

D3.js как инструмент визуализации данных

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План

1. Введение.
 - a. Визуализация данных и как мы пришли к d3
 - b. Немного о d3
2. Возможности D3 и примеры (тримап, хитмап, блокс.орг) (раньше?)
3. DOM API
 - a. Важность корректного построения дом-дерева
 - b. Selections API & Transition API
 - c. SVG, Canvas и D3.
4. D3 - **DATA** driven documents.
 - a. Стандартные API и структуры для работы с данными.
 - b. Визуализируем данные.
 - c. Helpers API, Layouts API
5. Пример из реального мира.
6. Заключение.

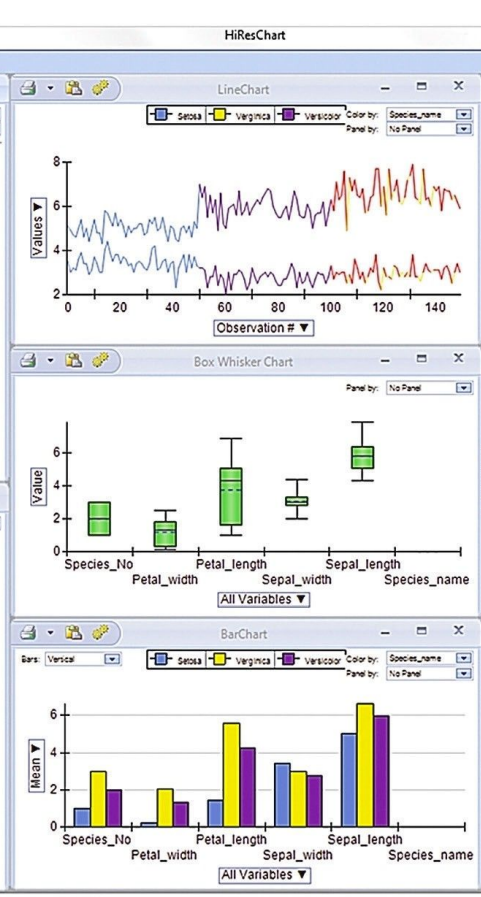
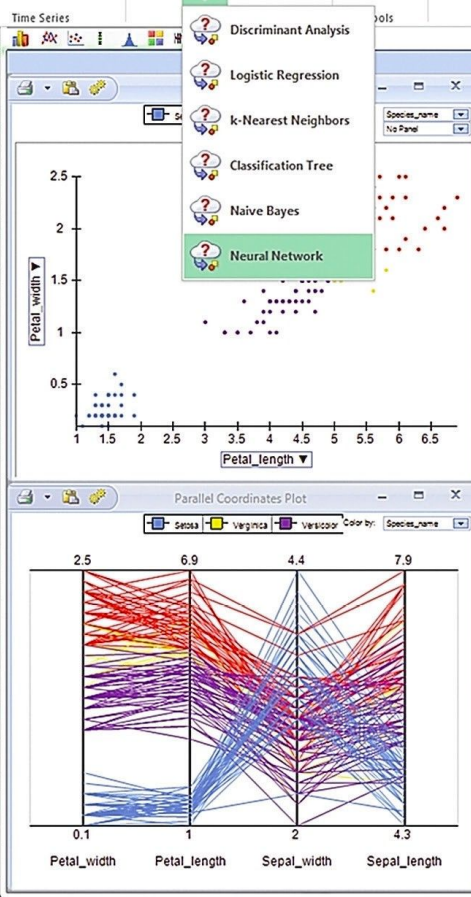


	A			B	C	D	E	F	G	H	I	J	K
1	File Name			EX_COEF_355	BA_COEF_355	EX_COEF_532	BA_COEF_532	BA_COEF_1064	mw	nm	real	imaginary	reff
2	FILE: r1200i000-0ln140410.LID d=0.01	m = 1.200 - .000E+00 i		2.02E-06	5.38E-09	1.56E-06	3.00E-09	2.70E-09	14	410	1.2	0.00E+00	5.44E-01
3	FILE: r1200i100-0ln140410.LID d=0.01	m = 1.200 - .100E+01 i		1.61E-06	9.46E-09	1.67E-06	9.56E-09	1.02E-08	14	410	1.2	1.00E+00	5.44E-01
4	FILE: r1200i100-1ln140410.LID d=0.01	m = 1.200 - .100E+00 i		1.57E-06	5.74E-10	1.41E-06	6.69E-10	9.98E-10	14	410	1.2	1.00E-01	5.44E-01
5	FILE: r1200i100-2ln140410.LID d=0.01	m = 1.200 - .100E-01 i		1.94E-06	2.56E-09	1.53E-06	2.06E-09	2.25E-09	14	410	1.2	1.00E-02	5.44E-01
6	FILE: r1200i100-3ln140410.LID d=0.01	m = 1.200 - .100E-02 i		2.01E-06	4.96E-09	1.56E-06	2.88E-09	2.65E-09	14	410	1.2	1.00E-03	5.44E-01
7	FILE: r1200i100-4ln140410.LID d=0.01	m = 1.200 - .100E-03 i		2.02E-06	5.34E-09	1.56E-06	2.99E-09	2.69E-09	14	410	1.2	1.00E-04	5.44E-01
8	FILE: r1200i100-5ln140410.LID d=0.01	m = 1.200 - .100E-04 i		2.02E-06	5.38E-09	1.56E-06	3.00E-09	2.70E-09	14	410	1.2	1.00E-05	5.44E-01
9	FILE: r1200i100-8ln140410.LID d=0.01	m = 1.200 - .100E-07 i		2.02E-06	5.38E-09	1.56E-06	3.00E-09	2.70E-09	14	410	1.2	1.00E-08	5.44E-01
10	FILE: r1200i125-1ln140410.LID d=0.01	m = 1.200 - .125E+00 i		1.53E-06	6.24E-10	1.40E-06	6.88E-10	9.65E-10	14	410	1.2	1.25E-01	5.44E-01
11	FILE: r1200i125-2ln140410.LID d=0.01	m = 1.200 - .125E-01 i		1.92E-06	2.18E-09	1.53E-06	1.89E-09	2.15E-09	14	410	1.2	1.25E-02	5.44E-01
12	FILE: r1200i150-1ln140410.LID d=0.01	m = 1.200 - .150E+00 i		1.51E-06	6.93E-10	1.40E-06	7.39E-10	9.79E-10	14	410	1.2	1.50E-01	5.44E-01
13	FILE: r1200i150-2ln140410.LID d=0.01	m = 1.200 - .150E-01 i		1.91E-06	1.88E-09	1.52E-06	1.75E-09	2.07E-09	14	410	1.2	1.50E-02	5.44E-01
14	FILE: r1200i175-1ln140410.LID d=0.01	m = 1.200 - .175E+00 i		1.49E-06	7.77E-10	1.40E-06	8.13E-10	1.03E-09	14	410	1.2	1.75E-01	5.44E-01
15	FILE: r1200i175-2ln140410.LID d=0.01	m = 1.200 - .175E-01 i		1.89E-06	1.63E-09	1.51E-06	1.63E-09	1.99E-09	14	410	1.2	1.75E-02	5.44E-01
16	FILE: r1200i200-1ln140410.LID d=0.01	m = 1.200 - .200E+00 i		1.48E-06	8.76E-10	1.41E-06	9.06E-10	1.10E-09	14	410	1.2	2.00E-01	5.44E-01
17	FILE: r1200i200-2ln140410.LID d=0.01	m = 1.200 - .200E-01 i		1.87E-06	1.43E-09	1.51E-06	1.52E-09	1.91E-09	14	410	1.2	2.00E-02	5.44E-01
18	FILE: r1200i225-1ln140410.LID d=0.01	m = 1.200 - .225E+00 i		1.47E-06	9.88E-10	1.42E-06	1.01E-09	1.20E-09	14	410	1.2	2.25E-01	5.44E-01
19	FILE: r1200i225-2ln140410.LID d=0.01	m = 1.200 - .225E-01 i		1.86E-06	1.27E-09	1.50E-06	1.42E-09	1.84E-09	14	410	1.2	2.25E-02	5.44E-01
20	FILE: r1200i250-1ln140410.LID d=0.01	m = 1.200 - .250E+00 i		1.47E-06	1.11E-09	1.42E-06	1.14E-09	1.31E-09	14	410	1.2	2.50E-01	5.44E-01
21	FILE: r1200i250-2ln140410.LID d=0.01	m = 1.200 - .250E-01 i		1.84E-06	1.14E-09	1.50E-06	1.33E-09	1.78E-09	14	410	1.2	2.50E-02	5.44E-01
22	FILE: r1200i250-3ln140410.LID d=0.01	m = 1.200 - .250E-02 i		2.00E-06	4.41E-09	1.55E-06	2.71E-09	2.57E-09	14	410	1.2	2.50E-03	5.44E-01
23	FILE: r1200i275-1ln140410.LID d=0.01	m = 1.200 - .275E+00 i		1.47E-06	1.25E-09	1.43E-06	1.27E-09	1.44E-09	14	410	1.2	2.75E-01	5.44E-01
24	FILE: r1200i275-2ln140410.LID d=0.01	m = 1.200 - .275E-01 i		1.83E-06	1.03E-09	1.49E-06	1.26E-09	1.72E-09	14	410	1.2	2.75E-02	5.44E-01

Sample Explore Transform Cluster Partition ARIMA Smoothing Partition Classify Predict Associate Score Help

Data Analysis

	A	B
	Species_No	Petal_width
1	1	0.2
2	1	0.2
3	1	0.2
4	1	0.2
5	1	0.2
6	1	0.2
7	1	0.4
8	1	0.3
9	1	0.2
10	1	0.2
11	1	0.1
12	1	0.2
13	1	0.2
14	1	0.1
15	1	0.1
16	1	0.2
17	1	0.4
18	1	0.4
19	1	0.3
20	1	0.3
21	1	0.3
22	1	0.2
23	1	0.4
24	1	0.2
25	1	0.5
26	1	0.2
27	1	0.2
28	1	0.4
29	1	0.2
30	1	0.2
31	1	0.2
32	1	0.2
33	1	0.4
34	1	0.1
35	1	0.2
36	1	0.2
37	1	0.2
38	1	0.2
39	1	0.1
40	1	0.2
41	1	0.2
42	1	0.3
43	1	0.3
44	1	0.2
45	1	0.6
46	1	0.4
47	1	0.3
48	1	0.2
49	1	0.2



Filters

Species_No

Petal_width

Petal_length

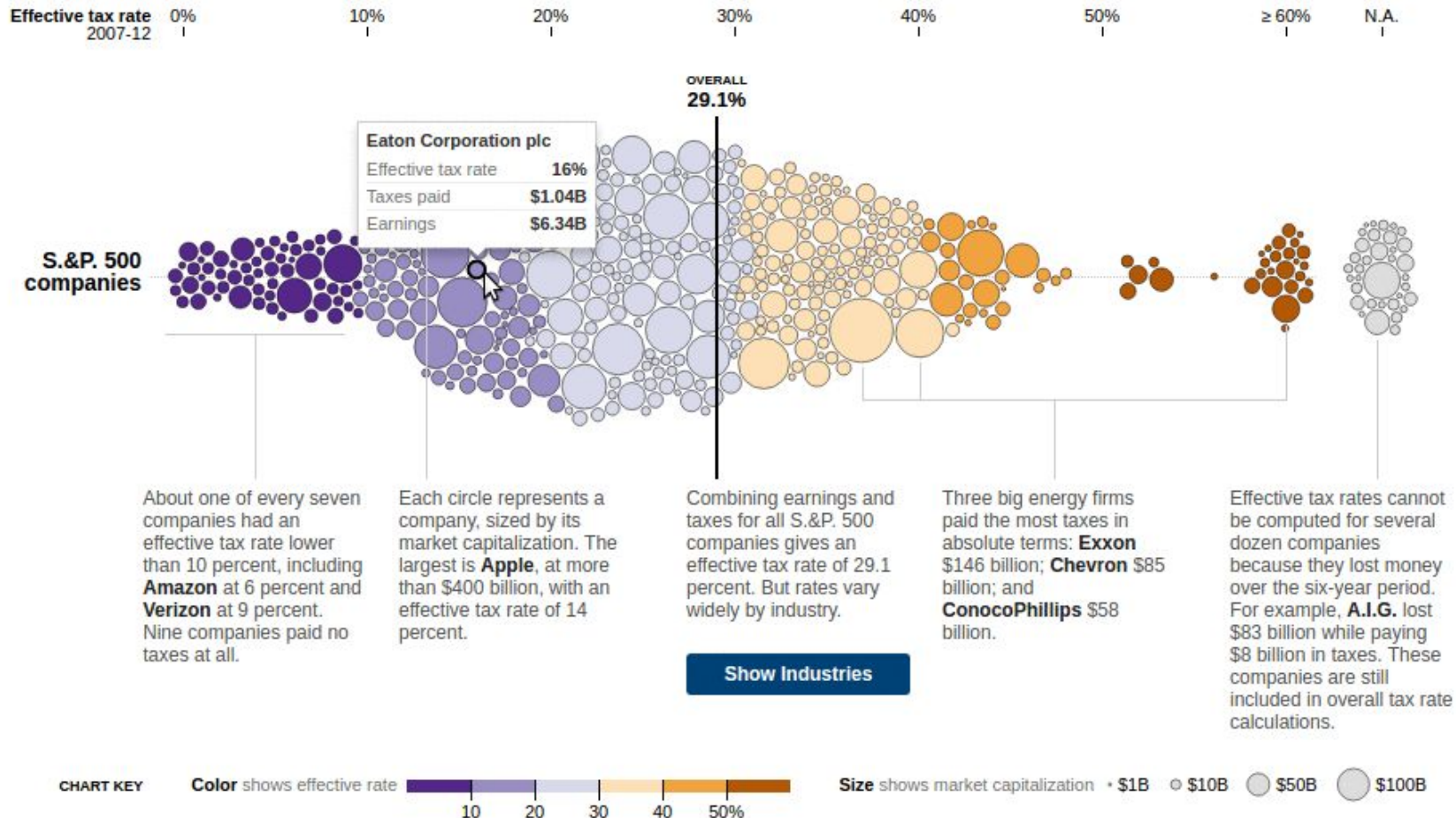
Sepal_width

Sepal_length

Species_name

Observations (38 out of 150)

Variable	Value 1	Value 2
Species_No	3	3
Petal_width	2.5	1.9
Petal_length	6	5.1
Sepal_width	3.3	2.7
Sepal_length	6.3	5.8
Species_name	Virginica	Virginica





Fabric.js
Interactive Framework






<> Code

Issues 2

Pull requests 1

Wiki

Insights

Bring data to life with SVG, Canvas and HTML.  <https://d3js.org>

visualization

4,099 commits

34 branches

224 releases

119 contributors

BSD-3-Clause

Branch: master

New pull request

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mbostock 4.10.2

Latest commit 41dad64 18 hours ago

img	Add pack images.	a year ago
test	Add test for d3.event re-export on Node. Related #3055.	8 months ago
.gitignore	Checkpoint 4.0 branch.	2 years ago
.npmignore	Checkpoint 4.0 branch.	2 years ago
API.md	Update.	4 months ago
CHANGES.md	HTTPS for bl.ocks.org.	7 months ago
ISSUE_TEMPLATE.md	Add ISSUE_TEMPLATE.md. Related #2994.	11 months ago
LICENSE	Update year to 2017 in License. Closes #3084	6 months ago
README.md	HTTPS for bl.ocks.org.	7 months ago
d3.sublime-project	Checkpoint 4.0 branch.	2 years ago
index.js	Missing semicolon	7 months ago
package.json	4.10.2	18 hours ago
rollup.config.js	Update dependencies.	2 days ago
rollup.node.js	Update dependencies.	2 days ago

Преимущества

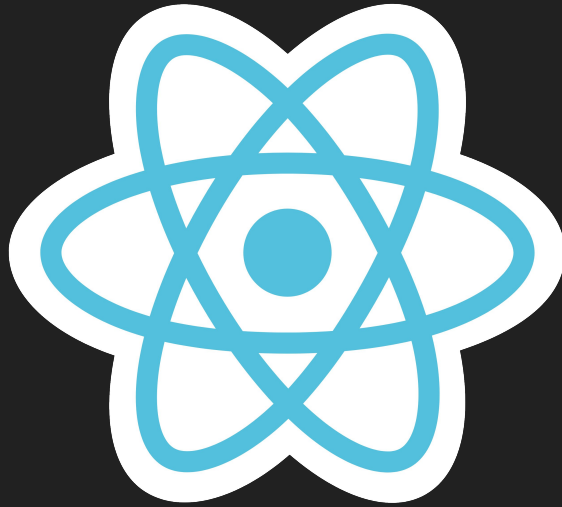
- Гибкость
- Богатый API
- Одинаково хорошо работает с HTML, Canvas & SVG
- Open Source
- Community
- Документация

Недостатки

- Сложность
- Богатый API
- IE 9+

Библиотеки на основе d3

- dc.js
- NVD3
- Dimple
- c3.js
- dex.js

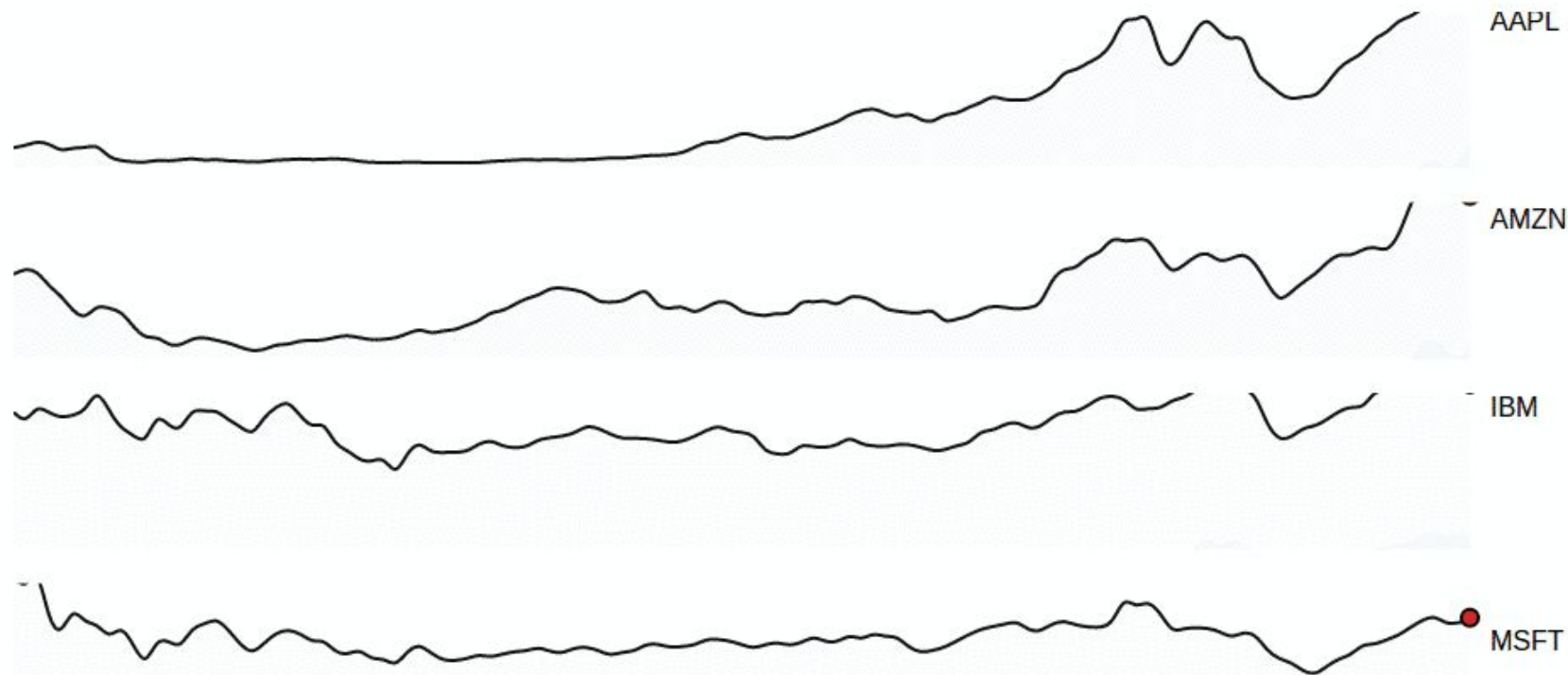


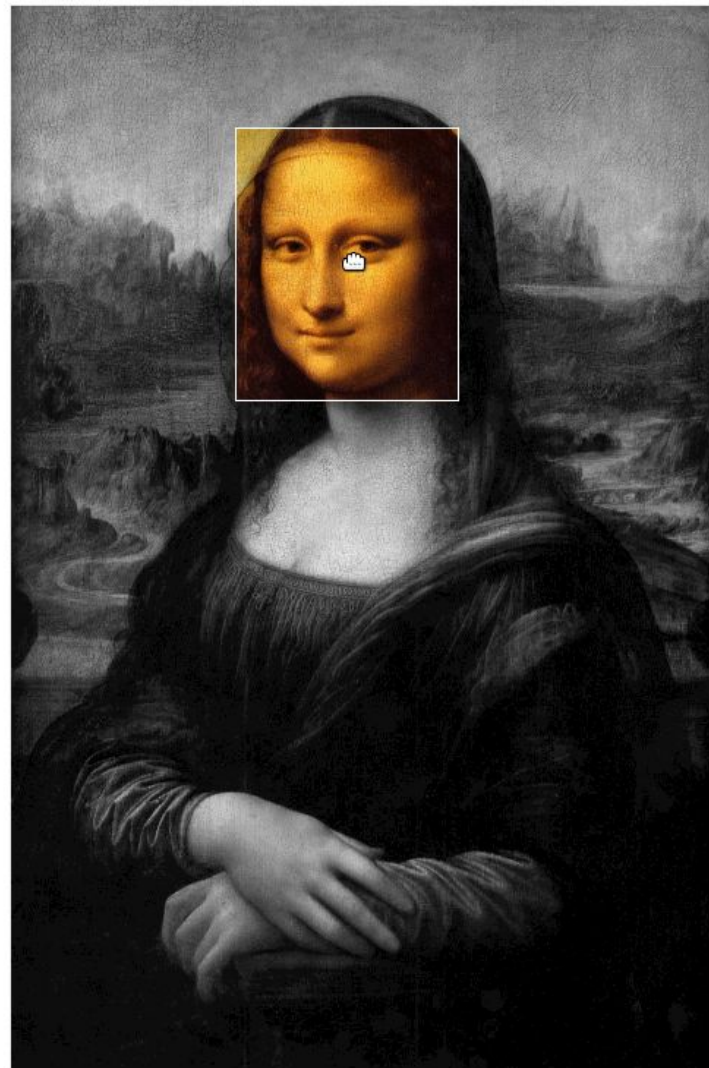


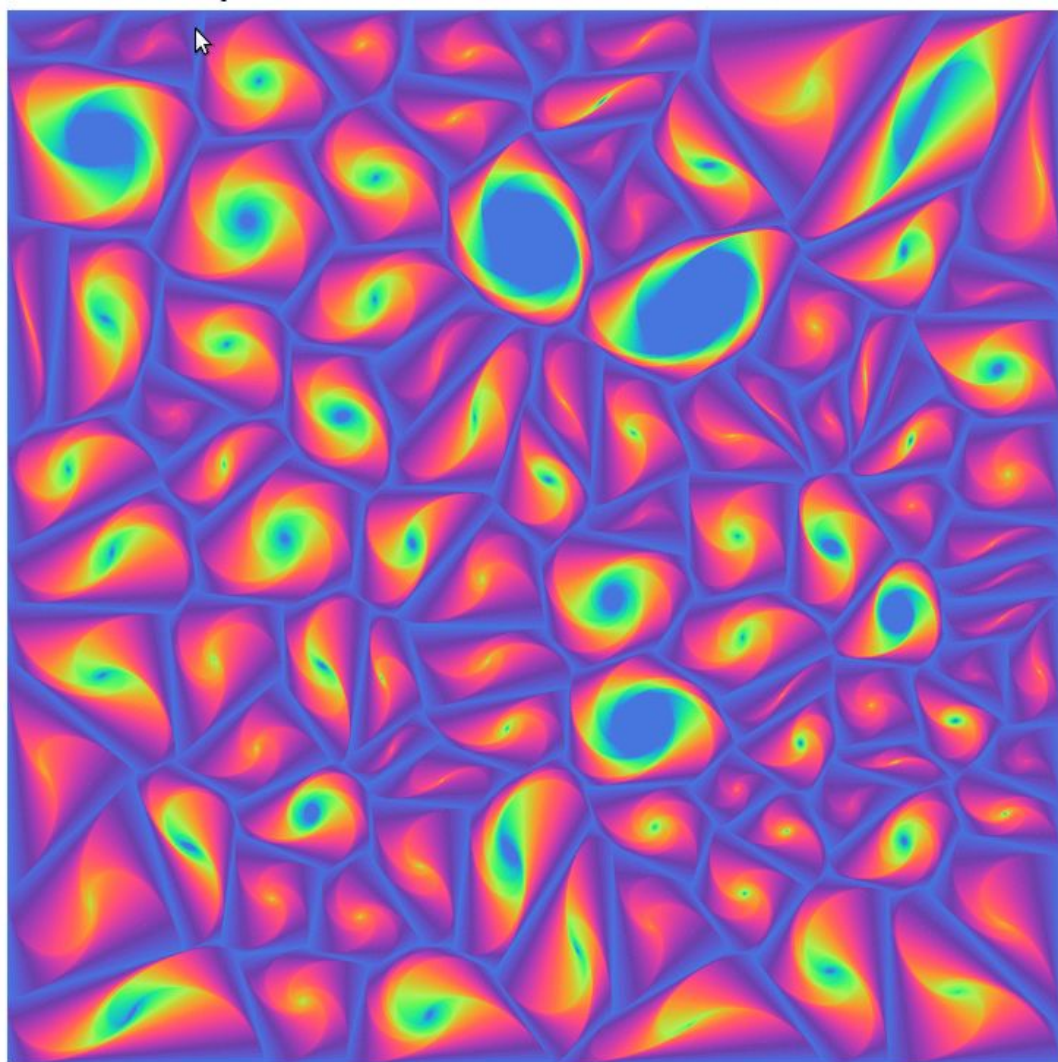
```
204         : data.p.source_keys[0];
205
206     tooltip.select( selector: '.text').html(html);
207
208     const { width } = tooltip.node().getBoundingClientRect();
209     const headerOffset = 20;
```

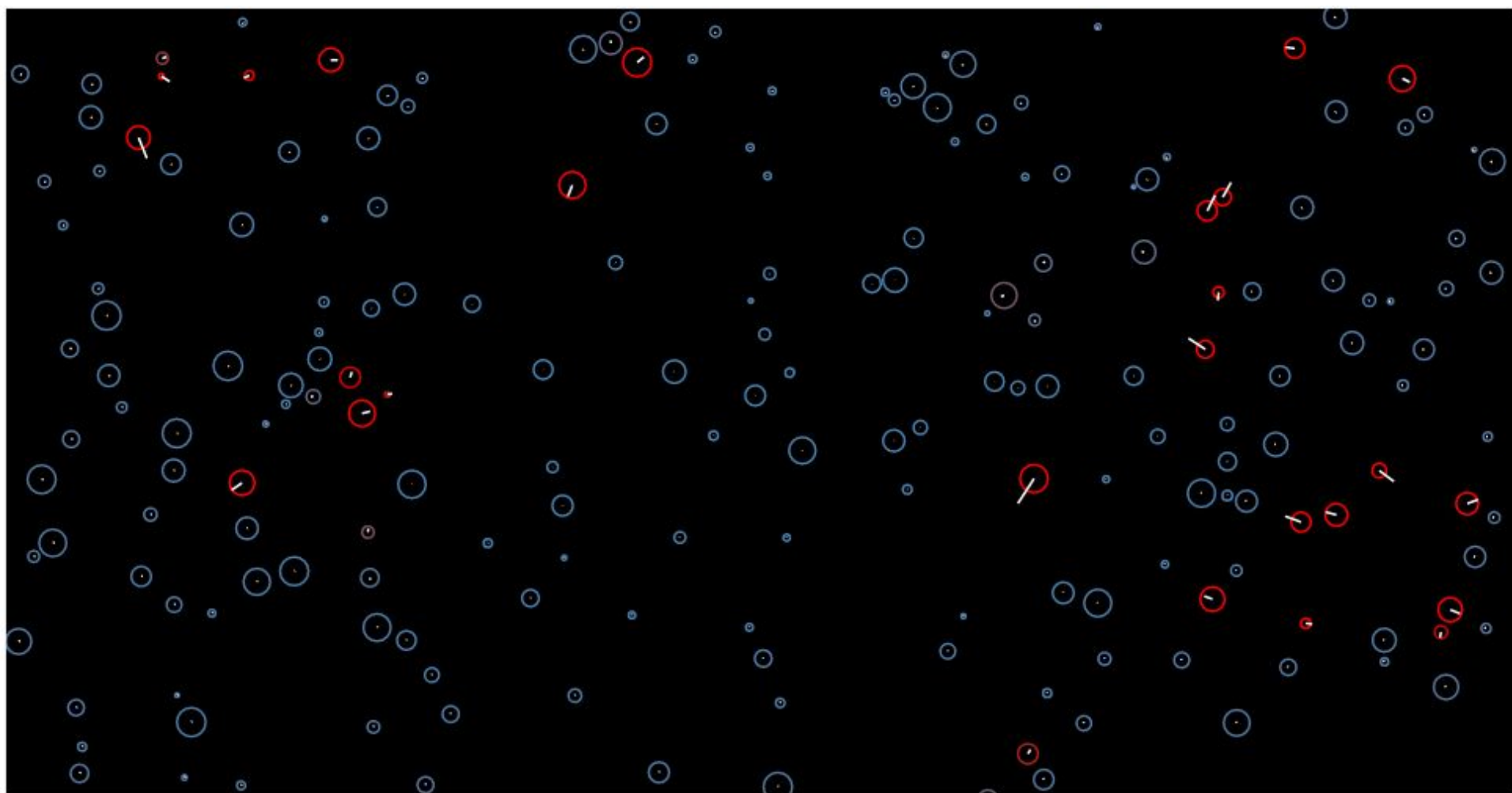
TS2339:Property 'getBoundingClientRect' does not exist on type 'BaseType'. Property 'getBoundingClientRect' does not exist on type 'EnterElement'.

```
211     const top = d3.mouse(this as any)[1] - headerOffset;
212
```

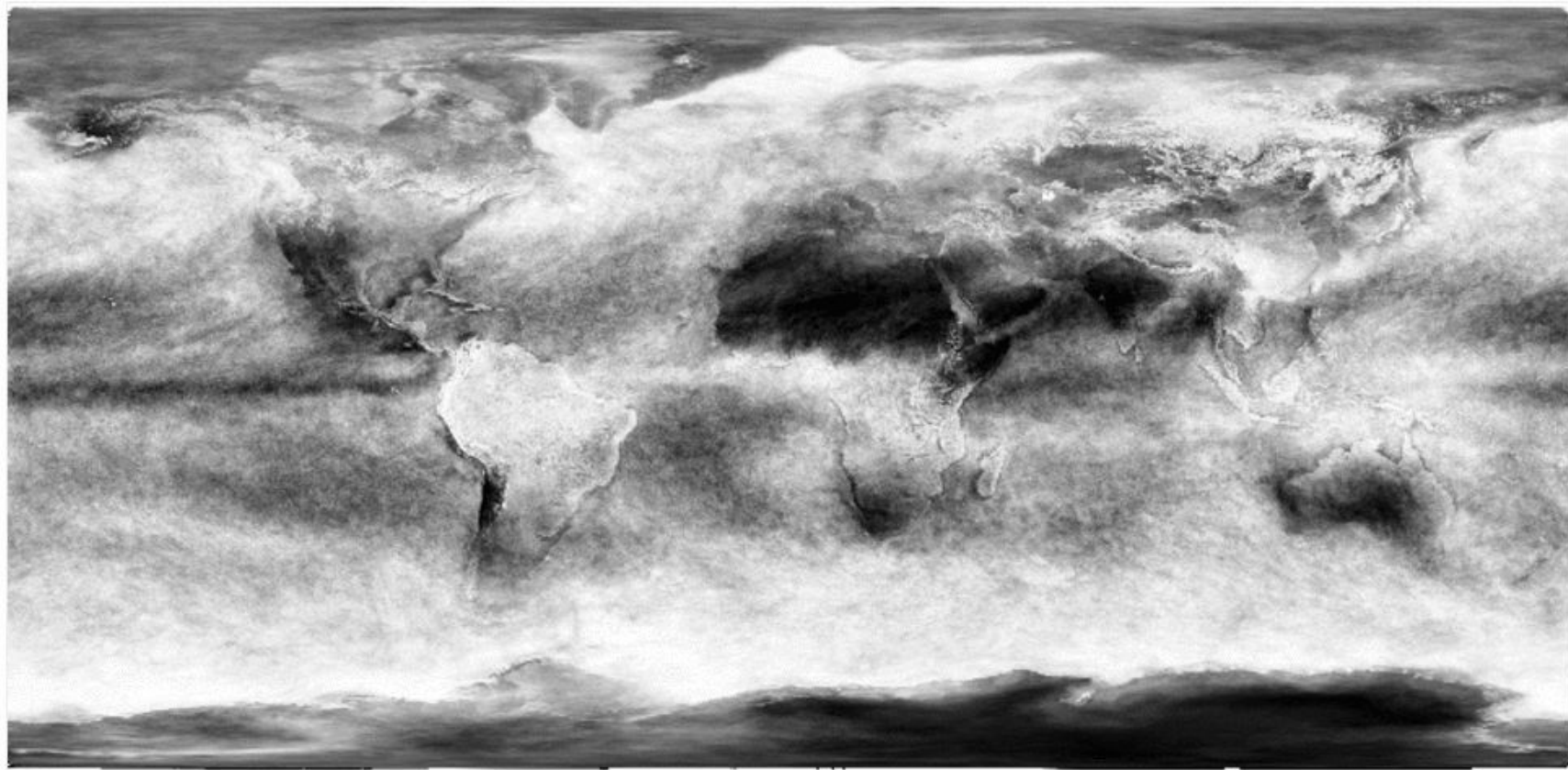



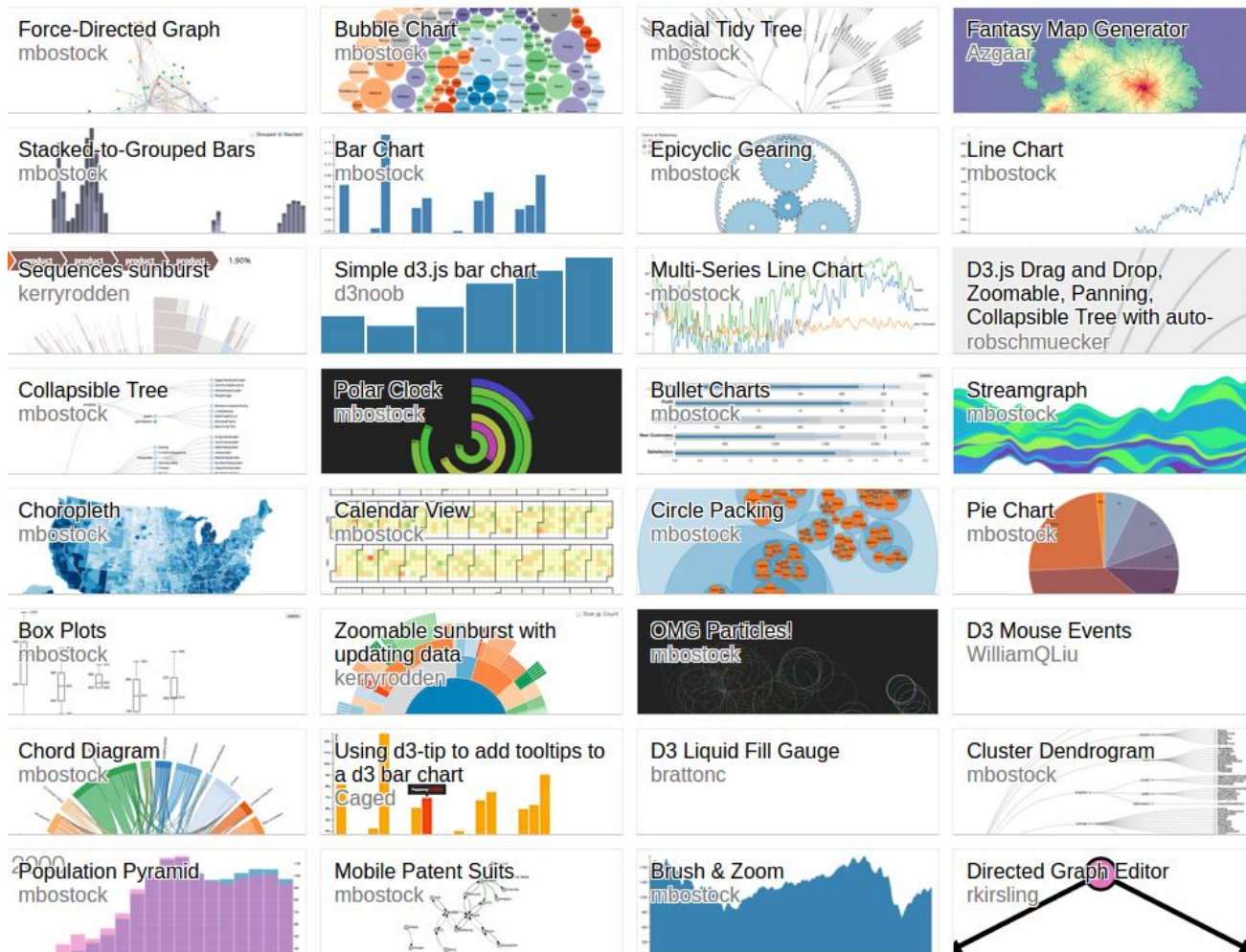












Что d3 делает за нас

- Связывание данных с DOM
- Обработка и форматирование данных
- Преобразования визуального состояния
- Анимация



Selection API

- `d3.select`
- `d3.selectAll`
- *selection.select*
- *selection.selectAll*
- *selection.filter*
- *selection.merge*

Hello!

Привет!

Bonjour!

```
d3.selectAll('p').style('background', 'green');
```

Hello!

Привет!

Bonjour!

```
d3.select('p').style('background', 'yellow');
```

Transition API

- `selection.transition`
- `transition.duration`
- `transition.delay`
- `transition.interrupt`


```
d3.selectAll('p')  
  .style('background', 'rgba(0, 255, 0, 0)')  
  .transition()  
  .duration(3000)  
  .style('background', 'rgba(0, 255, 0, 1)');
```

Hello!

TipuBet!

Bonjour!

```
const p = d3.selectAll('p');  
let angle = -180;  
transition();  
  
function transition() {  
  angle -= 10;  
  p.transition()  
    .duration(500)  
    .style('transform', `rotate(${angle}deg)`)  
    .on('end', transition);  
}
```



```
d3.selectAll('p')  
  .style('background', 'rgba(0, 255, 0, 0)')  
  .transition()  
  .duration(3000)  
  .style('background', 'rgba(0, 255, 0, 1)')  
  .delay((d, i) => i * 500);
```



canvas



<> Code

! Issues 1

🔗 Pull requests 0

📁 Projects 0

📖 Wiki

Insights ▾

transition on canvas with d3

canvas

transition

d3js

svg

d3-module

🕒 59 commits

🌿 1 branch

📦 16 releases

👤 2 contributors

📄 BSD-3-Clause

Branch: master ▾

New pull request

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Isbardel new minor version

Latest commit 201ea2e on Jul 19

📁 src	added canvas cursor style	7 months ago
📁 test	export getSize	8 months ago
📄 .eslintrc	updated	a year ago
📄 .gitignore	new deployment process	9 months ago
📄 .npmignore	new deployment process	9 months ago
📄 LICENSE	license fix	2 years ago
📄 README.md	d3-color is a requirement	8 months ago
📄 circle.yml	circleci fix	9 months ago
📄 index.js	map - arcs and polygons	8 months ago
📄 package.json	new minor version	2 months ago
📄 rollup.config.js	new minor version	2 months ago
📄 yarn.lock	new minor version	2 months ago

Как d3 работает с данными



Data API

- Манипуляция массивами
- Коллекции
- Парсеры DSV
- Форматтеры
- Интерполяторы
- Очереди
- Генераторы случайных чисел
- XHR запросы

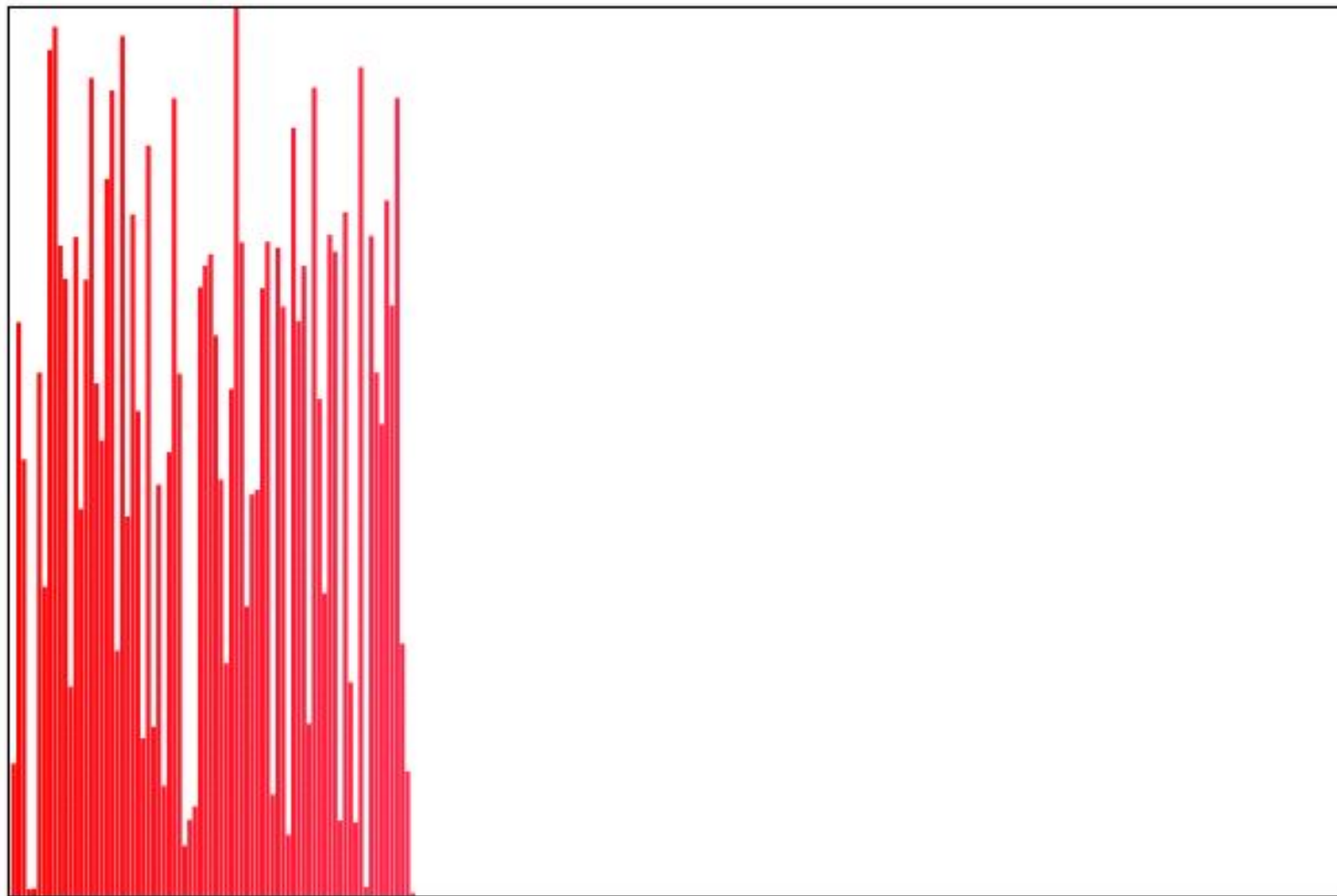
Hello!

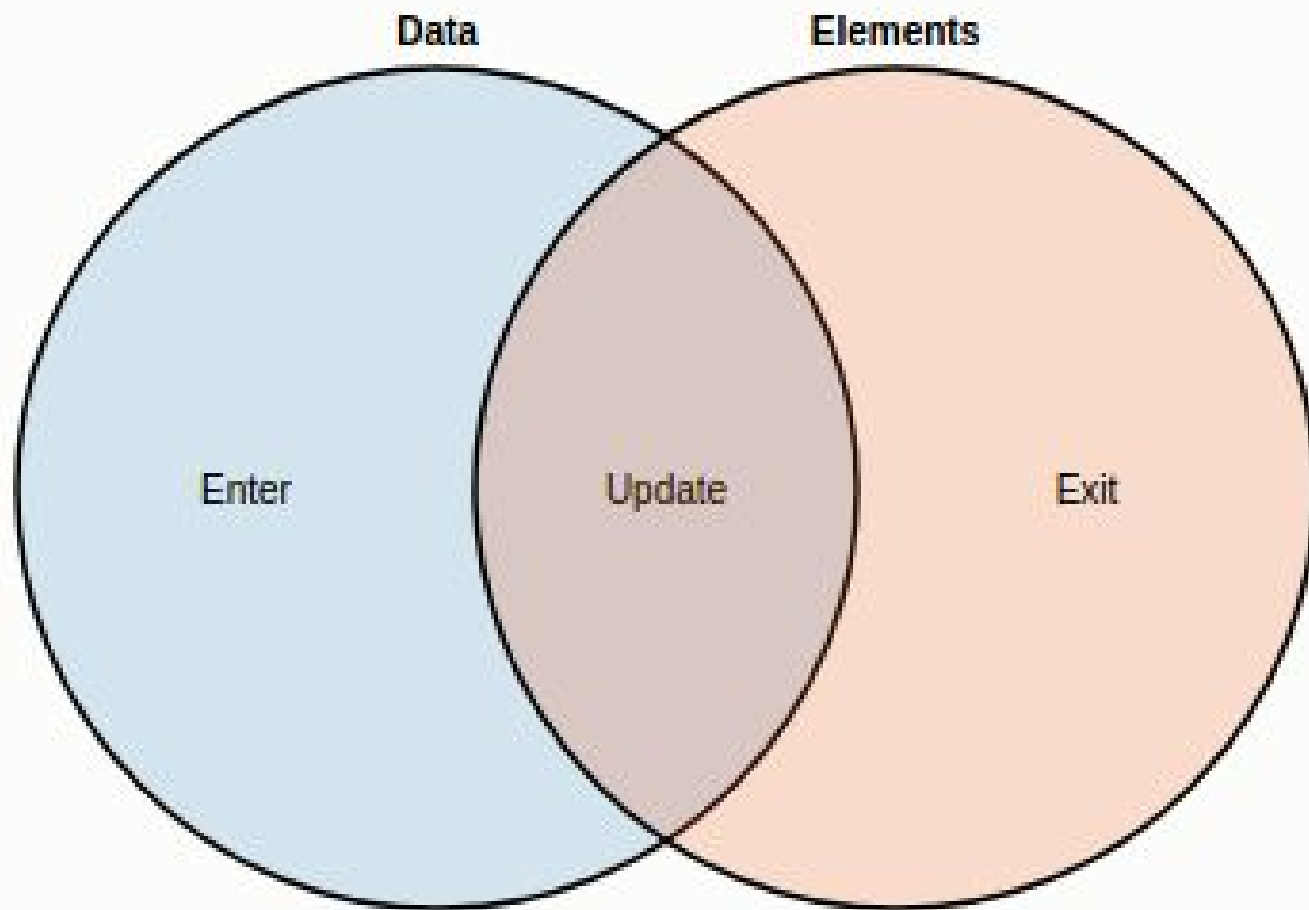
Привет!

Bonjour!

```
const data = [  
  'Hello!',  
  'Привет!',  
  'Bonjour!',  
];
```

```
d3.select('body')  
  .append('div')  
  .selectAll('p')  
  .data(data)  
  .enter()  
  .append('p')  
  .text(d => d);
```





Hello!

Привет!

Bonjour!

```
const div = d3.select('body').append('div');  
const oldData = ['Hello!', 'Привет!', 'Bonjour!'];  
const newData1 = ['Hello!', 'Привет!', 'Bonjour!', 'Guten tag!', 'Hola!'];  
const newData2 = ['Hello!', 'Привет!'];
```

```
div.selectAll('p')  
  .data(oldData)  
  .enter()  
  .append('p')  
  .text(d => d);
```

```
setTimeout(() => update(newData1), 3000);  
setTimeout(() => update(newData2), 6000);
```

```
function update(data) {  
  const text = div.selectAll('p')  
    .data(data);  
  
  text.classed('old', true)  
  
  text.enter().append('p')  
    .attr('class', 'new')  
    .merge(text)  
    .text(d => d);  
  
  text.exit().remove();  
}
```

Hello!

Привет!

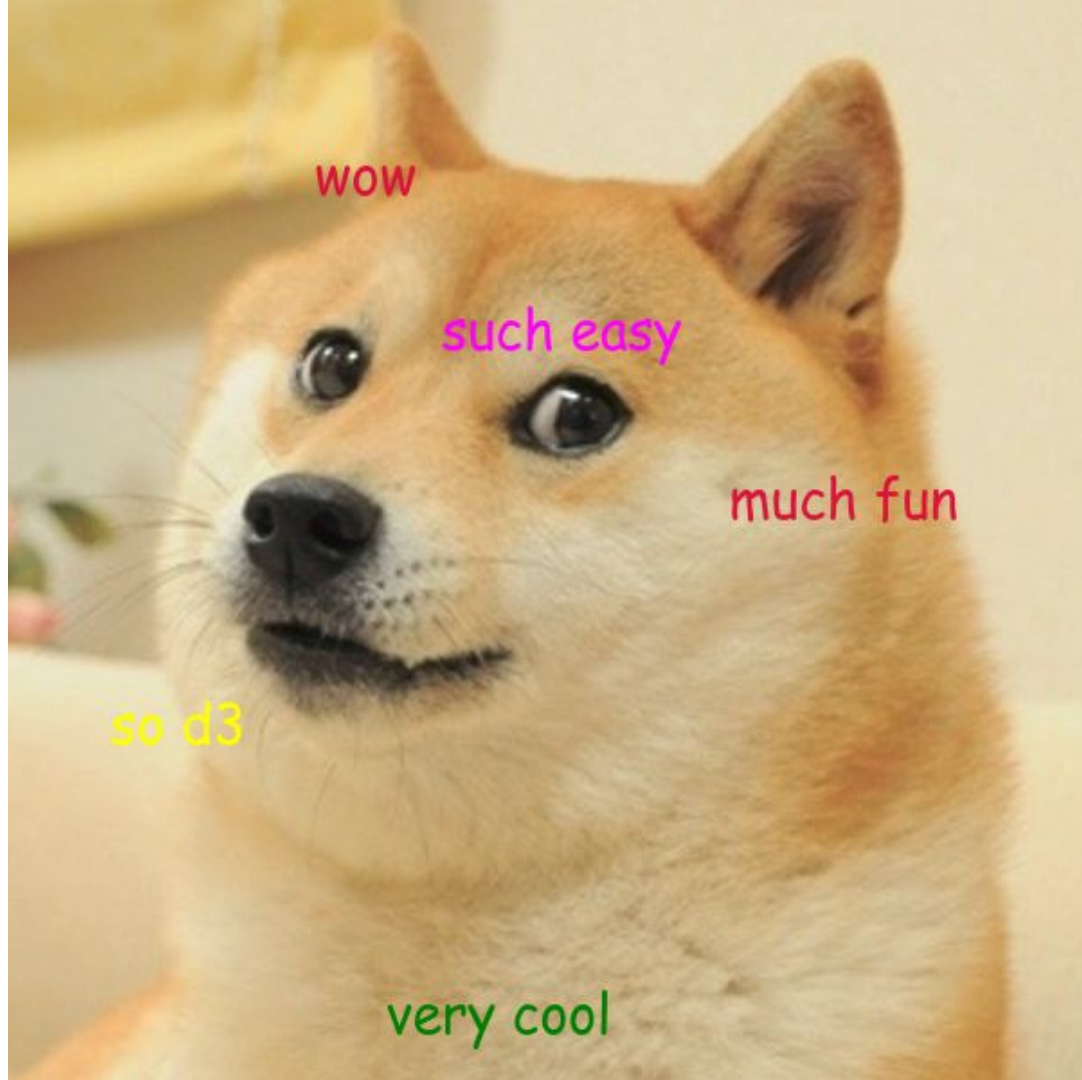
Bonjour!

```
const div = d3.select('body').append('div');  
const oldData = ['Hello!', 'Привет!', 'Bonjour!'];  
const newData1 = ['Hello!', 'Привет!', 'Bonjour!', 'Guten tag!', 'Hola!'];  
const newData2 = ['Hello!', 'Привет!'];
```

```
div.selectAll('p')  
  .data(oldData)  
  .enter()  
  .append('p')  
  .text(d => d);
```

```
setTimeout(() => update(newData1), 3000);  
setTimeout(() => update(newData2), 6000);
```

```
function update(data) {  
  const text = div.selectAll('p')  
    .data(data);  
  
  text.exit()  
    .transition().duration(1000)  
    .style('opacity', '0')  
    .remove();  
  
  text.classed('old', true)  
  
  text.enter().append('p')  
    .attr('class', 'new')  
    .text(d => d)  
    .style(['opacity', '0'])  
    .transition().duration(1000)  
    .style('opacity', '1');  
}
```



wow

such easy

much fun

so d3

very cool