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Q  
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## sparkTable: Generating Graphical Tables for Websites and Documents with R

- ▶ Providing quick access to additional insight to underlying data using *graphical tables*
- ▶ Presentation of numerous data in a well-arranged way
- ▶ Improving data density by using spark-graphs
- ▶ Results should be easy to modify
- ▶ Development of a tool to create graphical tables easily

How can this be achieved? → R-package `sparkTable`

# Example (production indices)
















## Seasonally adjusted production indices by branch, monthly.

Produktionsindex ÖNACE 2008 (Ø 2005=100), EU harmonisiert saisonal bereinigt

Berichts- periode	Verwendungskategorien (MIG)				ÖNACE 2008 - Abschnitte											
	Insgesamt (B bis F)	Industrie (B bis E)	EU insgesamt (B, C, D, F ohne 353)	EU Industrie (B, C, D ohne 353)	Vorleistungen	Energie	Investitionsgüter	Konsumgüter			Bergbau und Gewinnung von Steinen und Erden (B)	Herstellung von Waren (C)	Energieversorgung (D)	Wasserversorgung und -entwässerung, Abfallentsorgung (E)	Bau (F)	
								Insgesamt	Langlebige Konsumgüter	Kurzlebige Konsumgüter						
Q 2006	107,2	107,5	107,1	107,3	106,7	108,7	110,4	105,1	108,4	104,5	110,8	107,4	106,8	108,6	106,2	
Q 2007	113,1	113,7	113,2	113,8	113,8	109,1	119,0	110,1	112,1	109,7	110,7	114,4	107,8	110,0	110,9	
Q 2008	114,7	116,0	114,2	115,3	113,8	124,1	122,0	108,0	113,7	106,8	117,5	115,6	118,8	119,0	110,2	
Q 2009	103,1	102,1	102,8	101,5	96,7	118,7	99,6	104,6	110,4	103,4	108,0	100,1	114,3	128,5	107,8	
2005	I.	95,2	95,7	95,6	96,2	97,5	90,5	94,6	98,8	93,7	99,9	109,2	96,2	87,9	92,7	93,6
	II.	96,6	97,0	96,9	97,2	97,9	95,4	96,7	98,0	97,7	98,3	101,0	97,2	95,2	90,6	95,6
	III.	96,2	97,2	96,3	97,3	98,8	95,7	96,4	98,4	94,9	99,3	98,1	97,4	95,1	95,7	92,6
	IV.	99,3	99,4	99,5	99,5	99,0	97,6	98,5	99,7	101,1	99,4	98,1	99,7	96,4	96,1	99,1
	V.	98,6	98,3	98,8	98,5	98,3	96,9	99,9	100,5	102,1	100,3	95,6	98,4	98,0	95,2	99,9
	VI.	100,9	100,5	100,7	100,1	100,2	101,7	100,8	99,5	99,8	100,1	95,8	100,2	102,6	108,6	102,6
	VII.	100,9	101,3	101,1	101,1	100,5	99,3	100,6	101,9	98,9	102,2	109,8	101,3	99,6	99,8	99,4
	VIII.	99,7	99,6	99,9	99,7	100,3	96,8	99,0	101,5	103,5	101,3	97,8	99,8	98,9	97,5	100,4
	IX.	101,9	102,0	101,5	101,5	100,7	104,0	101,4	100,4	100,7	100,1	96,0	101,7	105,0	106,8	101,4
	X.	102,3	101,7	102,2	101,4	102,5	103,9	102,9	99,2	102,3	98,6	97,4	101,6	104,2	100,5	104,9
	XI.	104,1	103,9	103,8	103,5	104,0	107,1	106,9	100,6	103,7	100,0	97,8	103,8	107,1	100,7	104,9
	XII.	104,2	103,9	103,6	103,0	99,9	110,7	102,9	100,9	101,5	100,4	103,8	103,0	109,9	116,1	105,8



# Example (production indices enhanced)

	2005-2010	2009 - 3	2009 - 4	2009 - 5	2009 - 6	2009 - 7	2009 - 8	2009 - 9	2009 - 10	2009 - 11	2009 - 12	2010 - 1	2010 - 2
BbisF		103	101.7	100.5	101.6	102.6	102.2	103.5	105.2	104.8	104.3	104.2	101.6
BbisE		102.1	99.8	99.2	100.2	101.8	100.9	102.6	104.8	103.8	103.6	103.6	101.4
EU_BCDF		102.7	101.1	99.8	100.9	102	101.9	102.4	104.5	104	103.9	105.1	101.4
EU_Industrie		101.2	98.8	98.4	99.1	100.9	100.7	100.8	104.1	102.6	103.4	104	100.6
Vorleistungen		98.2	92.8	93.4	95.2	96.6	96	98.7	98.2	100.2	99.6	99.6	98.6
Energie		119.9	121.3	118.7	118.9	118.4	115.6	117.5	119.8	118.8	118	114.9	115.4
Investitionsgueter		98.6	97.7	96.9	98.1	97.8	98.5	99.2	99.7	104.5	103	97.3	99.3
Konsumgueter		105.7	104.9	104	103.3	103.4	103.4	104.4	105.1	104.1	105.2	104.4	105.2
Lang_Konsumg		122.9	117.7	121.7	107.7	109.4	104.1	103.1	105.3	108.6	110.7	109.9	107.4
Kurz_Konsumg		103.1	103.1	101.5	102.6	102.1	103.3	104.3	104.5	103	103.7	103.2	103.8
Bergbau		103.3	105	108.3	114.5	115	111	110.1	108.7	111.9	102.8	98.6	105.7
HerstellungC		99.9	97.8	96.7	98	99.8	98.9	100.3	102.8	102.4	101.8	102	99.1
D		118.1	112.1	114.9	112	111.5	111.7	116.5	118.8	111.3	116.9	114.9	115.3
Wasser		122.4	132.4	130.6	132.9	135	134.6	133	128.1	125.8	124.3	128.8	134.2
Bau		107.3	109	105.9	107.6	106.7	107.6	107.7	107.4	109.3	107.3	106.2	102.7

# Example (developments of the Austrian population)









## Bevölkerung zu Jahresbeginn seit 1981 nach Geschlecht bzw. breiten Altersgruppen (Absolutwerte)

Jahr	Insgesamt	Nach Geschlecht		Männer auf 1.000 Frauen	Nach Altersgruppen			
		Männer	Frauen		0 bis 19 Jahre	20 bis 64 Jahre	65 Jahre und älter	dar.: 75 Jahre und älter
1981	7.553.326	3.570.172	3.983.154	896	2.184.224	4.212.971	1.156.131	454.278
1982	7.584.094	3.590.286	3.993.808	899	2.159.778	4.292.823	1.131.493	465.300
1983	7.564.185	3.582.589	3.981.596	900	2.115.305	4.348.057	1.100.823	473.838
1984	7.559.635	3.583.422	3.976.213	901	2.070.767	4.415.758	1.073.110	480.749
1985	7.563.233	3.588.116	3.975.117	903	2.028.352	4.465.937	1.068.944	491.279
1986	7.566.736	3.594.380	3.972.356	905	1.988.702	4.499.348	1.078.686	500.239
1987	7.572.852	3.602.199	3.970.653	907	1.950.892	4.528.383	1.093.577	508.013
1988	7.576.319	3.608.710	3.967.609	910	1.911.761	4.553.802	1.110.756	519.409
1989	7.594.315	3.623.136	3.971.179	912	1.879.112	4.589.333	1.125.870	527.740
1990	7.644.818	3.654.915	3.989.903	916	1.862.258	4.642.719	1.139.841	534.306
1991	7.710.882	3.696.200	4.014.682	921	1.856.653	4.700.847	1.153.382	526.559
1992	7.798.899	3.746.551	4.052.348	925	1.864.333	4.770.187	1.164.379	511.086
1993	7.882.519	3.793.245	4.089.274	928	1.876.578	4.831.640	1.174.301	494.349
1994	7.928.746	3.820.889	4.107.857	930	1.880.290	4.862.793	1.185.663	479.964
1995	7.943.489	3.831.200	4.112.289	932	1.875.112	4.871.503	1.196.874	481.743
1996	7.953.067	3.836.950	4.116.117	932	1.871.831	4.873.219	1.208.017	494.972
1997	7.964.966	3.844.019	4.120.947	933	1.870.818	4.877.700	1.216.448	511.436
1998	7.971.116	3.848.305	4.122.811	933	1.866.873	4.880.028	1.224.215	528.564
1999	7.982.461	3.856.029	4.126.432	934	1.862.619	4.890.127	1.229.715	545.049
2000	8.002.186	3.868.331	4.133.855	936	1.857.356	4.911.163	1.233.667	559.914
2001	8.020.946	3.881.104	4.139.842	938	1.844.074	4.938.856	1.238.016	575.493
2002	8.063.640	3.906.734	4.156.906	940	1.827.823	4.986.599	1.249.218	593.437
2003	8.100.273	3.929.599	4.170.674	942	1.819.450	5.030.344	1.250.479	601.901
2004	8.142.573	3.952.600	4.189.973	943	1.813.186	5.068.488	1.260.899	612.140
2005	8.201.359	3.984.866	4.216.493	945	1.809.717	5.083.697	1.307.945	625.028
2006	8.254.298	4.014.344	4.239.954	947	1.803.687	5.093.024	1.357.587	638.263
2007	8.282.984	4.030.062	4.252.922	948	1.790.880	5.093.505	1.398.599	648.843
2008	8.318.592	4.048.633	4.269.959	948	1.777.869	5.115.684	1.425.039	658.531
2009	8.355.260	4.068.047	4.287.213	949	1.763.948	5.140.425	1.450.887	665.415

Q: STATISTIK AUSTRIA, Statistik des Bevölkerungsstandes.- Revidierte Ergebnisse für 2002 bis 2008. Erstellt am: 27.05.2009.

# Example (developments of the Austrian population, enhanced)


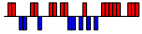



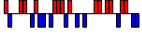









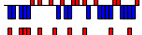


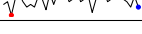

## Bevölkerung zu Jahresbeginn seit 1981 nach Geschlecht bzw. breiten Altersgruppen (Überblick)

	1981-2009	1981	2009	Minimum	Maximum
Insgesamt		7.5533.26	8.355.260	7.553.326	8.355.260
Männer		3.570.172	4.068.047	3.570.172	4.068.047
Frauen		3.983.154	4.287.213	3.967.609	4.287.213
Männer auf 1.000 Frauen		896	949	896	949
0-19 Jahre		2.184.224	1.763.948	1.763.948	2.184.224
20-64 Jahre		4.212.971	5.140.425	4.212.971	5.140.425
65+ Jahre		1.156.131	1.450.887	1.068.944	1.450.887
75+ Jahre		454.278	665.415	454.278	665.415

## Bevölkerung zu Jahresbeginn seit 1981 nach Geschlecht bzw. breiten Altersgruppen (Absolutwerte)

Jahr	Geschlecht			Männer auf 1.000 Frauen	Altersgruppen			
	Insgesamt	Männer	Frauen		0-19 Jahre	20-64 Jahre	65+ Jahre	75+ Jahre
2009	8.355.260	4.068.047	4.287.213	949	1.763.948	5.140.425	1.450.887	665.415
2008	8.318.592	4.048.633	4.269.959	948	1.777.869	5.115.684	1.425.039	658.531
2007	8.282.984	4.030.062	4.252.922	948	1.790.880	5.093.505	1.398.599	648.843
2006	8.254.298	4.014.344	4.239.954	947	1.803.687	5.093.024	1.357.587	638.263
2005	8.201.359	3.984.866	4.216.493	945	1.809.717	5.083.697	1.307.945	625.028
2004	8.142.573	3.952.600	4.189.973	943	1.813.186	5.068.488	1.260.899	612.140
...	...	...	...	...	...	...	...	...

# Example (team performance)

	Points	ShotGoal	GetGoal	GoalDiff	WinLoose
Rapid	62	63	40		
Salzburg	80	110	35		
Austria	53	58	44		
Sturm	48	55	56		
Groedig	54	68	71		
Neustadt	39	43	84		
FC Wacker	29	42	70		
Wolfsberg	41	51	63		
Ried	43	55	66		
Admira	42	51	67		






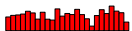

<b>IS</b> <i>Population :</i>  <i>Debt :</i> 		<b>NO</b> <i>Population :</i>  <i>Debt :</i> 	<b>SE</b> <i>Population :</i>  <i>Debt :</i> 	<b>FI</b> <i>Population :</i>  <i>Debt :</i> 	<b>EE</b> <i>Population :</i>  <i>Debt :</i> 
	<b>NL</b> <i>Population :</i>  <i>Debt :</i> 	<b>DE</b> <i>Population :</i>  <i>Debt :</i> 	<b>DK</b> <i>Population :</i>  <i>Debt :</i> 	<b>LT</b> <i>Population :</i>  <i>Debt :</i> 	<b>LV</b> <i>Population :</i>  <i>Debt :</i> 
<b>UK</b> <i>Population :</i>  <i>Debt :</i> 	<b>IE</b> <i>Population :</i>  <i>Debt :</i> 	<b>BE</b> <i>Population :</i>  <i>Debt :</i> 	<b>CZ</b> <i>Population :</i>  <i>Debt :</i> 	<b>PL</b> <i>Population :</i>  <i>Debt :</i> 	<b>SK</b> <i>Population :</i>  <i>Debt :</i> 
<b>LU</b> <i>Population :</i>  <i>Debt :</i> 	<b>CH</b> <i>Population :</i>  <i>Debt :</i> 	<b>LI</b> <i>Population :</i>  <i>Debt :</i> 	<b>AT</b> <i>Population :</i>  <i>Debt :</i> 	<b>HU</b> <i>Population :</i>  <i>Debt :</i> 	<b>RO</b> <i>Population :</i>  <i>Debt :</i> 
<b>PT</b> <i>Population :</i>  <i>Debt :</i> 	<b>FR</b> <i>Population :</i>  <i>Debt :</i> 	<b>SI</b> <i>Population :</i>  <i>Debt :</i> 	<b>HR</b> <i>Population :</i>  <i>Debt :</i> 	<b>BG</b> <i>Population :</i>  <i>Debt :</i> 	<b>TR</b> <i>Population :</i>  <i>Debt :</i> 
	<b>ES</b> <i>Population :</i>  <i>Debt :</i> 	<b>IT</b> <i>Population :</i>  <i>Debt :</i> 	<b>MT</b> <i>Population :</i>  <i>Debt :</i> 	<b>GR</b> <i>Population :</i>  <i>Debt :</i> 	<b>CY</b> <i>Population :</i>  <i>Debt :</i> 

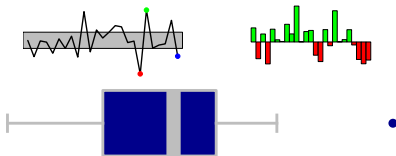
R-package `sparkTable` (available on CRAN) provides the following features<sup>1</sup>

- ▶ Different graphical representations
- ▶ Combining numerical with graphical information into a table
- ▶ Creation of tables for online- or print publication

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<sup>1</sup>for details, see: *The Visual Display of Quantitative Information*, E. R. Tufte

- ▶ Creation of customized time-series, box- and barplots
  - ▶ Time series plots 
  - ▶ Bar plots 
  - ▶ Box plots 
- ▶ Graphical options include (among others)
  - ▶ Highlighting of specific values in time series plots
  - ▶ Choice of colors
  - ▶ Choice of boundaries
  - ▶ Inclusion of interquartile-range in time-series plots



The user can decide to generate *pdf*, *eps* or *png* output

- ▶ *Pdf*, *Eps* graphics can be included in  $\text{\LaTeX}$  for scientific use
- ▶ *Png* can be used to show both graphics on websites

- ▶ Non-experts should be able to create highly complex graphical tables
- ▶ It should be possible to modify (changing graphs, adding and remove variables, ordering) and export tables interactively
- ▶ Interactivity was added to **sparkTable** using **shiny**
  - ▶ `runShinyApp()`: allows to view an existing graphical table directly in a browser with some basic interactive function like sorting and filtering.
  - ▶ `shiny_sparkTable()`: functions that allows to customize both graphs and the tables and makes it possible to add/remove variables, filter and re-order the table and to export a final result.
- ▶ All the functionality is available directly in a browser
- ▶ No additional software needs to be installed

## plotSparkTable using shiny...

Import data

[Add/Delete rows/columns](#)

[Customize](#)

[Sort/Re-order](#)

[sparkTable-Plot](#)

### Select groups

- Rapid
- Salzburg
- Austria
- Sturm
- Groedig
- Neustadt
- FC Wacker
- Wolfsberg
- Ried
- Admira

25 records per page

Search:

team	time	points	wl	goaldiff	shotgoal	getgoal
Rapid	1	1	0	0	2	2
Rapid	2	3	1	4	4	0
Rapid	3	3	1	2	4	2
Rapid	4	1	0	0	0	0
Rapid	5	0	-1	-2	0	2
Rapid	6	0	-1	-1	0	1
Rapid	7	1	0	0	1	1

# Example: shiny\_sparkTable() - Delete/Add columns from/to the table

## plotSparkTable using shiny...

Import data

Add/Delete rows/columns

Customize

Sort/Re-order

sparkTable-Plot

### Select columns that should be available in the table

- Points
- ShotGoal
- GetGoal
- WinLoose
- GoalDiff

Remove selected columns

### Add columns

column name

newcol\_222610065247864

type

sparkline

variable

points

Add another column

## plotSparkTable using shiny...

Import data Add/Delete rows/columns **Customize** Sort/Re-order sparkTable-Plot

Modify column Points

Column name

Points

Set plot type and variable to be plotted

Type

function

Variable

points

Custom function

function(x) {sum(x)}

Set additional options

Modify column ShotGoal

Column name

ShotGoal

Set plot type and variable to be plotted

Type

function

Variable

shotgoal

Custom function

function(x) { round(sum(x),2) }

Set additional options

Modify column GetGoal

Column name

GetGoal



## plotSparkTable using shiny...

[Import data](#)[Add/Delete rows/columns](#)[Customize](#)[Sort/Re-order](#)[sparkTable-Plot](#)

**Please drag and drop the columns into the desired order**

Points

ShotGoal

GetGoal

WinLoose

GoalDiff

**Please drag and drop the rows (groups) into the desired order**

Rapid

Salzburg

Austria

Sturm

Groedig

Neustadt

FC Wacker

Wolfsberg

Ried

Admira





















```
[1] "Rapid" "Salzburg" "Austria" "Sturm" "Groedig" "Neustadt"  
[7] "FC Wacker" "Wolfsberg" "Ried" "Admira"
```

# Example: shiny\_sparkTable() - View/Export current graphical table

## plotSparkTable using shiny...

Import data Add/Delete rows/columns Customize Sort/Re-order sparkTable-Plot

25 records per page Search:

	Points	ShotGoal	GetGoal	GoalDiff	WinLoose
Rapid	62	63	40		
Salzburg	80	110	35		
Austria	53	58	44		
Sturm	48	55	56		
Groedig	54	68	71		
Neustadt	39	43	84		
FC Wacker	29	42	70		
Wolfsberg	41	51	63		
Ried	43	55	66		
Admira	42	51	67		

Points  ShotGoal  GetGoal  GoalDiff  WinLoose

Showing 1 to 10 of 10 entries

[Export to html](#) [Export to latex](#)

← Previous 1 Next →

- ▶ **R-Package `sparkTable`** allows to create highly-customizeable graphs and graphical tables in flexible way.
- ▶ The package has been improved over time and new interactive features have been added.
- ▶ Even more improvements (e.g. additional customization options, additional graphs) are already planned to be implemented.
- ▶ Room for improvement to integrate graphical tables into traditional output of NSIs.
- ▶ User-feedback is (of course) very welcome!