

SVG를 이용한 데이터 시각화

-Fill

-Fill Patterns

-Clip Path

강혜인

1. SVG FILL

Fill

Shape의 안에 들어갈 색을 정의합니다.

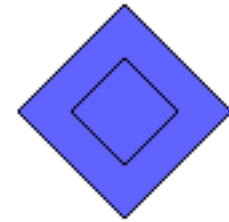
Ex) SVG안에서 `style="fill:#000000;"`을 적용합니다.

1. Fill을 조절하는 속성들

- a. fill
- b. stroke
- c. fill-opacity
- d. fill-rule : 도형의 바깥 쪽과 안쪽을 정의합니다.
 - a. nonzero
 - b. evenodd

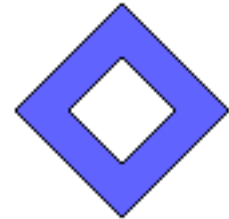
2. nonzero

```
<path d="M50,20 l40,40 l-40,40 l-40,-40 l40,-40  
M50,40 l20,20 l-20,20 l-20,-20 l20,-20"  
style="stroke: #000000;  
fill: #6666ff;  
fill-rule: nonzero;  
" />
```



⇒ 안쪽 다이아몬드가
시계방향으로 그려짐

```
<path d="M150,20 l40,40 l-40,40 l-40,-40 l40,-40  
M150,40 l-20,20 l20,20 l20,-20 l-20,-20"  
style="stroke: #000000;  
fill: #6666ff;  
fill-rule: nonzero;" />
```



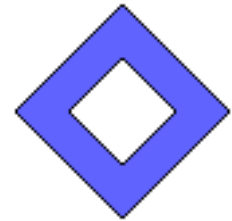
⇒ 안쪽 다이아몬드가
반시계방향으로 그려짐

Draw a line (ray) from the point to infinity in any direction.

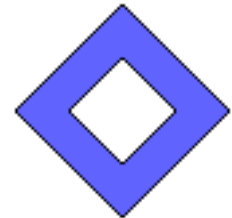
For each time a path in the shape crosses this ray, add 1 to a counter if the path crosses the ray from left to right, and subtract 1 from the counter if the path crosses the ray from right to left. Having counted all the paths that cross the ray, if the total count is zero then the point is considered outside the path. If the total count is nonzero, then the point is considered inside the path.

1. evenodd

```
<path d="M50,20 l40,40 l-40,40 l-40,-40 l40,-40  
      M50,40 l20,20 l-20,20 l-20,-20 l20,-20"  
      style="stroke: #000000;  
      fill: #6666ff;  
      fill-rule: evenodd;" />
```



```
<path d="M150,20 l-40,40 l40,40 l40,-40 l-40,-40  
      M150,40 l-20,20 l20,20 l20,-20 l-20,-20"  
      style="stroke: #000000;  
      fill: #6666ff;  
      fill-rule: evenodd;" />
```



Draw a line (ray) from the point to infinity in any direction.
For every time the path crosses the ray, increment a counter.
If the total count is an even number, the point is outside.
If the total count is an odd number, the point is inside the shape.

포토샵의 'Tiles'기능과 비슷한 역할을 하는

1. SVG FILL PATTERNS

참고: <http://www.svggeneration.com/generate/Bubble-Fade>

Fill Patterns

SVG Images, Shapes 그리고 비트맵 이미지로 패턴을 만들어
도형을 채우기 위한 기능입니다.

Ex)

```
<defs>
```

```
  <pattern id="pattern1"
```

```
    x="10" y="10" r="10"
```

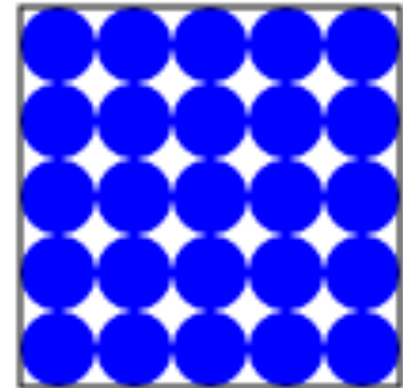
```
    style="stroke: none; fill: #0000ff;" />
```

```
  </pattern>
```

```
</defs>
```

```
<rect x="10" y="10" width="100" height="100"
```

```
  style="stroke:#000000; fill: url(#pattern1); />
```



1. X, Y , Width 와 Height

- a. x, y값은 shape안의 어떤 위치에서 패턴을 시작할지 정합니다.
- b. Width와 Height값은 패턴의 가로, 세로값을 정의합니다.

2. 패턴을 품은 패턴

패턴 안에 패턴을 적용시킬 수 있습니다.

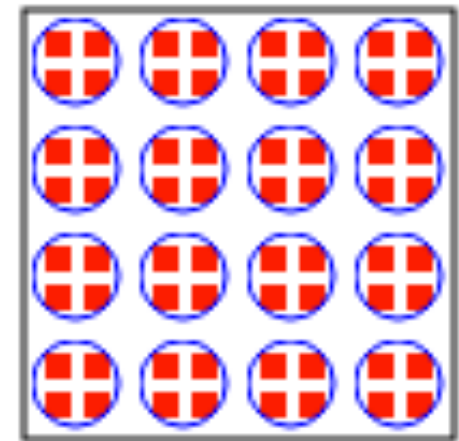
```

<defs>
  <pattern id="innerPattern"
    x="3" y="3" width="9" height="9"
    patternUnits="userSpaceOnUse"
  >
    <rect x="0" y="0" width="6" height="6"
      style="stroke: none; fill: #ff0000;" />
  </pattern>

  <pattern id="outerPattern"
    x="12" y="12" width="25" height="25"
    patternUnits="userSpaceOnUse"
  >
    <circle cx="10" cy="10" r="10"
      style="stroke: #0000ff; fill: url(#innerPattern)" />
  </pattern>
</defs>

<rect x="10" y="10" width="100" height="100"
  style="stroke: #000000; fill: url(#outerPattern);" />

```



1. 패턴에 transform 적용하기

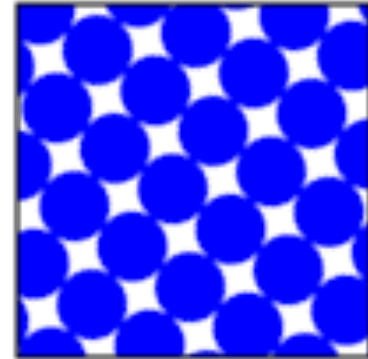
patternTransform 을 패턴에 적용하여
SVG의 기본 변형기능을 사용할 수 있습니다.

```
<defs>  
  <pattern id="transformedPattern"  
    x="10" y="10" width="20" height="20"  
    patternUnits="userSpaceOnUse"  
    patternTransform="rotate(35)"  
  >
```

```
    <circle cx="10" cy="10" r="10" style="stroke:  
none; fill: #0000ff" />
```

```
  </pattern>  
</defs>
```

```
<rect x="10" y="10" width="100" height="100"  
  style="stroke: #000000;  
  fill: url(#transformedPattern);" />
```



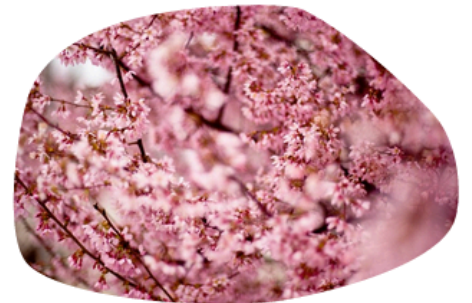
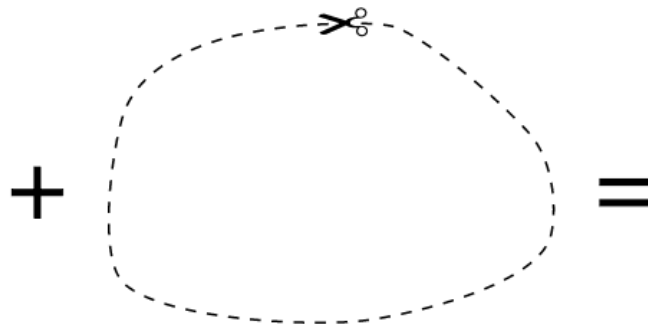
(=SVG clipping)

2. CLIP PATH

참고: <http://sarasoueidan.com/blog/css-svg-clipping/>

Clip Path

어떠한 path에 따라 svg shape를 자르기 위하여 쓰입니다.
이 때, 보이는 부분은 path의 안 쪽이며 path의 바깥쪽은 잘려져서
보이지 않습니다.



1. 그룹에서 clip path 사용하기

Svg shape 그룹에 clip path를 적용시킬 수 있습니다.
Svg 이미지들을 <g>안에 넣고, <g>에 clip path를 적용시킵니다.

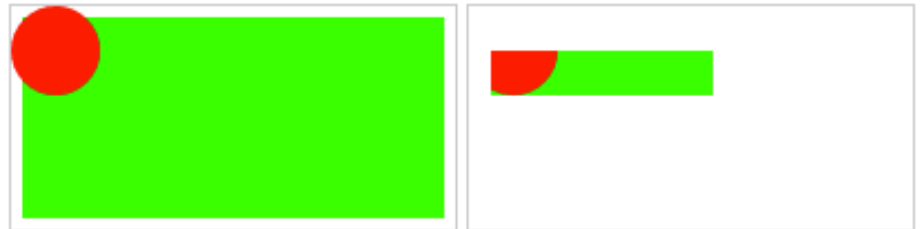
Ex)

```
<defs>  
  <clipPath id="clipPath4">  
    <rect x="10" y="20" width="100" height="20" />
```

```
  </clipPath>  
</defs>
```

```
<g style="clip-path: url(#clipPath4);">  
  <rect x="5" y="5" width="190" height="90"  
    style="stroke: none; fill:#00ff00;"/>
```

```
  <circle cx="20" cy="20" r="20" style="stroke: none; fill: #ff0000;" />  
</g>
```



2. 텍스트를 clip path로서 사용하기

```
<defs>
  <clipPath id="clipPath5">
    <text x="10" y="20" style="font-size: 20px; ">This is a text</text>
  </clipPath>
</defs>

<g style="clip-path: url(#clipPath5);">
  <rect x="5" y="5" width="190" height="90"

    style="stroke: none; fill:#00ff00;"/>
  <circle cx="20" cy="20" r="20" style="stroke: none; fill: #ff0000;" />
</g>
```



This is a text

```
<body>
```

```
<style>
```

```
  .svg-clipped {
```

```
    -webkit-clip-path: url(#svgPath);
```

```
    clip-path: url(#svgPath);
```

```
  }
```

```
</style>
```

```

```

```
<svg height="0" width="0">
```

```
  <defs>
```

```
    <clipPath id="svgPath">
```

```
      <text x="0" y="300" textLength="800" lengthAdjust="spacing"
```

```
      font-family="Vollkorn" font-size="230px" font-weight="700" font-style="italic"> Blossom </text>
```

```
    </clipPath>
```

```
  </defs>
```

```
</svg>
```

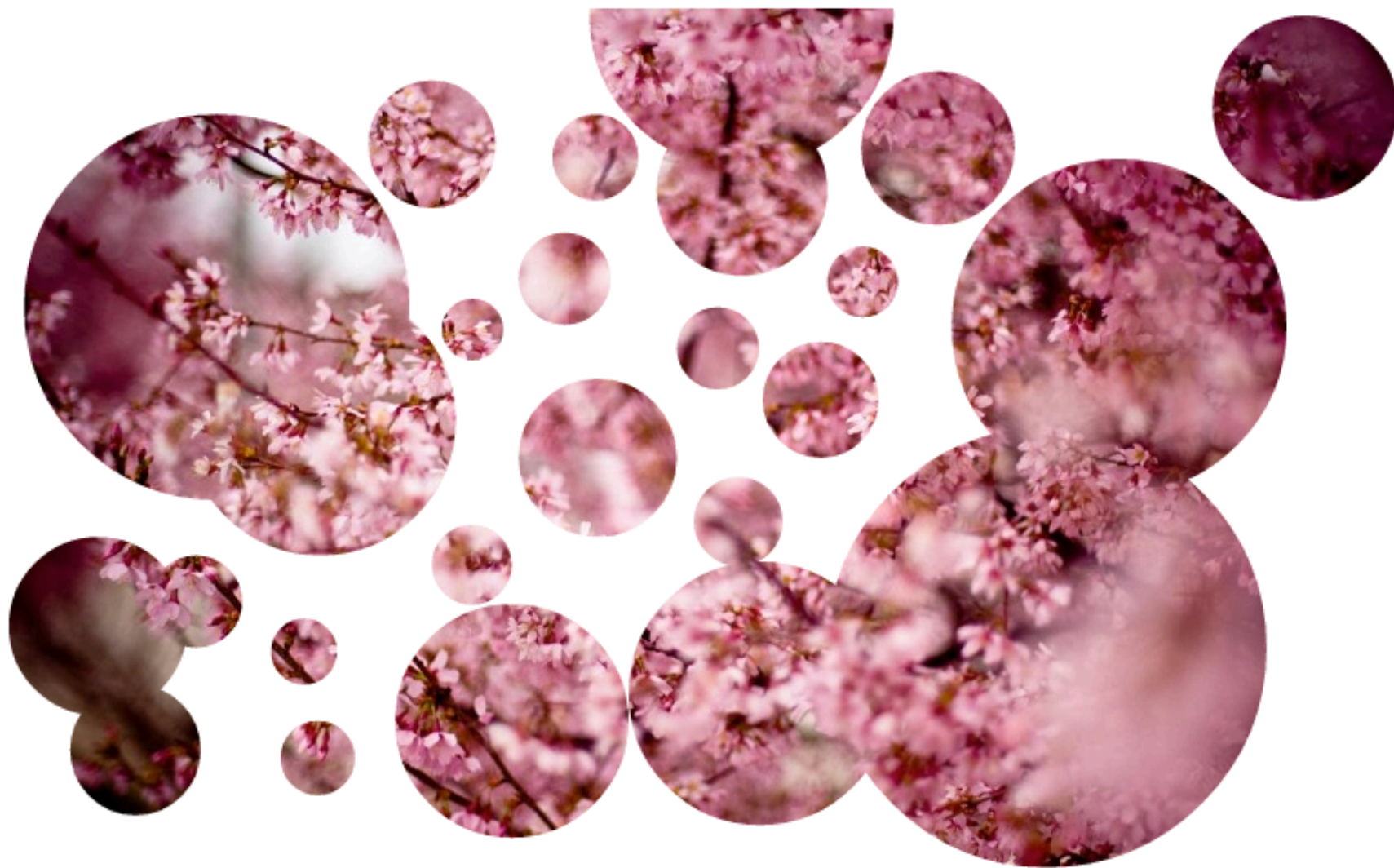
```
</body>
```

Blossom

<clipPath>에 다양한 도형을 넣을 수도 있습니다.
그렇지만 <g>는 포함 할 수 없습니다.

Ex)

```
<svg height="0" width="0">
  <defs>
    <clipPath id="svgPath">
      <circle stroke="#000000" stroke-miterlimit="10" cx="50" cy="50"
r="40" />
      <circle stroke="#000000" stroke-miterlimit="10" cx="193.949" cy="235"
r="74.576"/>
      <circle stroke="#000000" stroke-miterlimit="10" cx="426.576"
cy="108.305" r="47.034"/>
      <circle stroke="#000000" stroke-miterlimit="10" cx="346.915"
cy="255.763" r="43.644"/>
      <circle stroke="#000000" stroke-miterlimit="10" cx="255.39"
cy="82.882" r="35.17"/>
      <!-- more circles... -->
    </clipPath>
  </defs>
</svg>
```



- Clipping path에 css로 애니메이션 효과를 줄 수 있습니다. 또는, SVG의 <clipPath>의 경우에는 애니메이션을 그 안에 넣어서 애니메이션 효과를 줄 수 있습니다.
- clipPath의 Attribute중에 clipPathUnits가 있습니다. clip path의 요소의 좌표계를 설정 해 줍니다.
 - userSpaceOnUse (default)
Clip path의 coordinate system의 값
= 현재 user coordinate system의 값
 - objectBoundingBox
Clip path의 coordinate system의 값
=둘러 싸고 있는 박스의 coordinate system의 값

<http://sarasoueidan.com/demos/css-svg-clipping/svg-img-clipped-pointer-events/index.html>