RIGHT: an HTML canvas and JavaScript-based interactive data visualization package for linked graphics

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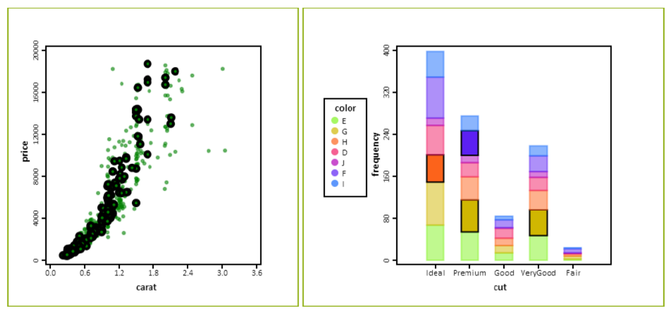
Abstract

R Interactive Graphics via HTml (RIGHT) is the first package that implements linked graphs using HTML canvas and JavaScript and supports efficient linked graphics that can show obvious relationship between multiple plots using same data. Also, HTML canvas and JavaScript make it possible to deliver the visualization to various platforms, including mobile devices since they are standard web technologies.

Motivation

Why linked graphs?
Link between two graphs can provide users with deep insight when analyzing the data large set. Clicking or dragging nodes from one graph just shows the related nodes of another graph.



How does work?

<R command>

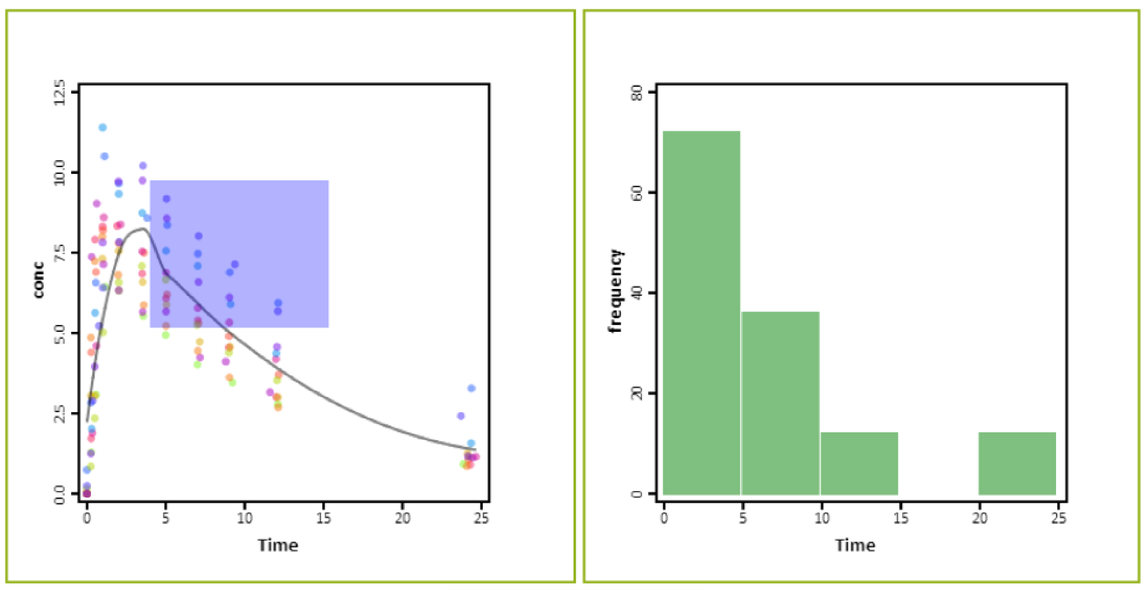
```
Obj <- RIGHT({
       plot(conc ~Time, Theoph, color = color)
       runServer.RIGHT(loessArray, {
            obj <- loess(conc ~ Time, data = Theoph)
            xRange <- range(Theoph$conc)
            simArray <- data.frame(conc = seq(xRange[1],
                                   xRange[2], length.out = 100))
            simArray$Time <- predict(obj, newdata = simArray)
            return(simArray)
       })
       lines(loessArray, Time, conc)
       hist(Time, Theoph)
}, Theoph)
```

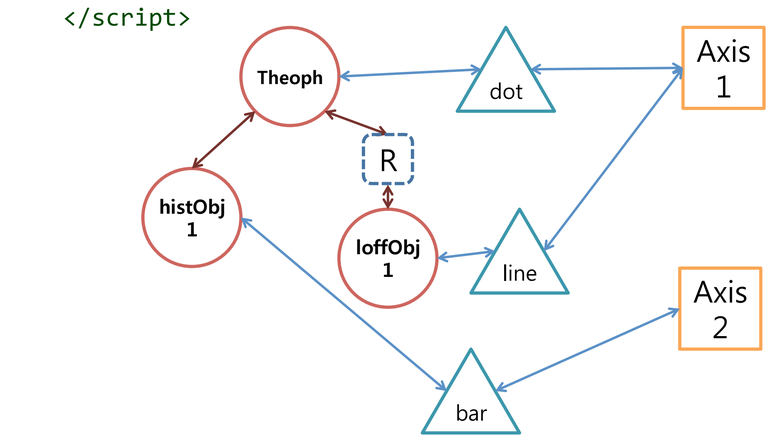
Code generation

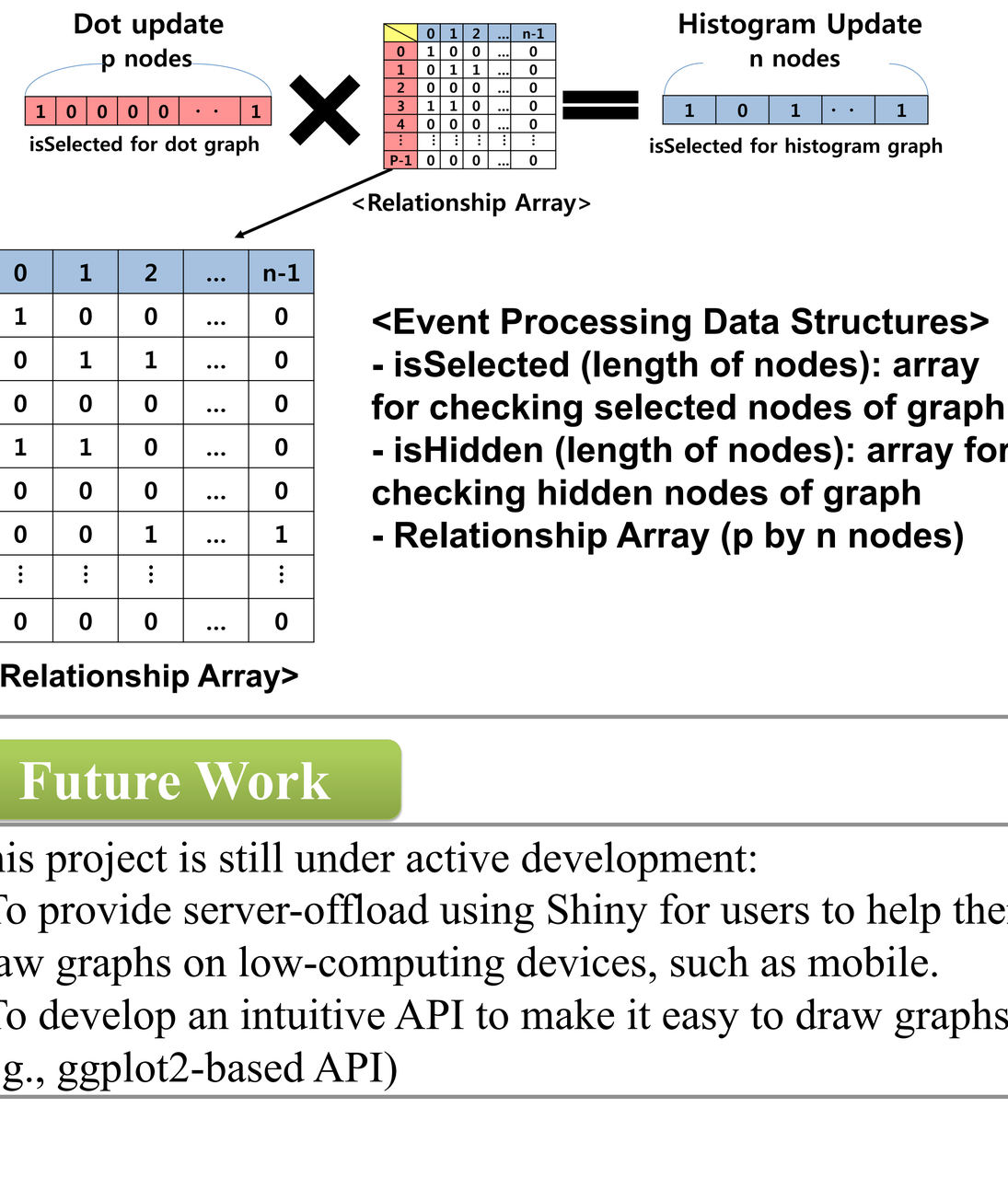
<JavaScript>

```
<script> var Theoph = createMainStructureE(rawArr1);</script>
<script>
var axis1 = new Axis(1, Theoph, 'Time', 'conc', {legend: 'Subject'});
var point1 = new Dot(axis1, Theoph, 'Time', 'conc', {});
var histObj1 = new ddply(Theoph, ['Time'], {});
var axis2 = new Axis(2, histObj1, 'Time', 'frequency', {});
var hist1 = new Bar(axis2, histObj1, 'Time', 'frequency', {});
Theoph.draw();
var AllAxisObjArr = [axis1, axis2];
eventTrigger(AllAxisObjArr);
</script>
<script>
// offload part.
var loessArray = createMainStructureE('Theoph');
var loffObj1 = new MakeLineObj(loessArray, 'Time', 'conc', {});
var loff1 = new Line(axis1, loffObj1, 'x1', 'x2', 'y1', 'y2', {});
$(function() {
          setTimeout(function() {
           window.Shiny.onInputChange('Theoph', Theoph.$isHidden);
          }, 1)
});
</script>
```

<Update Sequence>







	0	1	2	...	n-1
0	1	0	0	...	0
1	0	1	1	...	0
2	0	0	0	...	0
3	1	1	0	...	0
4	0	0	0	...	0
5	0	0	1	...	1
⋮	⋮	⋮	⋮		⋮
p-1	0	0	0	...	0

<Relationship Array>

<Event Processing Data Structures>
- isSelected (length of nodes): array for checking selected nodes of graph
- isHidden (length of nodes): array for checking hidden nodes of graph
- Relationship Array (p by n nodes)

Future Work

This project is still under active development:
- To provide server-offload using Shiny for users to help them draw graphs on low-computing devices, such as mobile.
- To develop an intuitive API to make it easy to draw graphs (e.g., ggplot2-based API)

This work was supported in part by the **Korean Ministry of Science, ICT & Future Planning** (KEIT-10047038) and by **Google Summer of Code** (GSoC) 2013 and 2014.