title: React 和 D3 实现簇布局
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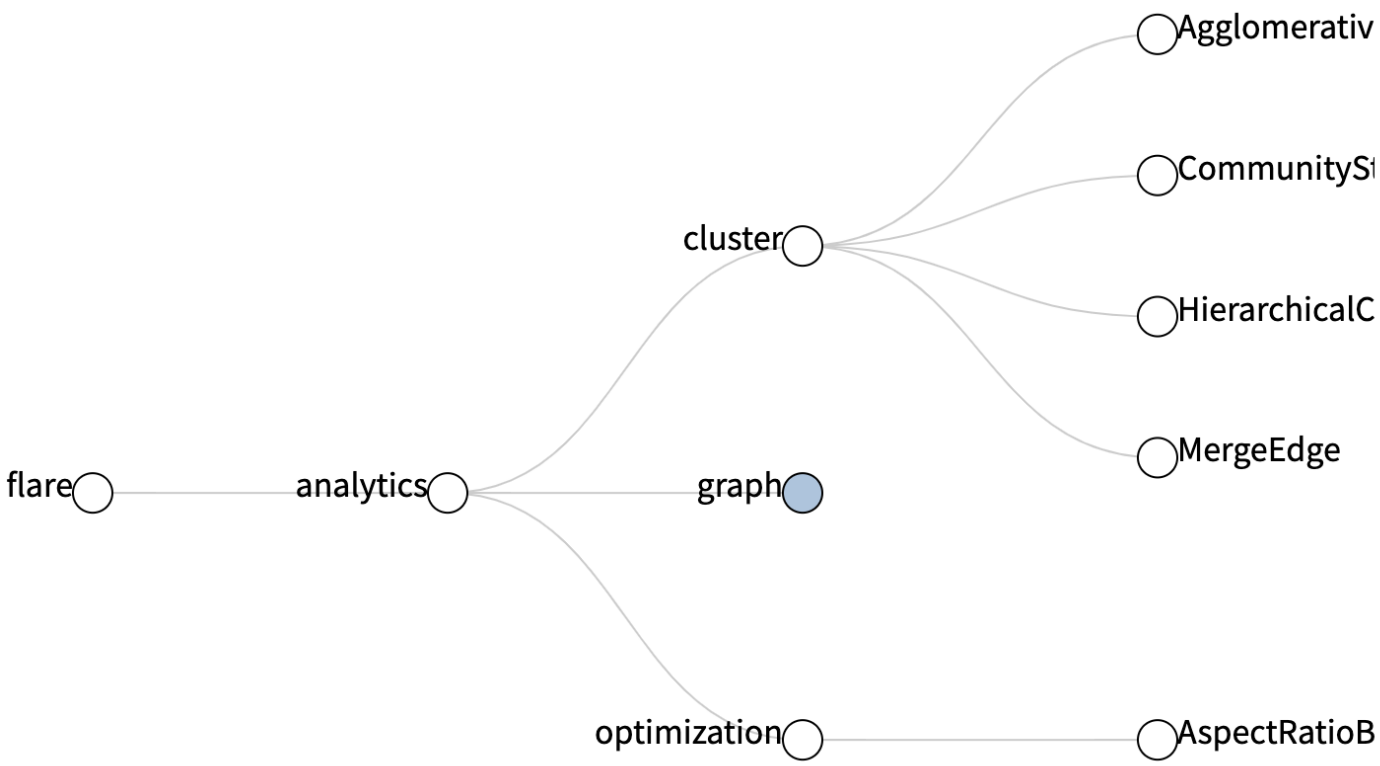
tags: React, Chart

description: 使用 React 开发 cluster layout（簇布局） 结构的布局



相关知识

工作原理

使用的是 D3 cluster layout 中的 API，对简单的数据进行格式化，补充父级、子级、坐标位置（Automatic Graph Drawing 算法）等可用数据。同时，提供快捷函数拿到需要数据进行渲染绘图。渲染后的数据结构如下：

```
{
  children: Array, // 子级
  data: Object, // 自身数据
  depth: Number,
  height: Number,
  parent: Object, // 父级
  x: Number, // x 轴坐标
  y: Number, // y 轴坐标
}
```

使用函数

- d3.layout.cluster() 设置默认簇布局
- d3.layout.hierarchy() 默认设置创建新的分层布局
- root.descendants() 所有节点的数组
- root.links() 表达父子关系的数组

实现简单的簇布局

依赖 `d3-hierarchy`

```jsx run

```

jsx
import React from 'react';
import { hierarchy, cluster } from 'd3-hierarchy';
import data from './datas';
import './style.scss';

const width = 450;
const height = 500;

const clusterLayout = cluster().size([height - 50, width - 100]);
const root = hierarchy(data, function (d) {
return d.children;
});
clusterLayout(root);

class ClusterLayout extends React.PureComponent {
renderNodes = () => {
return root.descendants().map((d, idx) => {
return (
link_${idx}} >
)
});
}
renderLinks = () => {
return root.links().map((d, idx) => {
return (
link_${idx}} x1={d.source.x} y1={d.source.y} x2={d.target.x} y2={d.target.y} />
)
});
}
renderSvg = () => {
return (

)
}
render() {
return (

{this.renderSvg()}

)
}
}

export default ClusterLayout;

绘制曲线

绘制曲线链接需要将 line 改为更加灵活的 path 进行绘图。改动细节：

jsx
// 格式化
function formatPath(d) {
const averageX = (d.source.x + d.target.x) / 2;
return `M ${d.source.x}, ${d.source.y} C ${averageX}, ${d.source.y} ${averageX}, ${d.target.y} ${d.target.x}, ${d.target.y}`;
}
// 使用 path
renderLinks = () => {
return root.links().map((d, idx) => {
return (
link_${idx}} />
)
});
}

横向排列并补充文案

1. 线条：要将 formatPath 函数的 x、y 对换
2. 节点：transform 翻转，同时去掉 circle 的 cx、cy 属性

jsx
// 线条 x、y 轴对换
function formatPath(d) {
const averageY = (d.source.y + d.target.y) / 2;
return `M ${d.source.y}, ${d.source.x} C ${averageY}, ${d.source.x} ${averageY}, ${d.target.x} ${d.target.y}, ${d.target.x}`;
}
// 节点翻转
renderNodes = () => {
return root.descendants().map((d, idx) => {
return (
translate(${d.y}, ${d.x})} className="node" key={ `link_${idx}` } > {d.data.name}
)
});
}

实现收缩

jsx run
CollapsibleTree

jsx
import React from 'react';
import { hierarchy, cluster } from 'd3-hierarchy';
import { select } from 'd3-selection';
import datas from './datas';
import './style.scss'

// Set the dimensions and margins of the diagram
const width = 700;
const height = 500;
const diameter = 10;
const distance = 160;

// Collapse the node and all it's children
function collapse(d) {
if (d.children) {
d._children = d.children
d._children.forEach(collapse)
d.children = null
}
}

// Creates a curved (diagonal) path from parent to the child nodes
function diagonal(s, d) {
const averageY = (s.y + d.y) / 2;
return `M ${s.y}, ${s.x} C ${averageY}, ${s.x} ${averageY}, ${d.x} ${d.y}, ${d.x}`;
}

const clusterLayout = cluster().size([height, width - 100]);
// Assigns parent, children, height, depth
const root = hierarchy(datas, function (d) { return d.children; });
root.x0 = height / 2;
root.y0 = 0;

class CollapsibleTree extends React.PureComponent {
componentDidMount() {
const svg = select('.CollapsibleTree svg g');
let i = 0;

```
// Collapse after the second level
root.children.forEach(collapse);
update(root);

function update(source) {

  // Assigns the x and y position for the nodes
  const treeData = clusterLayout(root);

  // Compute the new tree layout.
  const nodes = treeData.descendants();
  const links = treeData.descendants().slice(1);

  nodes.forEach(function (d) { d.y = d.depth * distance });

  // Update the nodes...
  const node = svg.selectAll('g.node')
    .data(nodes, function (d) { return d.id || (d.id = ++i); });

  // Enter any new modes at the parent's previous position.
  const nodeEnter = node.enter().append('g')
    .attr('class', 'node')
    .attr("transform", function (d) {
      return "translate(" + source.y0 + "," + source.x0 + ")";
    })
    .on('click', click);

  // Add Circle for the nodes
  nodeEnter.append('circle')
    .attr('class', 'node')
    .attr('r', diameter)
    .style("fill", function (d) {
      return d._children ? "lightsteelblue" : "#fff";
    });

  // Add labels for the nodes
  nodeEnter.append('text')
    .attr("dy", 2)
```

```
    .attr("x", function (d) {
      return d.children || d._children ? -diameter : diameter;
    })
    .attr("text-anchor", function (d) {
      return d.children || d._children ? "end" : "start";
    })
    .text(function (d) { return d.data.name; });

  // UPDATE
  const nodeUpdate = nodeEnter.merge(node);

  // Transition to the proper position for the node
  nodeUpdate
    .attr("transform", function (d) {
      return "translate(" + d.y + "," + d.x + ")";
    });

  // Update the node attributes and style
  nodeUpdate.select('circle.node')
    .attr('r', 10)
    .style("fill", function (d) {
      return d._children ? "lightsteelblue" : "#fff";
    })
    .attr('cursor', 'pointer');


  // Remove any exiting nodes
 node.exit()
    .attr("transform", function (d) {
      return "translate(" + source.y + "," + source.x + ")";
    })
    .remove();

  // Update the links...
  const link = svg.selectAll('path.link')
    .data(links, function (d) { return d.id; });

  // Enter any new links at the parent's previous position.
  const linkEnter = link.enter().insert('path', "g")
    .attr("class", "link")
    .attr('d', function (d) {
      const o = { x: source.x0, y: source.y0 }
      return diagonal(o, o)
    });

  // UPDATE
  const linkUpdate = linkEnter.merge(link);

  // Transition back to the parent element position
  linkUpdate
    .attr('d', function (d) { return diagonal(d, d.parent) });

  // Remove any exiting links
  link.exit()
    .attr('d', function (d) {
      const o = { x: source.x, y: source.y }
      return diagonal(o, o)
    })
    .remove();

  // Store the old positions for transition.
  nodes.forEach(function (d) {
    d.x0 = d.x;
    d.y0 = d.y;
  });

  // Toggle children on click.
  function click(d) {
    if (d.children) {
      d._children = d.children;
      d.children = null;
    } else {
      d.children = d._children;
      d._children = null;
    }
    update(d);
  }
}
```

```
}
render() {
return (









)
}
}

export default CollapsibleTree;
```

参考

- Automatic Graph Drawing 算法： tidier-drawings, buchheim improving
- D3 Wiki 簇布局
- 实践：dendrogram_basic
- d3-hierarchy
- d3-selection