitmap image formats for the web are:
  - GIF – old format for images with <=256 colours
  - JPEG – best for images of ‘natural’ things (such as photographs of people, places)
  - PNG – high compression file format which does not change the pixels; this is the main web format for bitmap images
- These are all pixel based systems (=bitmap formats)

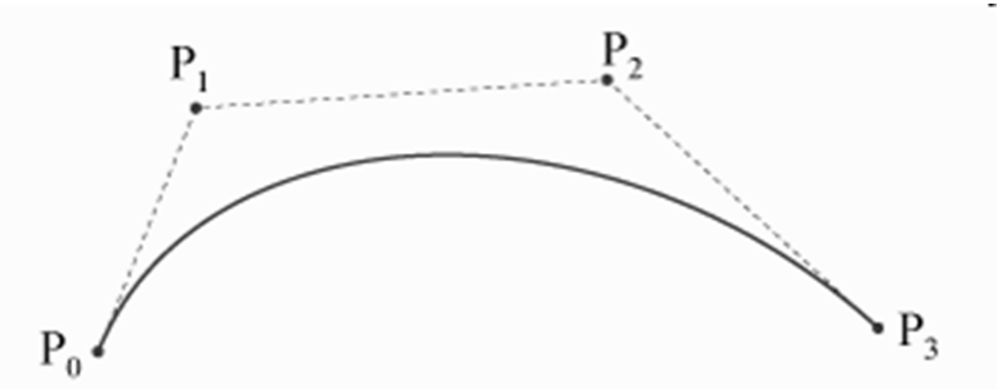
Bitmap Images

- With bitmap images
  - Looks poor when you zoom in/print it
    (if not enough pixels)
  - They are static (=non-moving), or sometimes can do very simple animation by looping (such as animated GIF files)
  - File size can be large



Vector Graphics

- With vector systems
  - Everything is mathematically represented



  - Get perfect quality, looks great even when you zoom in/print
  - Everything in the image is ‘separate’
  - This means e.g. dynamic change can be easily applied to some specific things in the image (=animation)
  - Often much smaller file size than bitmap images, so less disk space & less time needed for download

Vector Graphics on the Web

- There are two main ways to display vector graphics in a browser:
  - Canvas `<canvas>...</canvas>`
    - This is a bitmap system,
      which has some vector graphics commands
  - SVG `<svg>...</svg>`
    - This is a markup language (i.e. a language using tags, similar to HTML) for vector graphics

Possible Uses of Canvas

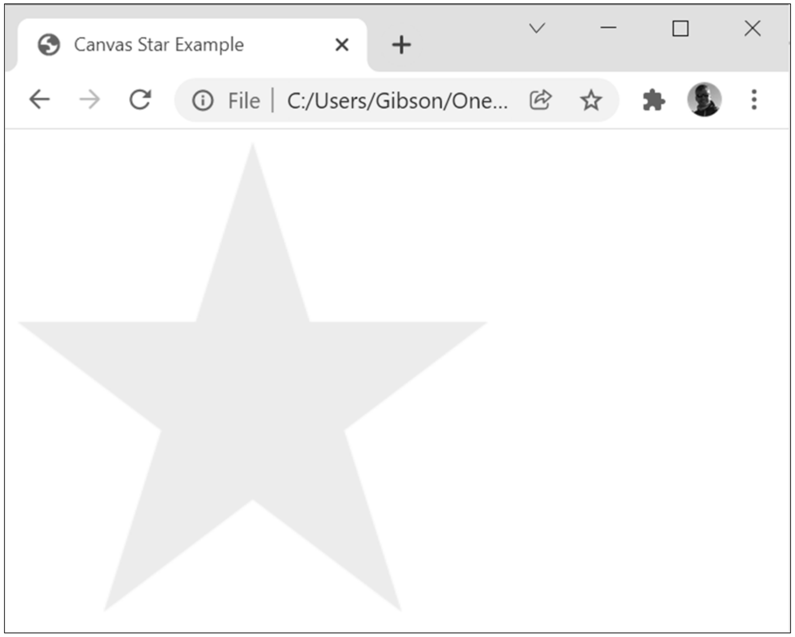
1. An image where nothing moves
2. An image which is controlled by JavaScript
   - JavaScript can react to user input and change anything at any time

An Example Canvas Image

```
<!DOCTYPE html>
<html>
<head>
  <title>Canvas Star Example</title>
</head>
<body>
  <canvas id="myCanvas"
   width="300" height="300"></canvas>
  <script>
  let e = document.getElementById("myCanvas");
  let ctx = e.getContext("2d");
  ctx.beginPath();
  ctx.moveTo(150, 0);
  ctx.lineTo(245, 300);
  ctx.lineTo(0, 115);
  ctx.lineTo(300, 115);
  ctx.lineTo(55, 300);
  ctx.closePath();
  ctx.fillStyle = "yellow";
  ctx.fill();
  </script>
</body>
</html>
```

- You don’t need to worry about the code
- You will know what it is doing later in the course

Code to draw the star



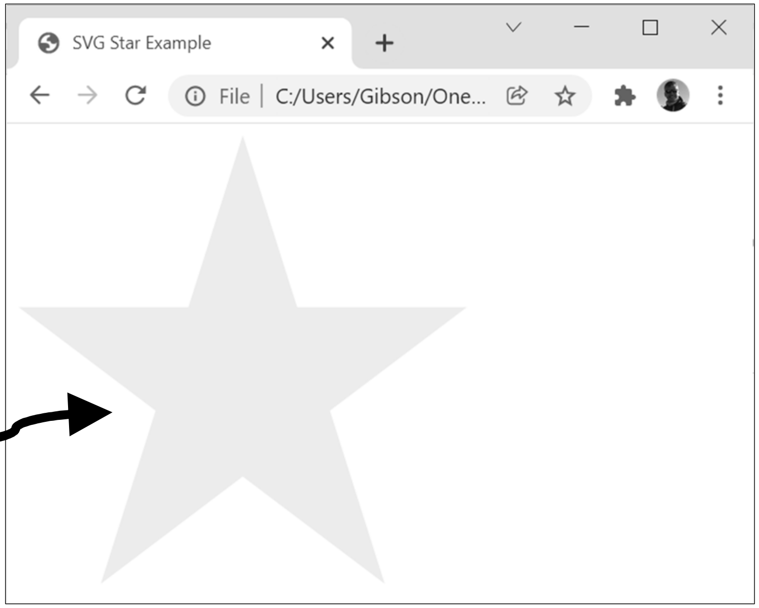
Possible Uses of SVG

1. An image where nothing moves
2. An image where some things move (animation)
   - Animation commands are included in SVG
3. An image which is controlled by JavaScript
   - JavaScript can react to user input and change anything at any time

An Example SVG Image

- SVG looks shorter than the canvas code
- You will also learn the details later

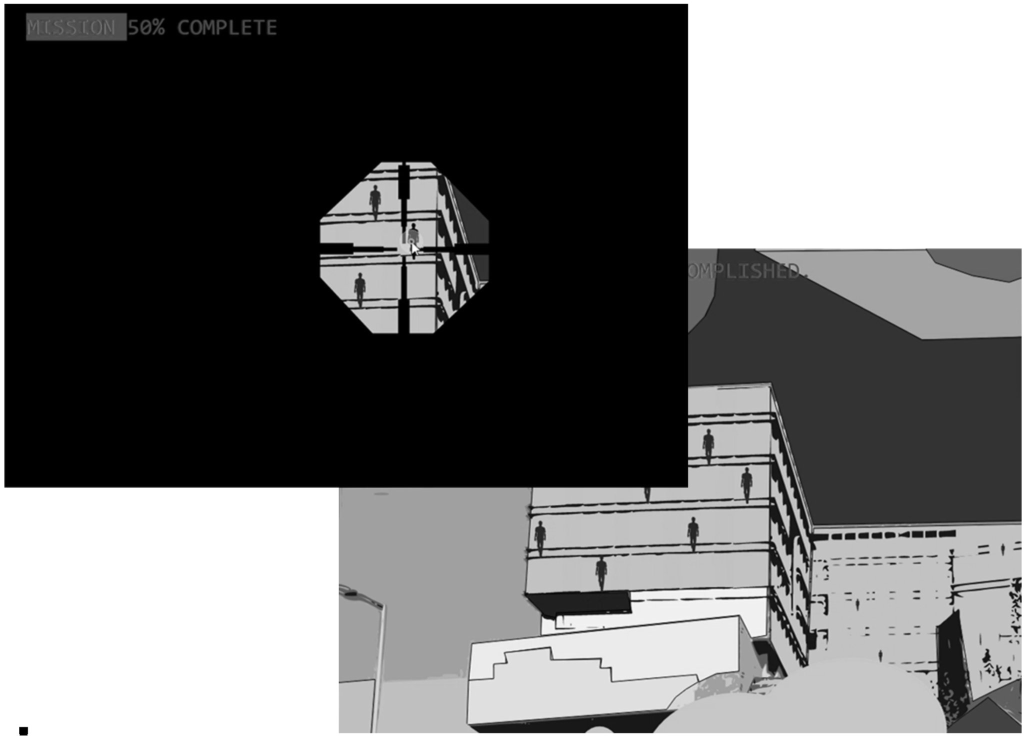
```
<!DOCTYPE html>
<html>
<head>
  <title>SVG Star Example</title>
</head>
<body>
  <svg width="300" height="300">
    <path d="M150 0L245 300L0 115
             L300 115L55 300"
          style="fill: yellow" />
  </svg>
</body>
</html>
```



An SVG element drawing the star

Making Games

- Both canvas and SVG are great for making games in a browser!



- We will look into using each to make interesting things later