D3.js 스터디

3주차 - Dot Plot

이지호

Element 선택하기

Select, SelectAll, Filter, Merge 등

- Select : css 선택자에 따라 요소 선택(단일 요소, 처음으로 나오는 요소)
- SelectAll : css 선택자에 따라 요소 선택(모든 요소)
- Filter : 선택된 selection 객체에서 조건에 맞는 요소들만 선택
- Merge : selection 객체 2개를 합해 새로운 selection 객체 반환

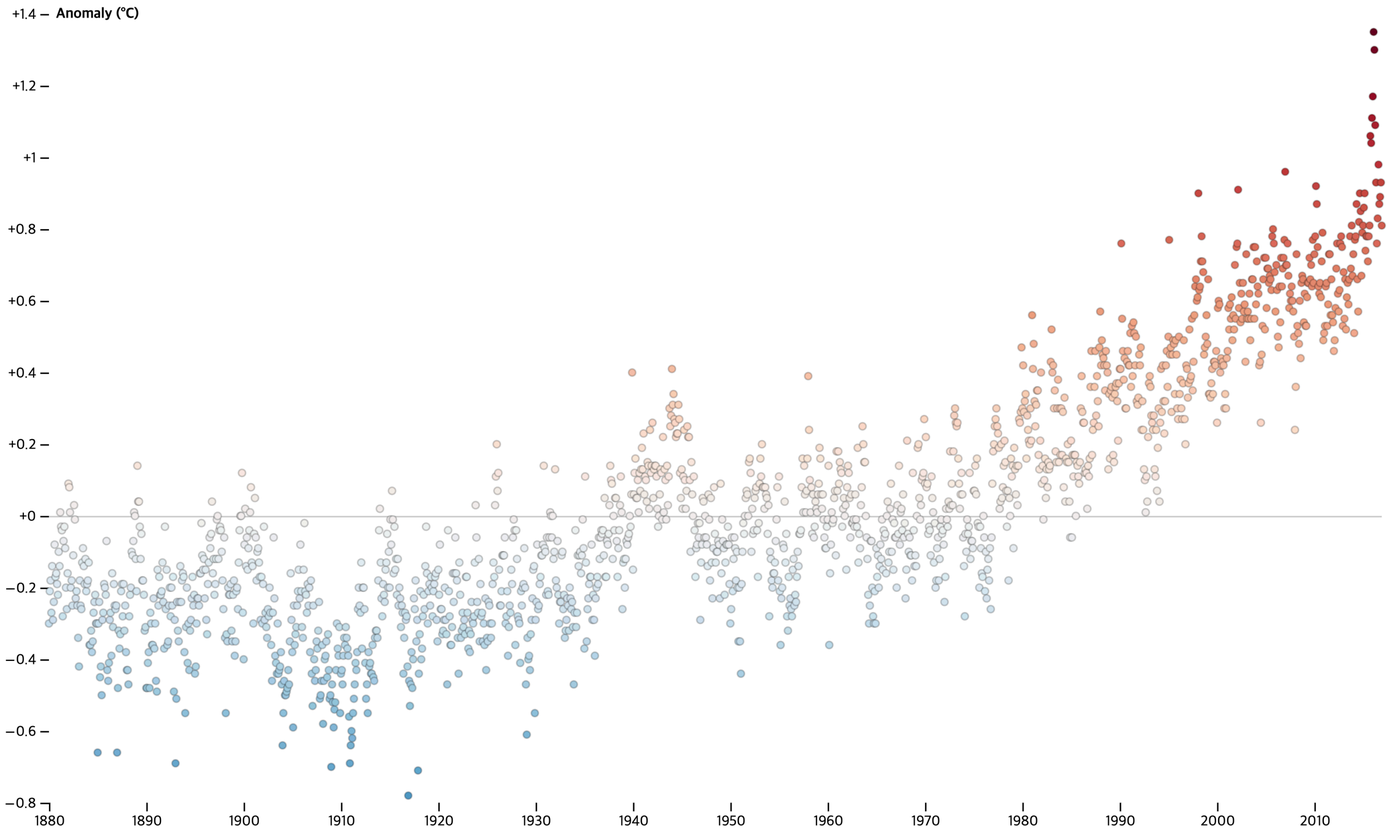
Data 연결하기

Data, Enter, Exit, Join

- Data : 선택된 selection에 array of data를 바인딩하여 바인딩된 selection 리턴
- Enter : 바인딩된 selection보다 데이터가 많을 경우, 부족한 selection을 가상의 객체(Enter Selection)로 만들어 리턴 -> append를 통해 실제 selection 추가
- Exit : 바인딩된 selection보다 데이터가 적을 경우, 남는 selection을 데이터 없는 객체(Exit Selection)로 만들어 리턴 -> remove를 통해 삭제
- Join : 데이터에 맞게 알아서 selection을 조절해서 Enter Selection은 알아서 추가, Exit Selection은 알아서 삭제 후 Enter Selection과 Exit Selection을 merge해서 리턴

Global Temperature Trend

Dot Plot(https://observablehq.com/@mbostock/global-temperature-trends)



Global Temperature Trend

데이터(temperatures.csv)

temperatures

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	J-D	D-N	DJF	MAM	JJA	SON
1880	-0.30	-0.21	-0.18	-0.27	-0.14	-0.29	-0.24	-0.08	-0.17	-0.16	-0.19	-0.22	-0.20	***	***	-0.20	-0.20	-0.17
1881	-0.10	-0.14	0.01	-0.03	-0.04	-0.28	-0.07	-0.03	-0.09	-0.20	-0.26	-0.16	-0.12	-0.12	-0.15	-0.02	-0.13	-0.19
1882	0.09	0.08	0.01	-0.20	-0.18	-0.25	-0.11	0.03	-0.01	-0.23	-0.21	-0.25	-0.10	-0.09	0.00	-0.12	-0.11	-0.15
1883	-0.34	-0.42	-0.18	-0.25	-0.26	-0.13	-0.09	-0.14	-0.19	-0.12	-0.21	-0.19	-0.21	-0.22	-0.34	-0.23	-0.12	-0.18
1884	-0.18	-0.13	-0.36	-0.36	-0.32	-0.38	-0.35	-0.27	-0.24	-0.22	-0.30	-0.30	-0.28	-0.28	-0.17	-0.35	-0.33	-0.25
1885	-0.66	-0.30	-0.24	-0.45	-0.42	-0.50	-0.29	-0.27	-0.19	-0.20	-0.22	-0.07	-0.32	-0.33	-0.42	-0.37	-0.35	-0.20
1886	-0.43	-0.46	-0.41	-0.29	-0.27	-0.39	-0.16	-0.31	-0.19	-0.25	-0.26	-0.25	-0.31	-0.29	-0.32	-0.33	-0.29	-0.23
1887	-0.66	-0.48	-0.32	-0.37	-0.33	-0.21	-0.19	-0.28	-0.19	-0.32	-0.25	-0.38	-0.33	-0.32	-0.46	-0.34	-0.22	-0.26
1888	-0.43	-0.43	-0.47	-0.28	-0.22	-0.20	-0.10	-0.11	-0.07	0.01	0.00	-0.12	-0.20	-0.22	-0.41	-0.33	-0.14	-0.02
1889	-0.21	0.14	0.04	0.04	-0.03	-0.12	-0.05	-0.18	-0.18	-0.22	-0.32	-0.31	-0.12	-0.10	-0.06	0.02	-0.11	-0.24
1890	-0.48	-0.48	-0.41	-0.38	-0.48	-0.27	-0.30	-0.36	-0.36	-0.23	-0.37	-0.30	-0.37	-0.37	-0.42	-0.42	-0.31	-0.32
1891	-0.46	-0.49	-0.15	-0.25	-0.17	-0.22	-0.22	-0.21	-0.13	-0.24	-0.37	-0.03	-0.24	-0.27	-0.42	-0.19	-0.21	-0.25
1892	-0.26	-0.15	-0.36	-0.35	-0.25	-0.20	-0.28	-0.20	-0.25	-0.17	-0.49	-0.29	-0.27	-0.25	-0.14	-0.32	-0.23	-0.30
1893	-0.69	-0.51	-0.24	-0.32	-0.35	-0.24	-0.14	-0.24	-0.18	-0.16	-0.17	-0.38	-0.30	-0.30	-0.50	-0.31	-0.21	-0.17
1894	-0.55	-0.31	-0.20	-0.41	-0.30	-0.43	-0.32	-0.29	-0.23	-0.17	-0.25	-0.22	-0.31	-0.32	-0.42	-0.30	-0.35	-0.22
1895	-0.44	-0.42	-0.30	-0.23	-0.23	-0.25	-0.16	-0.16	-0.02	-0.11	-0.15	-0.12	-0.21	-0.22	-0.36	-0.25	-0.19	-0.09
1896	-0.23	-0.15	-0.29	-0.33	-0.19	-0.13	-0.06	-0.09	-0.05	0.04	-0.16	-0.12	-0.15	-0.15	-0.16	-0.27	-0.10	-0.06
1897	-0.22	-0.19	-0.12	-0.01	0.00	-0.12	-0.04	-0.03	-0.04	-0.10	-0.18	-0.26	-0.11	-0.10	-0.18	-0.05	-0.06	-0.10
1898	-0.06	-0.34	-0.55	-0.33	-0.35	-0.20	-0.22	-0.22	-0.19	-0.32	-0.35	-0.22	-0.28	-0.28	-0.22	-0.41	-0.22	-0.28
1899	-0.18	-0.39	-0.35	-0.21	-0.20	-0.26	-0.13	-0.04	0.00	0.00	0.12	-0.27	-0.16	-0.15	-0.26	-0.25	-0.14	0.04
1900	-0.40	-0.08	0.02	-0.14	-0.06	-0.15	-0.09	-0.04	0.01	0.08	-0.13	-0.14	-0.09	-0.10	-0.25	-0.06	-0.09	-0.01
1901	-0.30	-0.05	0.05	-0.06	-0.18	-0.10	-0.09	-0.13	-0.17	-0.29	-0.17	-0.30	-0.15	-0.13	-0.16	-0.06	-0.11	-0.21
1902	-0.19	-0.03	-0.29	-0.27	-0.31	-0.34	-0.26	-0.28	-0.20	-0.27	-0.36	-0.46	-0.27	-0.26	-0.18	-0.29	-0.29	-0.28
1903	-0.27	-0.06	-0.23	-0.39	-0.41	-0.44	-0.30	-0.44	-0.43	-0.42	-0.38	-0.47	-0.35	-0.35	-0.26	-0.34	-0.39	-0.41
1904	-0.64	-0.55	-0.46	-0.50	-0.50	-0.49	-0.48	-0.43	-0.47	-0.35	-0.16	-0.29	-0.44	-0.46	-0.55	-0.48	-0.47	-0.33
1905	-0.38	-0.59	-0.25	-0.36	-0.33	-0.31	-0.25	-0.21	-0.15	-0.23	-0.08	-0.21	-0.28	-0.29	-0.42	-0.31	-0.26	-0.15
1906	-0.31	-0.34	-0.15	-0.02	-0.21	-0.22	-0.27	-0.19	-0.25	-0.20	-0.38	-0.18	-0.23	-0.23	-0.29	-0.13	-0.22	-0.28
1907	-0.44	-0.53	-0.25	-0.40	-0.46	-0.43	-0.35	-0.37	-0.32	-0.24	-0.51	-0.50	-0.40	-0.37	-0.38	-0.37	-0.38	-0.36
1908	-0.46	-0.36	-0.58	-0.46	-0.40	-0.39	-0.35	-0.45	-0.33	-0.43	-0.51	-0.50	-0.43	-0.43	-0.44	-0.48	-0.40	-0.42
1909	-0.70	-0.47	-0.52	-0.59	-0.54	-0.52	-0.43	-0.30	-0.37	-0.39	-0.31	-0.55	-0.47	-0.47	-0.55	-0.55	-0.42	-0.36
1910	-0.44	-0.43	-0.47	-0.39	-0.34	-0.36	-0.31	-0.34	-0.37	-0.39	-0.56	-0.69	-0.42	-0.41	-0.47	-0.40	-0.34	-0.44
1911	-0.64	-0.60	-0.62	-0.55	-0.51	-0.47	-0.41	-0.43	-0.38	-0.26	-0.20	-0.25	-0.44	-0.48	-0.64	-0.56	-0.43	-0.28
1912	-0.27	-0.13	-0.37	-0.20	-0.20	-0.26	-0.41	-0.51	-0.47	-0.55	-0.38	-0.42	-0.35	-0.33	-0.22	-0.25	-0.39	-0.47
1913	-0.41	-0.44	-0.44	-0.36	-0.45	-0.46	-0.34	-0.32	-0.32	-0.34	-0.18	-0.04	-0.34	-0.37	-0.42	-0.42	-0.37	-0.28
1914	0.02	-0.13	-0.23	-0.28	-0.19	-0.22	-0.24	-0.15	-0.13	-0.05	-0.20	-0.10	-0.16	-0.16	-0.05	-0.23	-0.21	-0.13
1915	-0.20	-0.01	-0.08	0.07	-0.01	-0.16	-0.03	-0.15	-0.12	-0.22	-0.12	-0.25	-0.11	-0.09	-0.10	-0.01	-0.11	-0.16
1916	-0.20	-0.23	-0.31	-0.25	-0.27	-0.44	-0.34	-0.27	-0.29	-0.28	-0.42	-0.78	-0.34	-0.30	-0.23	-0.28	-0.35	-0.33

Global Temperature Trend

소스코드(1)

```
<script type="text/javascript">
    const width = 1000;
    const height = 600;
    const margin = ({top: 20, right: 30, bottom: 30, left: 40});


    (async () => {
        const data = [];
        await d3.csv("temperatures.csv", (d, i, columns) => {
            for (let i = 1; i < 13; ++i) {
              data.push({
                date: new Date(Date.UTC(d.Year, i - 1, 1)),
                value: +d[columns[i]]
              });
            }
        });

        console.log(data);

        x = d3.scaleUtc()
            .domain(d3.extent(data, d => d.date))
            .range([margin.left, width - margin.right]);

        y = d3.scaleLinear()
            .domain(d3.extent(data, d => d.value)).nice()
            .range([height - margin.bottom, margin.top]);

        const max = d3.max(data, d => Math.abs(d.value));

        z = d3.scaleSequential(d3.interpolateRdBu).domain([max, -max]);

        xAxis = g => g
            .attr("transform", `translate(0,${height - margin.bottom})`)
            .call(d3.axisBottom(x).ticks(width / 80))
            .call(g => g.select(".domain").remove());

        yAxis = g => g
            .attr("transform", `translate(${margin.left},0)`)
            .call(d3.axisLeft(y).ticks(null, "+"))
            .call(g => g.select(".domain").remove())
            .call(g => g.selectAll(".tick line")
              .filter(d => d === 0)
              .clone()
                .attr("x2", width - margin.right - margin.left)
                .attr("stroke", "#ccc"))
            .call(g => g.append("text")
                .attr("fill", "#000")
                .attr("x", 5)
                .attr("y", margin.top)
                .attr("dy", "0.32em")
                .attr("text-anchor", "start")
                .attr("font-weight", "bold")
                .text("Anomaly (°C)"))
```

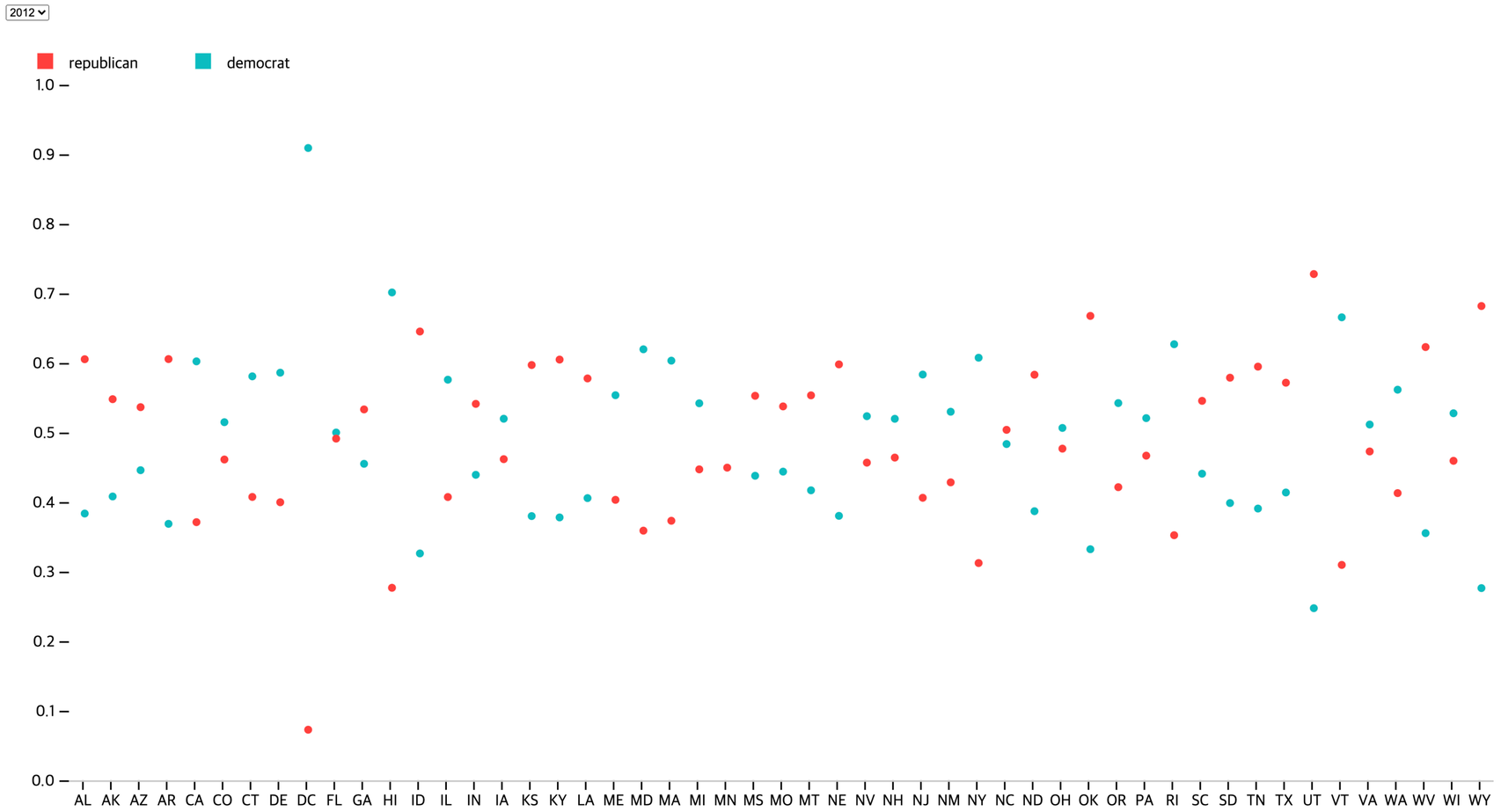
Global Temperature Trend

소스코드(2)

```
    const svg = d3.select("svg")
        .attr("viewBox", [0, 0, width, height]);

    svg.append("g")
        .call(xAxis);

    svg.append("g")
        .call(yAxis);

    svg.append("g")
        .attr("stroke", "#000")
        .attr("stroke-opacity", 0.2)
      .selectAll("circle")
      .data(data)
      .join("circle")
        .attr("cx", d => x(d.date))
        .attr("cy", d => y(d.value))
        .attr("fill", d => z(d.value))
        .attr("r", 2.5);

})();
```

미국 대선 트렌드

자체 제작 예제(https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/42MVDX)



미국 대선 트렌드

데이터(1976-2016-president.csv)

1976-2016-president

year	state	state_po	state_fips	state_cen	state_ic	office	candidate	party	writein	candidatevotes	totalvotes	version	notes
1976	Alabama	AL	1	63	41	US President	Carter, Jimmy	democrat	FALSE	659170	1182850	20171015	NA
1976	Alabama	AL	1	63	41	US President	Ford, Gerald	republican	FALSE	504070	1182850	20171015	NA
1976	Alabama	AL	1	63	41	US President	Maddox, Lester	american independent party	FALSE	9198	1182850	20171015	NA
1976	Alabama	AL	1	63	41	US President	Bubar, Benjamin ""Ben""	prohibition	FALSE	6669	1182850	20171015	NA
1976	Alabama	AL	1	63	41	US President	Hall, Gus	communist party use	FALSE	1954	1182850	20171015	NA
1976	Alabama	AL	1	63	41	US President	Macbride, Roger	libertarian	FALSE	1481	1182850	20171015	NA
1976	Alabama	AL	1	63	41	US President			TRUE	308	1182850	20171015	NA
1976	Alaska	AK	2	94	81	US President	Ford, Gerald	republican	FALSE	71555	123574	20171015	NA
1976	Alaska	AK	2	94	81	US President	Carter, Jimmy	democrat	FALSE	44058	123574	20171015	NA
1976	Alaska	AK	2	94	81	US President	Macbride, Roger	libertarian	FALSE	6785	123574	20171015	NA
1976	Alaska	AK	2	94	81	US President			TRUE	1176	123574	20171015	NA
1976	Arizona	AZ	4	86	61	US President	Ford, Gerald	republican	FALSE	418642	742719	20171015	NA
1976	Arizona	AZ	4	86	61	US President	Carter, Jimmy	democrat	FALSE	295602	742719	20171015	NA
1976	Arizona	AZ	4	86	61	US President	McCarthy, Eugene ""Gene""	independent	FALSE	19229	742719	20171015	NA
1976	Arizona	AZ	4	86	61	US President	Macbride, Roger	libertarian	FALSE	7647	742719	20171015	NA
1976	Arizona	AZ	4	86	61	US President	Camejo, Peter	socialist workers	FALSE	928	742719	20171015	NA
1976	Arizona	AZ	4	86	61	US President	Anderson, Thomas J.	american	FALSE	564	742719	20171015	NA
1976	Arizona	AZ	4	86	61	US President	Maddox, Lester	american independent party	FALSE	85	742719	20171015	NA
1976	Arizona	AZ	4	86	61	US President			TRUE	22	742719	20171015	NA
1976	Arkansas	AR	5	71	42	US President	Carter, Jimmy	democrat	FALSE	498604	767535	20171015	NA
1976	Arkansas	AR	5	71	42	US President	Ford, Gerald	republican	FALSE	267903	767535	20171015	NA
1976	Arkansas	AR	5	71	42	US President		independent	FALSE	639	767535	20171015	NA
1976	Arkansas	AR	5	71	42	US President	Maddox, Lester	american independent party	FALSE	389	767535	20171015	NA
1976	California	CA	6	93	71	US President	Ford, Gerald	republican	FALSE	3882244	7803770	20171015	NA
1976	California	CA	6	93	71	US President	Carter, Jimmy	democrat	FALSE	3742284	7803770	20171015	NA
1976	California	CA	6	93	71	US President	Macbride, Roger	independent	FALSE	56388	7803770	20171015	NA
1976	California	CA	6	93	71	US President	Maddox, Lester	american independent party	FALSE	51098	7803770	20171015	NA
1976	California	CA	6	93	71	US President	Wright, Margaret	peace & freedom	FALSE	41731	7803770	20171015	NA
1976	California	CA	6	93	71	US President	Camejo, Peter	independent	FALSE	17259	7803770	20171015	NA
1976	California	CA	6	93	71	US President	Hall, Gus	independent	FALSE	12766	7803770	20171015	NA
1976	Colorado	CO	8	84	62	US President	Ford, Gerald	republican	FALSE	584278	1081440	20171015	NA
1976	Colorado	CO	8	84	62	US President	Carter, Jimmy	democrat	FALSE	460801	1081440	20171015	NA
1976	Colorado	CO	8	84	62	US President	McCarthy, Eugene ""Gene""	independent	FALSE	26047	1081440	20171015	NA
1976	Colorado	CO	8	84	62	US President	Macbride, Roger	libertarian	FALSE	5338	1081440	20171015	NA
1976	Colorado	CO	8	84	62	US President	Bubar, Benjamin ""Ben""	prohibition	FALSE	2886	1081440	20171015	NA
1976	Colorado	CO	8	84	62	US President	Camejo, Peter	socialist workers	FALSE	1122	1081440	20171015	NA
1976	Colorado	CO	8	84	62	US President	Larouche, Lyndon, Jr.	u.s. labor	FALSE	565	1081440	20171015	NA
1976	Colorado	CO	8	84	62	US President	Hall, Gus	communist party use	FALSE	403	1081440	20171015	NA

미국 대선 트렌드

소스코드(1)

```
const margin = {
    top: 30,
    right: 0,
    bottom: 30,
    left: 40
};
const width = 942;
const height = 500;

const year = 1976;

const shuffle = a => {
    var i, x, j;
    for (i = a.length; i; i -= 1) {
        j = Math.floor(Math.random() * i);
        x = a[i - 1];
        a[i - 1] = a[j];
        a[j] = x;
    }
    return a;
}

d3.csv('1976-2016-president.csv', ({candidatevotes, candidate, party, state_po, totalvotes, year}) =>
    (party === 'democrat' || party === 'republican') ? {votes: +candidatevotes, party: party, state: state_po, total: +totalvotes, year: +year, rate: +candidatevotes / +totalvotes} : null)
.then(org_data => {
    const data = d3.group(org_data, d => d.year);

    const years = d3.rollups(org_data, group => group[0].year, d => d.year).map(el => el[0]);
    const states = [...new Set([...data.get(years[0]).values()].map(el => el.state))];
    const party = shuffle(d3.rollups(org_data, group => group[0].party, d => d.party).map(el => el[0]));

    console.log(data);
    console.log(years);
    console.log(states);
    console.log(party);

    const x = d3.scaleBand()
        .domain(d3.range(states.length))
        .range([margin.left, width - margin.right]);

    const y = d3.scaleLinear()
        .domain([0, 1])
        .range([height - margin.bottom, margin.top]);

    const z = d3.scaleSequential([0, party.length], d3.interpolateSinebow);
```

미국 대선 트렌드

소스코드(2)

```
    xAxis = g => g
        .attr("transform", `translate(0,${height - margin.bottom})`)
        .call(d3.axisBottom(x).tickFormat(i => states[i]))
        .call(g => g.select(".domain").remove());

    yAxis = g => g
        .attr("transform", `translate(${margin.left},0)`)
        .call(d3.axisLeft(y))
        .call(g => g.select(".domain").remove())
        .call(g => g.selectAll(".tick line")
          .filter(d => d === 0)
          .clone()
            .attr("x2", width - margin.right - margin.left)
            .attr("stroke", "#ccc"));


    const svg = d3.select("svg")
          .attr("viewBox", [0, 0, width, height]);

    svg.append("g")
          .call(xAxis);

    svg.append("g")
          .call(yAxis);

    svg.append("g")
          .selectAll("rect")
          .data(party)
          .join("rect")
            .attr("x", (d, i) => 100 * i + 20)
            .attr("y", 10)
            .attr("width", 10)
            .attr("height", 10)
            .attr("fill", (d, i) => z(i));

    svg.selectAll(".party")
          .data(party)
          .join('text')
            .attr("x", (d, i) => 100 * i + 40)
            .attr("y", 20)
            .attr("font-size", 10)
            .text(d => d);

    svg.append("g")
          .attr("stroke", "#000")
          .attr("stroke-opacity", 0.2);
```

미국 대선 트렌드

소스코드(3)

```
        function update(year) {

            svg.selectAll("circle")
            .data(d => data.get(year))
            .join("circle")
            .transition()
            .delay((d, i) => i)
              .attr("cx", d => x(states.findIndex(el => el === d.state)) + 10)
              .attr("cy", d => y(d.rate))
              .attr("fill", d => z(party.findIndex(el => el === d.party)))
              .attr("r", 2.5);
        }

        update(year);

        document.getElementById('select').addEventListener('change', (e) => {
            const selected_year = e.target.value;
            update(+selected_year);
        });

    });
```