

SVG 动画初探

@象跑跑

SVG 概况

- 一种矢量图形文件
- 使用 XML 格式定义
- <http://www.w3.org/2000/svg>
- <https://developer.mozilla.org/en-US/docs/Web/SVG>

优势

- 无限缩放
- 体积小
- 能实现一些高级交互、动画效果
- 可以通过CSS或JS控制

插入姿势

- img标签
- CSS background/CSS Sprite
- Inline SVG—把SVG节点写入 HTML 中
- symbol (demo)

生成 SVG

- 绘制 (Illustrator、Sketch、Inkscape等)
- 素材 (如iconfont.cn)
- 动态创建



建议：使用图形工具生成静态SVG，通过程序来产生交互、动画效果（工具生成的SVG往往会有一些冗余数据，最好优化后使用）

SVG (basic support) - REC

Global

89.87% + 2.74% = 92.61%

Method of displaying basic Vector Graphics features using the embed or object elements. Refers to the SVG 1.1 spec.

Current aligned	Usage relative	Show all						
IE	Firefox	Chrome	Safari	Opera	iOS Safari *	Opera Mini *	Android Browser *	Chrome for Android
		31						
		35						
		36					¹ 4.1	
8		37					¹ 4.3	
² 9	33	38			7.1		4.4	
² 10	34	39	7.1		8		4.4.4	
² 11	35	40	8	26	8.1	8	37	40
² TP	36	41		27				
	37	42		28				
	38	43						

SVG 库

- Raphaël
- SVG.js
- Snapsvg
.....

绘图、变形、动画、事件、遮罩、裁剪、滤镜等

Raphaël (IE6) —> Snapsvg (IE 9+)

www.zhangxinxu.com/GitHub/demo-Snap.svg/demo/basic/Element.add.php

SNAPSVG VS SVG.JS

SNAP.SVG:

```
var g = paper.gradient("L(0, 0, 100, 100)#000-#f00:25%-#fff");  
  
paper.circle(50, 50, 40).attr({  
  fill: g  
});
```

SVG.JS:

```
var g = draw.gradient('linear', function(stop) {  
  stop.at(0, '#000')  
  stop.at(0.25, '#f00')  
  stop.at(1, '#fff')  
})  
  
draw.circle(80).center(50,50).fill(g)
```


SVG 基本元素

- 圆形(circle)

```
<rect stroke="#979797" fill="#fff" x="0" y="0"
width="60" height="60"></rect>
```

- 椭圆(ellipse)

- 矩形(rect)



- 线(line)

- 折线 (polyline)

- 多边形 (polygon)

- 路径 (path)

Path

- M = moveto
- L = lineto
- H = horizontal lineto
- V = vertical lineto
- C = curveto
- S = smooth curveto
- Q = quadratic Bezier curve
- T = smooth quadratic Bezier curveto
- A = elliptical Arc
- Z = closepath

```
<path d="M1,83.5 C1,83.5 71,26.5 106,46 C141,65.5  
178,0.5 178,0.5" stroke="#fff" stroke-width="3" ></path>
```



SVG Animation

- requestAnimationFrame
- CSS3 animation/transition
- SVG SMIL

SVG SMIL

- <set>
- <animate>
- <animateColor>
- <animateTransform>
- <animateMotion>

```
<?xml version="1.0"?>
<svg width="120" height="120"
    viewport="0 0 120 120" version="1.1"
    xmlns="http://www.w3.org/2000/svg">

    <rect x="10" y="10" width="100" height="100">
        <animate attributeType="XML"
            attributeName="x"
            from="-100" to="120"
            dur="10s"
            repeatCount="indefinite"/>
    </rect>

</svg>
```

logo渐变demo:gradient.html

animateMotion

```
<?xml version="1.0"?>
<svg width="120" height="120" viewBox="0 0 120 120"
    xmlns="http://www.w3.org/2000/svg" version="1.1"
    xmlns:xlink="http://www.w3.org/1999/xlink" >
  <path d="M10,110 A120,120 -45 0,1 110 10 A120,120 -45 0,1 10,110"
    stroke="lightgrey" stroke-width="2"
    fill="none" id="theMotionPath"/>
  <circle cx="" cy="" r="5" fill="red">
    <!-- Define the motion path animation -->
    <animateMotion dur="6s" repeatCount="indefinite">
      <mpath xlink:href="#theMotionPath"/>
    </animateMotion>
  </circle>
</svg>
```

路径跟随demo: [run.html](#)

SVG SMIL animation - REC

China65.03% + 0.13% = 65.16%

Global75.79% + 0.76% = 76.55%

Method of using animation elements to animate SVG images

Current aligned	Usage relative	Show all						
IE	Firefox	Chrome	Safari	Opera	iOS Safari *	Opera Mini *	Android Browser *	Chrome for Android
		21						
		30						
		31						
		33						
		34						
6		35					4.1	
8	8	37					4.3	
9	33	38					4.4	
10	34	39			7.1		4.4.4	
11	35	40	8	26	8.1	8	37	40
TP	36	41		27				
	37	42		28				
	38	43						

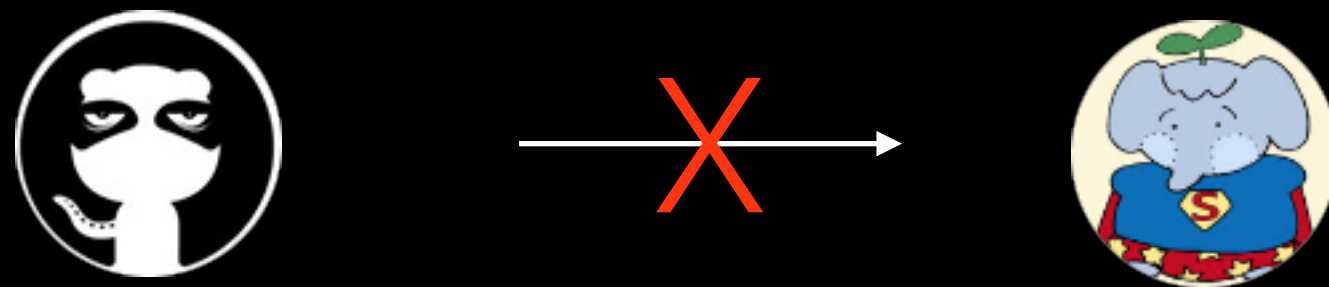
Stroke Animation

Stroke-dasharray:controls the pattern of dashes and gaps used to stroke paths.

Stroke-dashoffset:specifies the distance into the dash pattern to start the dash.

- [stroke demo:stroke-dash.html](#)
- [logo描边demo:logo_stroke1.html](#)
- [logo描边demo:logo_stroke2.html](#)

Shape Animation

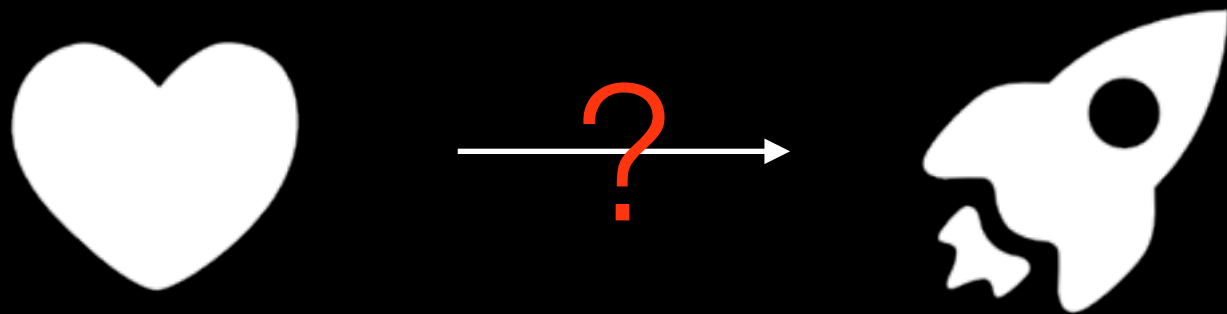


SVG可以制作形状动画，但并不是所有的变化都那么容易产生形状补件

变形demo:shape_ani.html & 2

Shape Animation

github.com/alexk111/SVG-Morpheus



人物行走demo:svh.html

水demo:water.html

Mask Animation

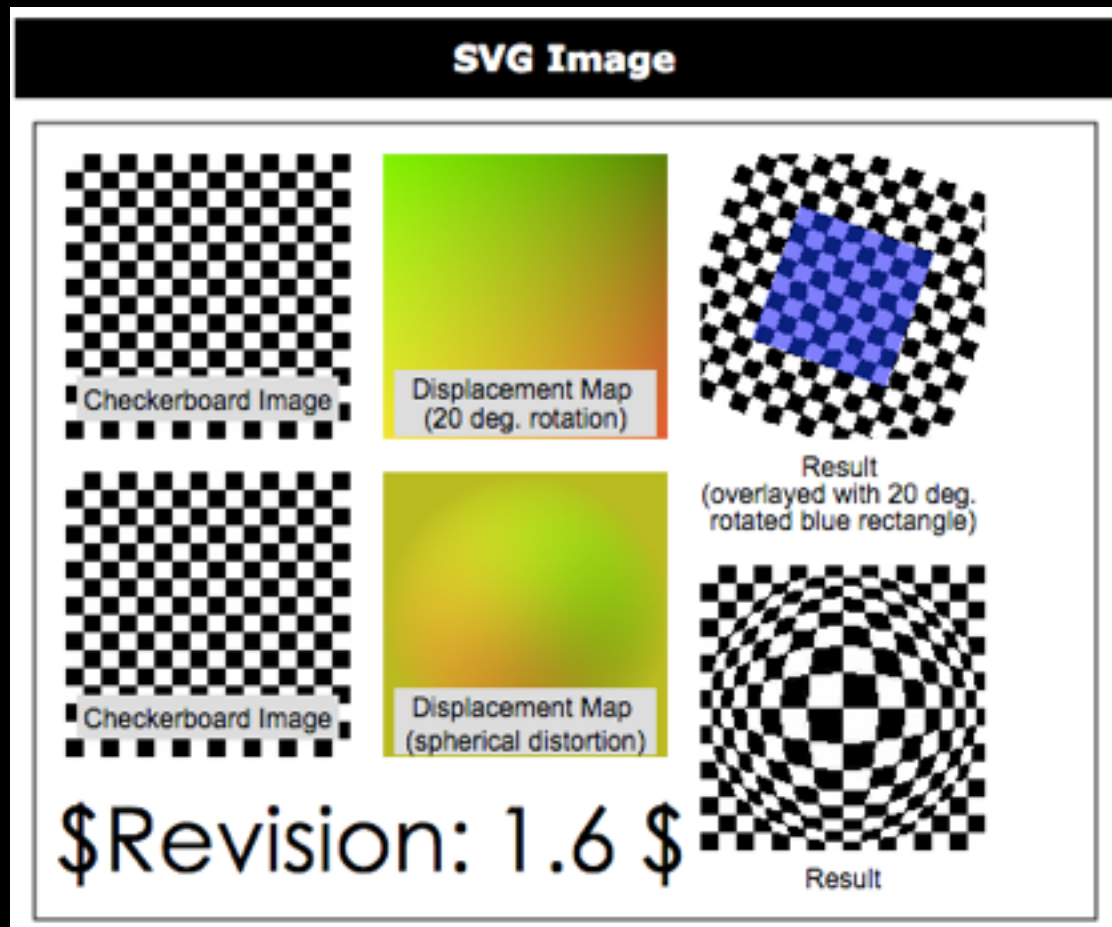
猜猜我是谁demo: [mask_mouse.html](#)

文字遮罩demo: [mask_text.html](#)

Filter

feBlend
feColorMatrix
feComponentTransfer
feComposite
feConvolveMatrix
feDiffuseLighting
feDisplacementMap
feFlood
feGaussianBlur
feImage

feMerge
feMorphology
feOffset
feSpecularLighting
feTile
feTurbulence
feDistantLight
fePointLight
feSpotLight

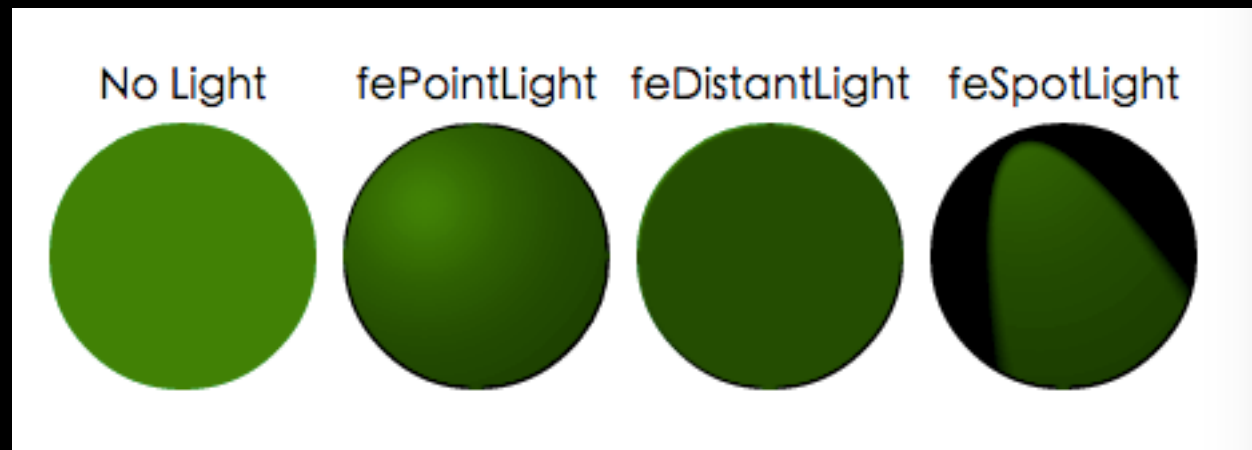


PS中的“水波”滤镜



feDisplacementMap水波动画

feDisplacementMap“置换贴图”
通过一张图的一个通道给另一张图做参考，供其产生位移变化



feDiffuseLighting



feComponentTransfer

光照文字demo: chiseled.html

http://ie.microsoft.com/testdrive/graphics/hands-on-css3/hands-on_svg-filter-effects.htm

http://commons.oreilly.com/wiki/index.php/SVG_Essentials/Filters

<http://srufaculty.sru.edu/david.dailey/svg/SVGOpen2010/filters2.htm>

SVG filters - REC

Global 86.93% + 0.05% = 86.97%

Method of using photoshop-like effects on SVG objects including blurring and color manipulation.

Current aligned	Usage relative	Show all						
IE	Firefox	Chrome	Safari	Opera	iOS Safari *	Opera Mini *	Android Browser *	Chrome for Android
		31						
		35						
		36					4.1	
8		37					4.3	
9	33	38			7.1		4.4	
10	34	39	7.1		8		4.4.4	
11	35	40	8	26	8.1	8	37	40
TP	36	41		27				
	37	42		28				
	38	43						

THE END