

Using the Google Visualisation API with R: Package Vignette

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Abstract

The `googleVis` package provides an interface between R and the Google Visualisation API. The purpose of the package is to allow the user to transform data stored in a R `data.frame` structure into a Google Visualisation Object. The output is html code, which when run on a web server, generates a dynamic flash based bubble chart to explore several indicators over time.

1 Introduction

The standard motion chart is essentially an animated bubble chart, which allows the user to explore several indicators over time. The idea of motion chart was popularised by Hans Rosling at a Ted talk [TED06] about social and economic developments in the world, see also [Gap10].

2 Google Motion Chart API

The Google Motion Chart is part of Google Visualisation API [Goo10a]. Charts are rendered within a browser using Adobe Flash. The charting data can either be embedded into the html file or read dynamically. Key to Google Visualisation API is that the data is structured in a `DataTable` [Goo10c], and this is where this package helps, as it uses the functionality of the `RJSONIO` package [Lan10] and wraps it into a Google Motion chart. The data has to have at least four columns with subject name (`idvar`), time (`timevar`) and two columns of numeric values. Further columns are optional. The Google Public Data Explorer [Goo10b] shows several examples of motion charts and how they can help to analyse data. Figure 1 shows the graphical user interface of a motion chart.

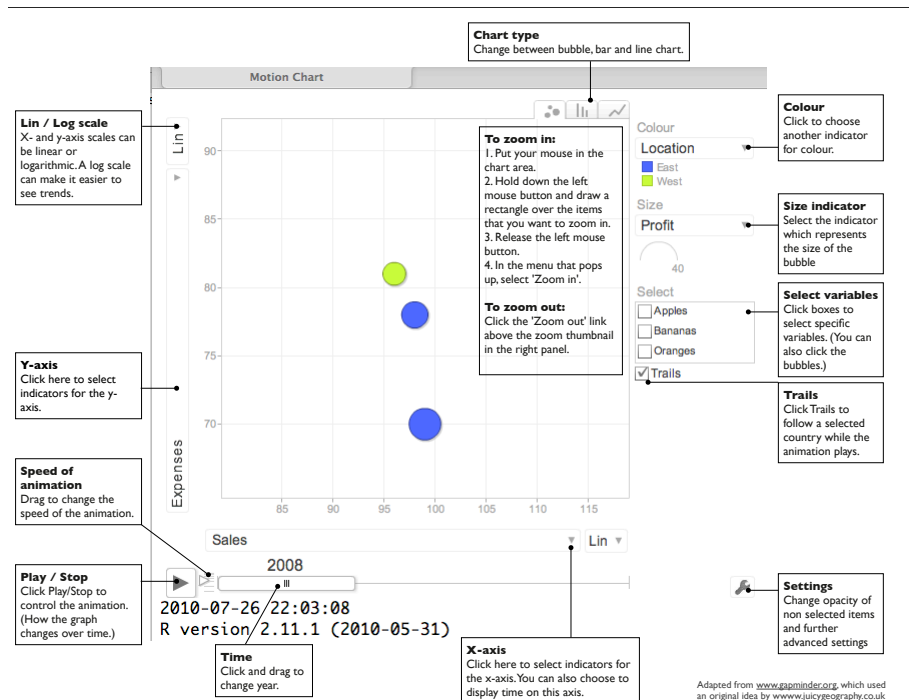


Figure 1: Overview of a Google motion chart. Screenshot of the output of `MotionChartPage(Fruits, idvar='Fruit', timevar='Year', file='FruitAnalysis.rsp')`

3 Example

The package comes with an example data set called `Fruits` and `Exports`.

```
R> require(googleVis)
```

Wellcome to `googleVis` version 0.1.6 by:

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Type `?googleVis` to see overall documentation and `vignette('googleVis')` to see the package vignette. See `demo(package='googleVis')` for a list of demos.

Feel free to send us an email if you would like to keep informed of new versions or if you have any feedback, ideas, suggestions or would like to collaborate.

More information is available on the googleVis project web-site:
<http://code.google.com/p/google-motion-charts-with-r/>

```
R> data(Fruits)
R> Fruits
```

	Fruit	Year	Location	Sales	Expenses	Profit	Date
1	Apples	2008	West	98	78	20	2008-12-31
2	Apples	2009	West	111	79	32	2009-12-31
3	Apples	2010	West	89	76	13	2010-12-31
4	Oranges	2008	East	96	81	15	2008-12-31
5	Bananas	2008	East	85	76	9	2008-12-31
6	Oranges	2009	East	93	80	13	2009-12-31
7	Bananas	2009	East	94	78	16	2009-12-31
8	Oranges	2010	East	98	91	7	2010-12-31
9	Bananas	2010	East	81	71	10	2010-12-31

```
R> data(Exports)
R> Exports
```

	Country	Profit	Online
1	Germany	3	TRUE
2	Brazil	4	FALSE
3	United States	5	TRUE
4	France	4	TRUE
5	Hungary	3	FALSE
6	India	2	TRUE
7	Iceland	1	FALSE
8	Norway	4	TRUE
9	Spain	5	TRUE
10	Turkey	1	FALSE

The example data shows sales information by Fruit and Year (also Date to illustrate how to handle this data type). Suppose we would like to generate the html output required for a motion chart, than we can use the function MotionChart.

```
R> gvisMotionChart(Fruits[, -7], "Fruit", "Year") ## exclude Date column
```

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN"
"http://www.w3.org/TR/REC-html40/loose.dtd"> <%title="Motion Chart: Fruits[, -7]"%>
<html>
<%include file="../src/simpleHead.rsp"%>
<body>
<%include file="../src/simpleHeader.rsp"%>
<!-- MotionChart generated in R 2.11.1 by googleVis 0.1.6 package -->
<!-- Sat Oct 9 07:29:06 2010 -->
```

```

<script type="text/javascript" src="http://www.google.com/jsapi"></script>
<script type="text/javascript">
  google.load("visualization", "1", { packages:["motionchart"] });
  google.setOnLoadCallback(drawChart);
  function drawChart() {
    var data = new google.visualization.DataTable();
    var datajson = [
      [
        "Apples",
        2008,
        "West",
        98,
        78,
        20
      ],
      [
        "Apples",
        2009,
        "West",
        111,
        79,
        32
      ],
      [
        "Apples",
        2010,
        "West",
        89,
        76,
        13
      ],
      [
        "Oranges",
        2008,
        "East",
        96,
        81,
        15
      ],
      [
        "Bananas",
        2008,
        "East",
        85,
        76,

```

```

        9
    ],
    [
        "Oranges",
        2009,
        "East",
        93,
        80,
        13
    ],
    [
        "Bananas",
        2009,
        "East",
        94,
        78,
        16
    ],
    [
        "Oranges",
        2010,
        "East",
        98,
        91,
        7
    ],
    [
        "Bananas",
        2010,
        "East",
        81,
        71,
        10
    ]
];

    data.addColumn('string','Fruit');
data.addColumn('number','Year');
data.addColumn('string','Location');
data.addColumn('number','Sales');
data.addColumn('number','Expenses');
data.addColumn('number','Profit');
    data.addRows(datajson);
    var chart = new google.visualization.MotionChart(document.getElementById('chart_div')
    var options ={};
        options["width"] = 600;
        options["height"] = 500;

```

```

        chart.draw(data,options);
    }
</script>
<div id="chart_div"></div>
<BR>2010-10-09 07:29:06<BR>R version 2.11.1 (2010-05-31)
<%@include file="../src/simpleFooter.rsp"%>
</body>
</html>

```

Now we can also create a motion chart using the date column. Please notice that

```
R> gvisMotionChart(Fruits[,-2], "Fruit", "Date") ## exclude Year column
```

```

<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN"
"http://www.w3.org/TR/REC-html40/loose.dtd"> <%title="Motion Chart: Fruits[, -2]"%>
<html>
<%@include file="../src/simpleHead.rsp"%>
<body>
<%@include file="../src/simpleHeader.rsp"%>
<!-- MotionChart generated in R 2.11.1 by googleVis 0.1.6 package -->
<!-- Sat Oct 9 07:29:06 2010 -->

```

```

<script type="text/javascript" src="http://www.google.com/jsapi"></script>
<script type="text/javascript">
  google.load("visualization", "1", { packages:["motionchart"] });
  google.setOnLoadCallback(drawChart);
  function drawChart() {
    var data = new google.visualization.DataTable();
    var datajson = [
      [
        "Apples",
        "2008-12-31",
        "West",
        98,
        78,
        20
      ],
      [
        "Apples",
        "2009-12-31",
        "West",
        111,
        79,
        32
      ],
    ],
    [

```

```

    "Apples",
    "2010-12-31",
    "West",
        89,
        76,
        13
    ],
    [
        "Oranges",
        "2008-12-31",
        "East",
            96,
            81,
            15
    ],
    [
        "Bananas",
        "2008-12-31",
        "East",
            85,
            76,
            9
    ],
    [
        "Oranges",
        "2009-12-31",
        "East",
            93,
            80,
            13
    ],
    [
        "Bananas",
        "2009-12-31",
        "East",
            94,
            78,
            16
    ],
    [
        "Oranges",
        "2010-12-31",
        "East",
            98,
            91,
            7
    ]

```

```

],
[
  "Bananas",
  "2010-12-31",
  "East",
  81,
  71,
  10
]
];
  data.addColumn('string','Fruit');
data.addColumn('string','Date');
data.addColumn('string','Location');
data.addColumn('number','Sales');
data.addColumn('number','Expenses');
data.addColumn('number','Profit');
  data.addRow(datajson);
  var chart = new google.visualization.MotionChart(document.getElementById('chart_div');
  var options ={};
      options["width"] = 600;
      options["height"] = 500;
  chart.draw(data,options);
}
</script>
<div id="chart_div"></div>
<BR>2010-10-09 07:29:06<BR>R version 2.11.1 (2010-05-31)
<%@include file="../src/simpleFooter.rsp"%>
</body>
</html>

```

The function `MotionChartPage` would top and tail the above output with some html tags to create a valid standalone page to be viewed. The page can be viewed immediately using the web server provided by the `R.rsp` package [Ben09].

Further examples are available via demos. See `demo('googleVis')` for a list of demos files.

References

- [Ben09] Henrik Bengtsson. *R.rsp: R Server Pages*, 2009. R package version 0.3.6.
- [Gap10] Gapminder, <http://www.gapminder.org>. 2010.
- [Goo10a] Google Inc., <http://code.google.com/apis/visualization/documentation/gallery/motionchart.html>. *Google Motion Chart API*, 2010.

- [Goo10b] Google Inc., <http://www.google.com/publicdata/home>. *Google Public Data Explorer*, 2010.
- [Goo10c] Google Inc, <http://code.google.com/apis/visualization/documentation/reference.html>. *Google Visualisation Reference*, 2010.
- [Lan10] Duncan Temple Lang. *RJSONIO: Serialize R objects to JSON, JavaScript Object Notation*, 2010. R package version 0.3-0.
- [TED06] TED Talk, http://www.ted.com/talks/hans_rosling_shows_the_best_stats_you_ve_ever_seen.html. *Hans Rosling shows the best stats you've ever seen*, 2006.