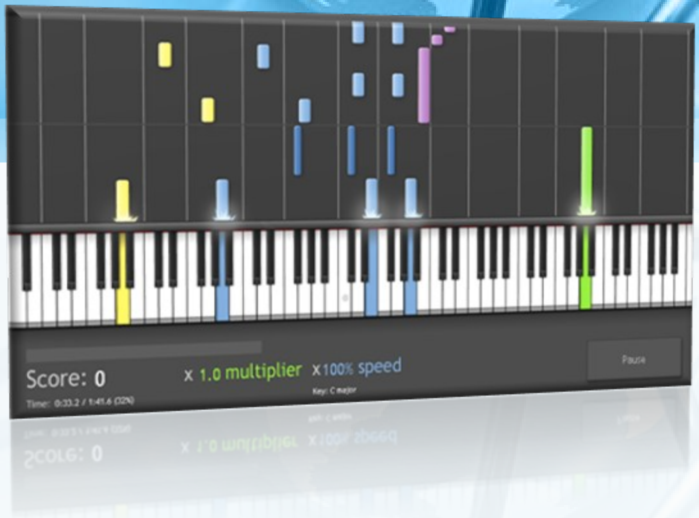
数据可视化

音乐可视化



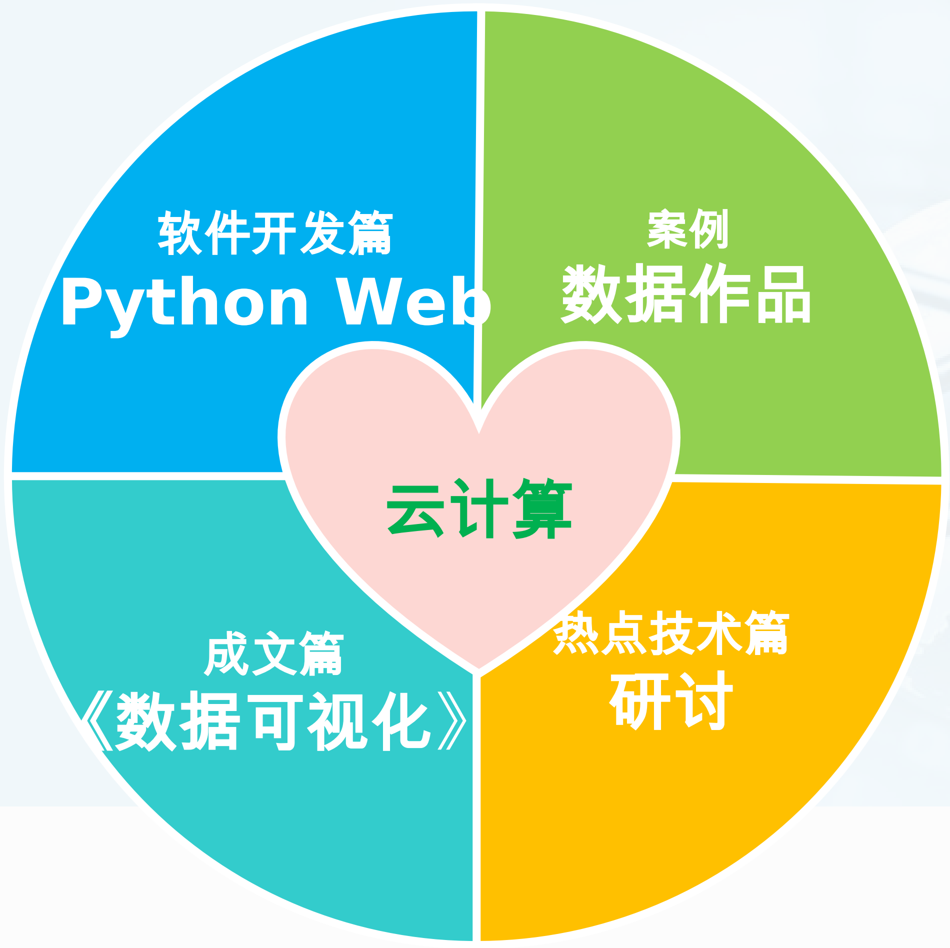
李春芳
计算机与网络空间安全学院

2020-6-10

中国传媒大学
COMMUNICATION UNIVERSITY OF CHINA

实践课程概述

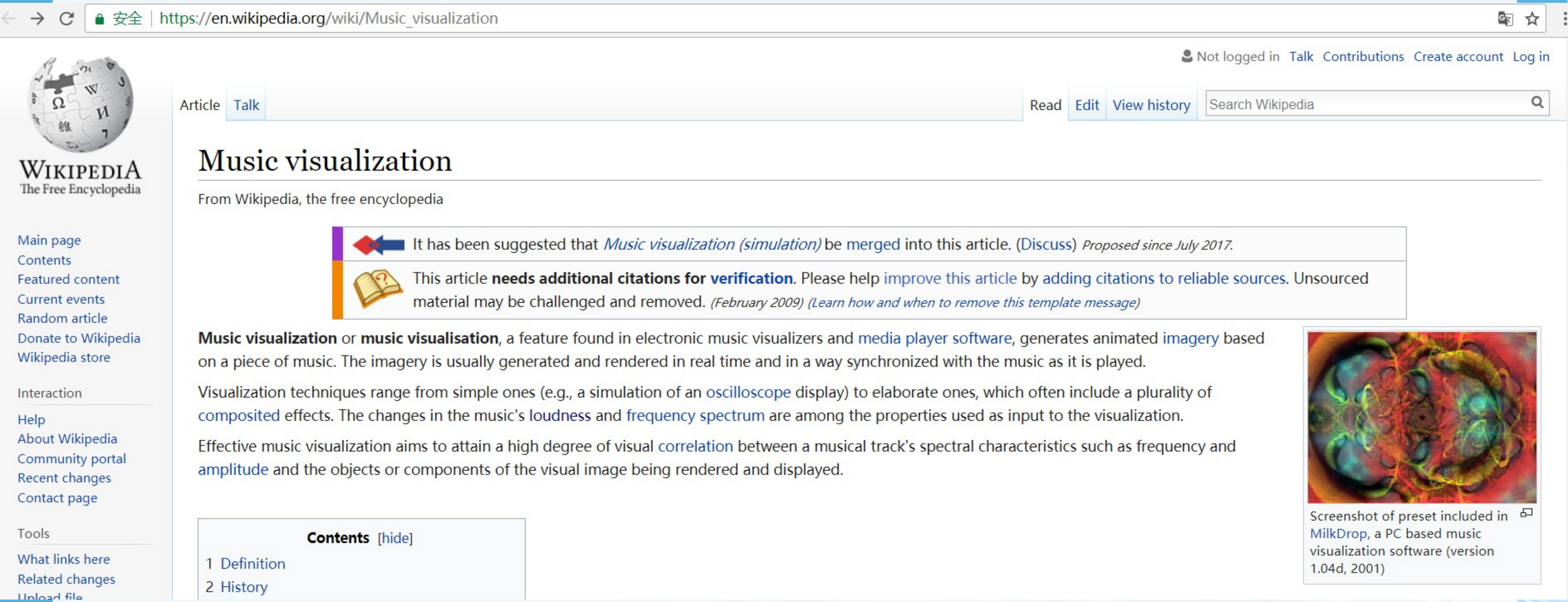
课程目标：软件开发中的数据可视化



第九章 音乐可视化

Music Visualization: Beautiful Tools to 'See' Sound

维基百科



https://en.wikipedia.org/wiki/Music_visualization

Music visualization

From Wikipedia, the free encyclopedia

It has been suggested that *Music visualization (simulation)* be merged into this article. (Discuss) *Proposed since July 2017.*

This article **needs additional citations for verification**. Please help improve this article by adding citations to reliable sources. Unsourced material may be challenged and removed. *(February 2009) (Learn how and when to remove this template message)*

Music visualization or **music visualisation**, a feature found in electronic music visualizers and media player software, generates animated imagery based on a piece of music. The imagery is usually generated and rendered in real time and in a way synchronized with the music as it is played.

Visualization techniques range from simple ones (e.g., a simulation of an oscilloscope display) to elaborate ones, which often include a plurality of composited effects. The changes in the music's loudness and frequency spectrum are among the properties used as input to the visualization.

Effective music visualization aims to attain a high degree of visual correlation between a musical track's spectral characteristics such as frequency and amplitude and the objects or components of the visual image being rendered and displayed.

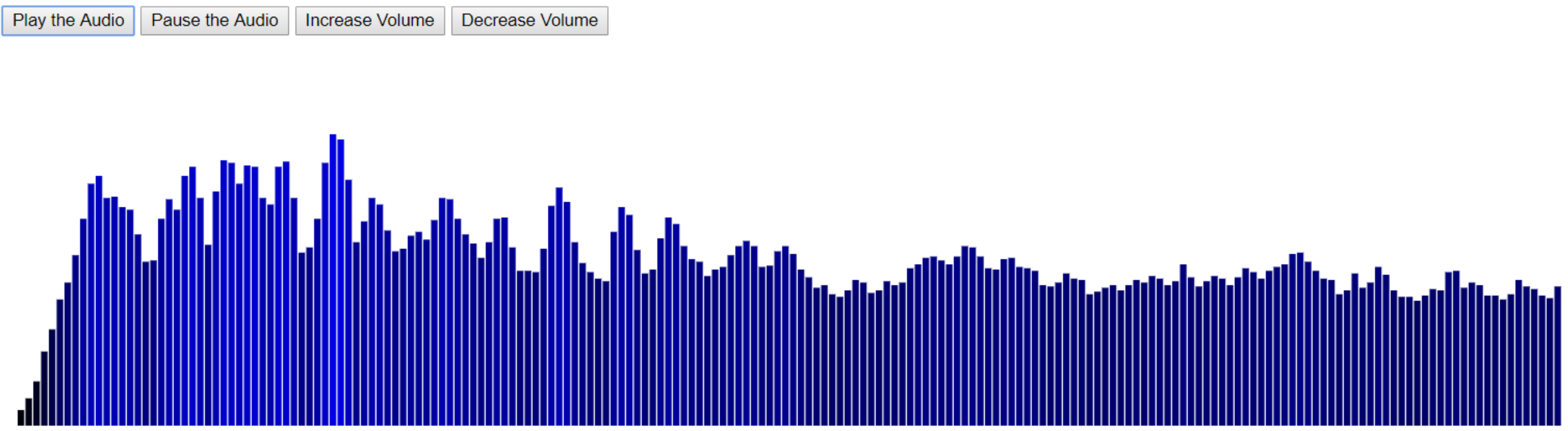
Screenshot of preset included in MilkDrop, a PC based music visualization software (version 1.04d, 2001)

Contents [hide]

基于 D3 的音乐可视化

Music Visualization with D3.js

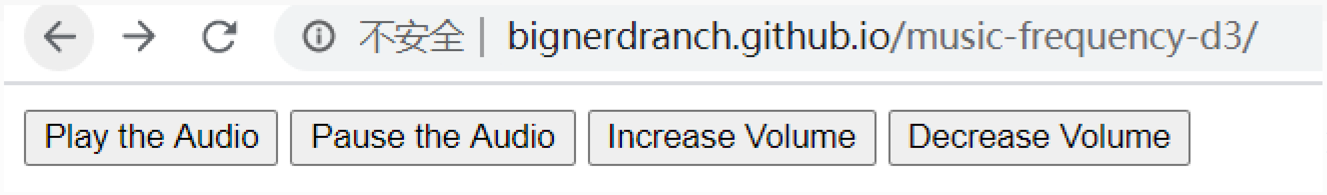
- http://bignerdranch.github.io/music-frequency-d3/



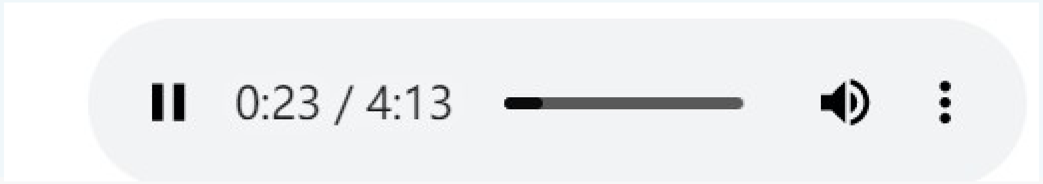
基于 JS 的音乐可视化

Music Visualization with D3.js

```
<audio id="audioElement" src="./audio/Odesza - Above The Middle.mp3"></audio
>
 <div>
<button onclick="document.getElementById('audioElement').play()">Play the Audi
o
</button>
<button onclick="document.getElementById('audioElement').pause()">Pause the A
udio
</button>
<button onclick="document.getElementById('audioElement').volume+=0.1">Increa
se Volume</button>
 <button onclick="document.getElementById('audioElement').volume-=0.1">Decre
ase Volume</button>
</div>
```


不安全 | bignerdranch.github.io/music-frequency-d3/

基于 JS 的音乐可视化
Music Visualization with D3.js



音乐控件

```
<div align="right">
 <audio id="audioElement" src="needme.mp3" controls="controls"></audio>
</div>
```

基于 JS 的音乐可视化 Music Visualization with D3.

```
<script>
//取音乐的频率
var audioCtx = new (window.AudioContext ||
window.webkitAudioContext)();

var audioElement =
document.getElementById('audioElement');

var audioSrc =
audioCtx.createMediaElementSource(audioElement);

var analyser = audioCtx.createAnalyser();
audioSrc.connect(analyser);
audioSrc.connect(audioCtx.destination);

//var frequencyData = new
Uint8Array(analyser.frequencyBinCount);
var myhist = document.getElementsByTagName("rect");
var frequencyData = new Uint8Array(200);
```

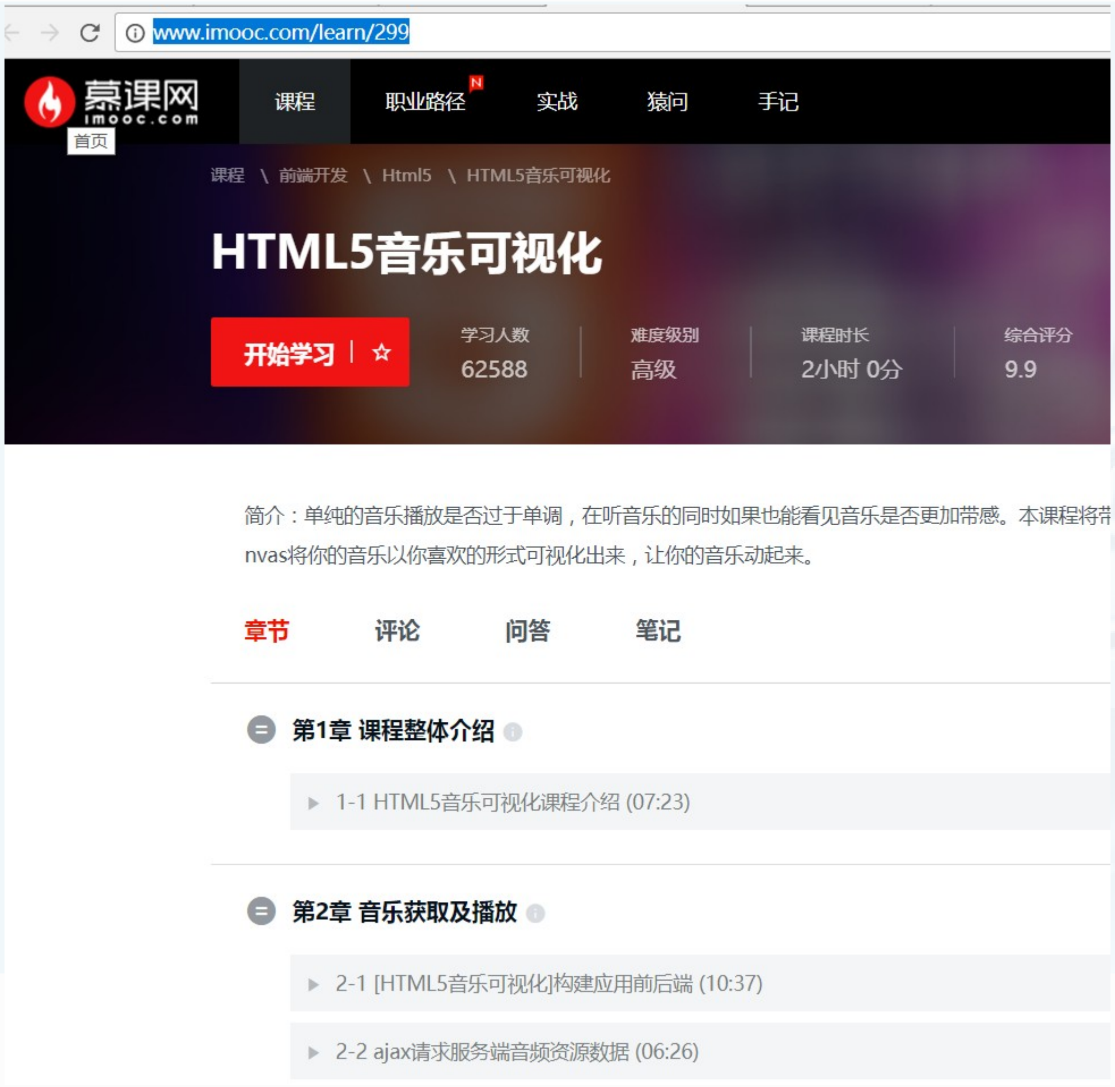
基于 JS 的音乐可视化
Music Visualization with D3.js

```
function every20() {
    analyser.getByteFrequencyData(frequencyData);

    for(var idx in myhist) {
    if (myhist[idx].getAttribute && frequencyData[idx])
    {
     myhist[idx].setAttribute("y", y-frequencyData[idx]);
     myhist[idx].setAttribute("height", frequencyData[idx]);
    }
    //console.log(frequencyData);
    }
}
window.setInterval(every20, 50);

</script>
```

1000 毫秒 /25 帧 =40 毫秒

http://www.imooc.com/learn/299

- 在线教程


www.imooc.com/learn/299

课程 \ 前端开发 \ Html5 \ HTML5音乐可视化

HTML5音乐可视化

开始学习 | ☆

学习人数	难度级别	课程时长	综合评分
62588	高级	2小时 0分	9.9

简介：单纯的音乐播放是否过于单调，在听音乐的同时如果也能看见音乐是否更加带感。本课程将带
nvas将你的音乐以你喜欢的形式可视化出来，让你的音乐动起来。

第1章 课程整体介绍

1-1 HTML5音乐可视化课程介绍 (07:23)

第2章 音乐获取及播放

2-1 [HTML5音乐可视化]构建应用前后端 (10:37)

2-2 ajax请求服务端音频资源数据 (06:26)

在线文档

- https://www.w3.org/TR/webaudio/

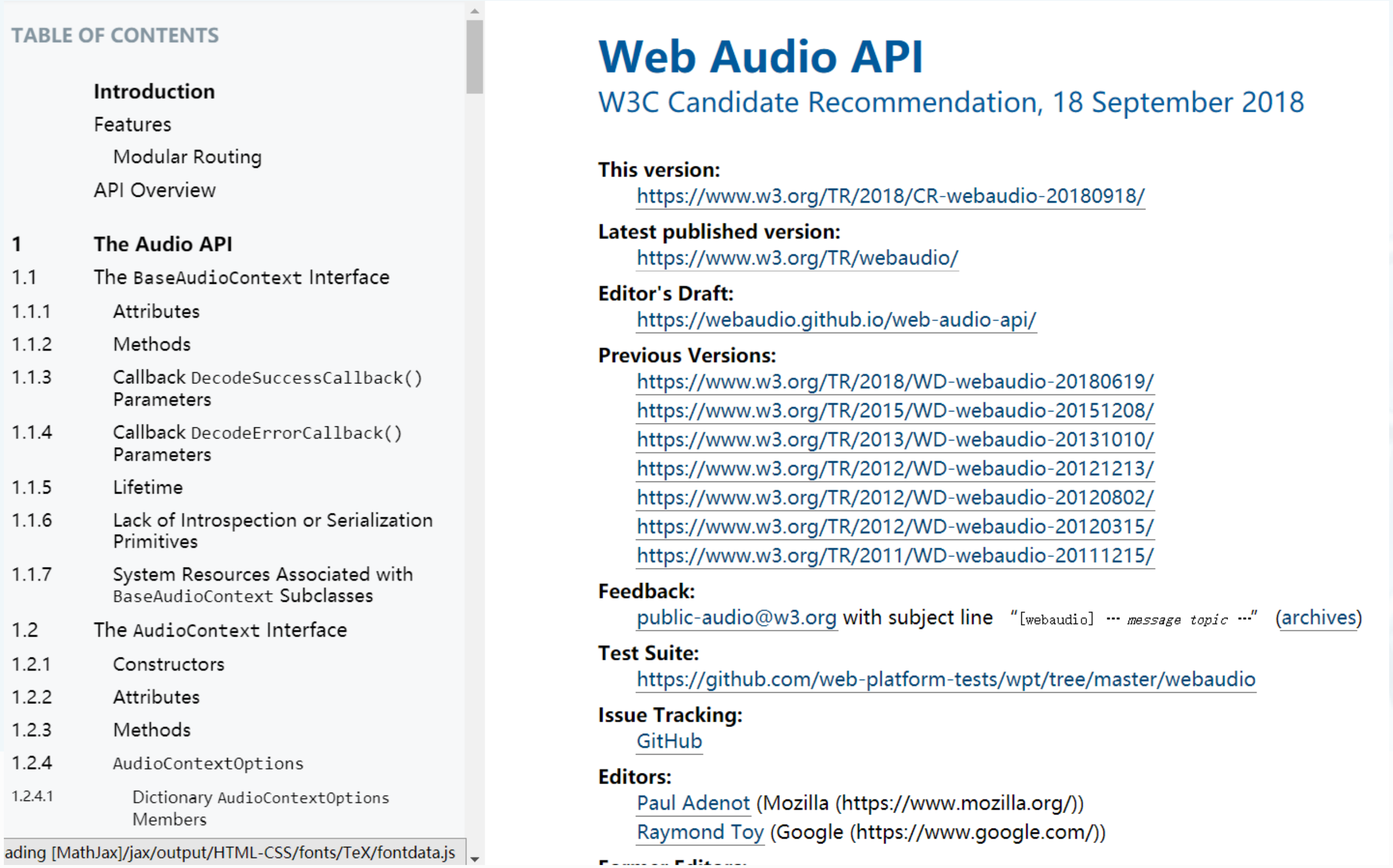


TABLE OF CONTENTS

ading [MathJax]/jax/output/HTML-CSS/fonts/TeX/fontdata.js

Web Audio API

W3C Candidate Recommendation, 18 September 2018

This version:
https://www.w3.org/TR/2018/CR-webaudio-20180918/

Latest published version:
https://www.w3.org/TR/webaudio/

Editor's Draft:
https://webaudio.github.io/web-audio-api/

Previous Versions:
https://www.w3.org/TR/2018/WD-webaudio-20180619/
https://www.w3.org/TR/2015/WD-webaudio-20151208/
https://www.w3.org/TR/2013/WD-webaudio-20131010/
https://www.w3.org/TR/2012/WD-webaudio-20121213/
https://www.w3.org/TR/2012/WD-webaudio-20120802/
https://www.w3.org/TR/2012/WD-webaudio-20120315/
https://www.w3.org/TR/2011/WD-webaudio-20111215/

Feedback:
public-audio@w3.org with subject line "[webaudio] … *message topic* …" (archives)

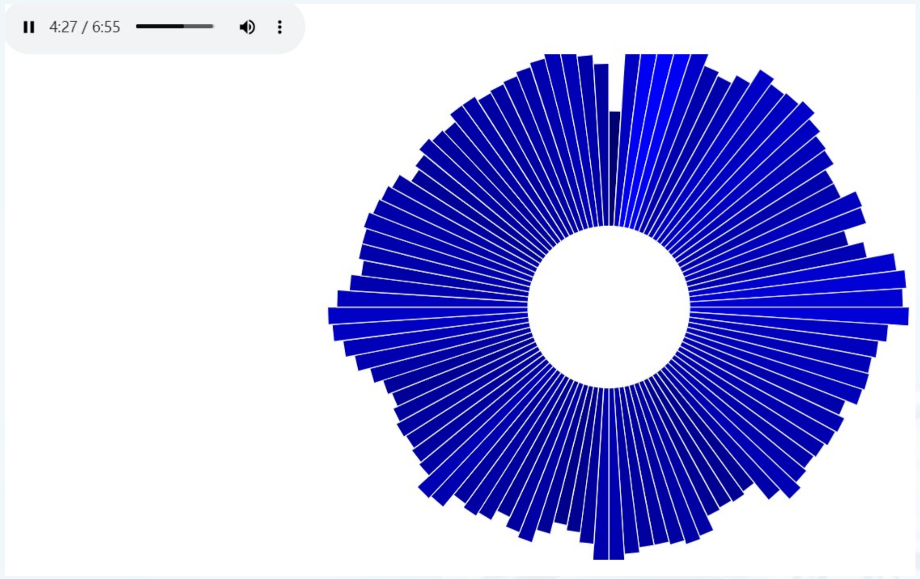
Test Suite:
https://github.com/web-platform-tests/wpt/tree/master/webaudio

Issue Tracking:
GitHub

Editors:
Paul Adenot (Mozilla (https://www.mozilla.org/))
Raymond Toy (Google (https://www.google.com/))

音乐可以驱动任何的可视化图形

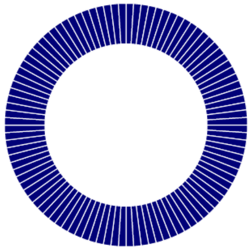
- 音乐分析器不变
- 图形随意换



```
var audioCtx = new (window.AudioContext || window.webkitAudioContext)();
var audioElement = document.getElementById('audioElement');
console.log(audioElement);
var audioSrc = audioCtx.createMediaElementSource(audioElement);
var analyser = audioCtx.createAnalyser();

//绑定分析器到音频媒体元素
audioSrc.connect(analyser);
audioSrc.connect(audioCtx.destination);

var frequencyData = new Uint8Array(100);
```

原生数据环图数据准备

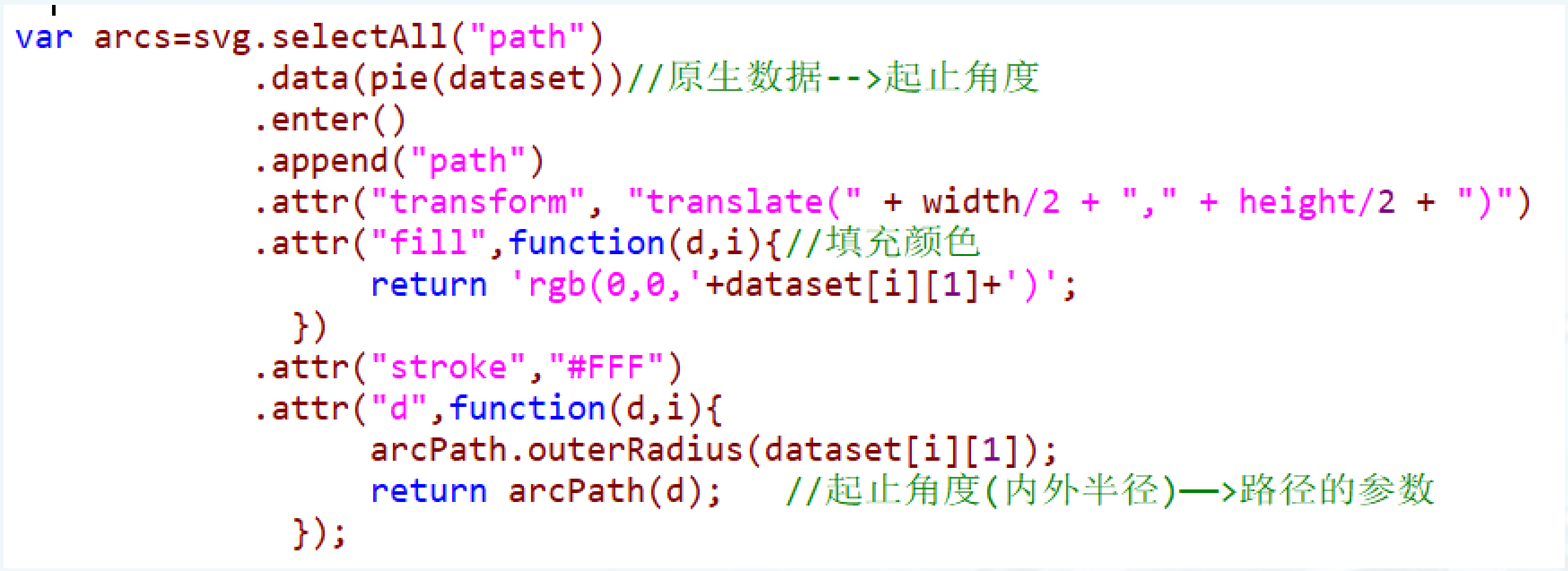
- 用 D3.V5 做一个不动的玫瑰图



```
var dataset=new Array(100);
for(var i=0;i<dataset.length;i++){
            dataset[i]=new Array();
            dataset[i][0]=120;
            dataset[i][1]=100+Math.floor(Math.random()*(255-100));
}
```

```
var pie = d3.pie()
                  .value(function(d){return d[0];});

var arcPath=d3.arc()//内外半径
                 .innerRadius(innerR);

var svg=d3.select("body")
            .append("svg")
            .attr("width",width)
            .attr("height",height);
```

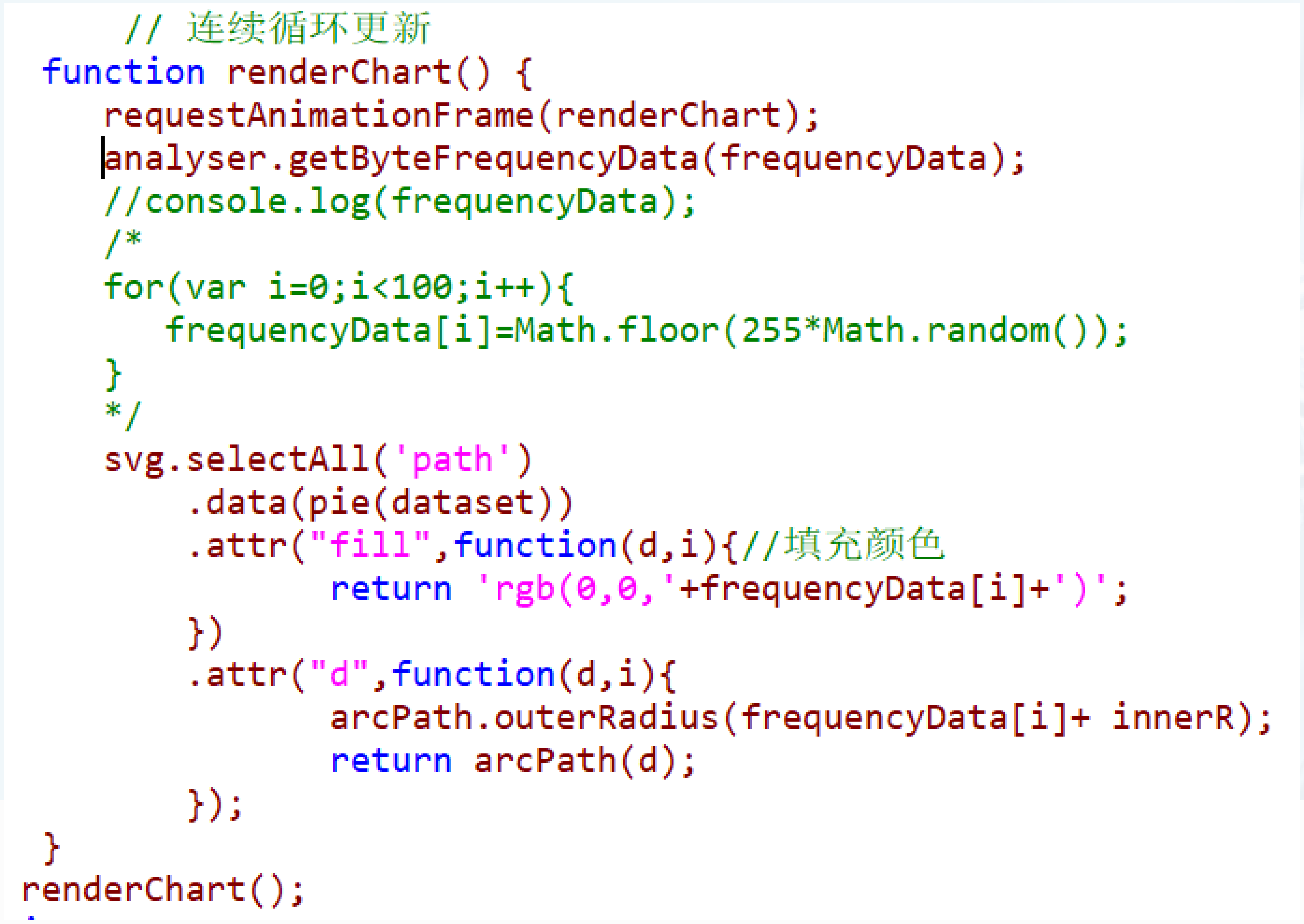
用 Path 绘制原生数据玫瑰图



```
var arcs=svg.selectAll("path")
            .data(pie(dataset))//原生数据-->起止角度
            .enter()
            .append("path")
            .attr("transform", "translate(" + width/2 + "," + height/2 + ")")
            .attr("fill",function(d,i){//填充颜色
                  return 'rgb(0,0,'+dataset[i][1]+')';
              })
            .attr("stroke","#FFF")
            .attr("d",function(d,i){
                  arcPath.outerRadius(dataset[i][1]);
                  return arcPath(d);   //起止角度(内外半径)—>路径的参数
              });
```

D3 请求动画帧

- **requestAnimationFrame(renderChart);**



```
      // 连续循环更新
 function renderChart() {
    requestAnimationFrame(renderChart);
    analyser.getByteFrequencyData(frequencyData);
    //console.log(frequencyData);
    /*
    for(var i=0;i<100;i++){
       frequencyData[i]=Math.floor(255*Math.random());
    }
    */
    svg.selectAll('path')
        .data(pie(dataset))
        .attr("fill",function(d,i){//填充颜色
               return 'rgb(0,0,'+frequencyData[i]+')';
        })
        .attr("d",function(d,i){
               arcPath.outerRadius(frequencyData[i]+ innerR);
               return arcPath(d);
        });
 }
renderChart();
```

谢谢

期待各位的佳作