



The R Project for Statistical
Computing



R Language Data Visualization

資料繪圖與展示

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R: An Introduction Visualization

Graphing data

Same statistics difference graphs

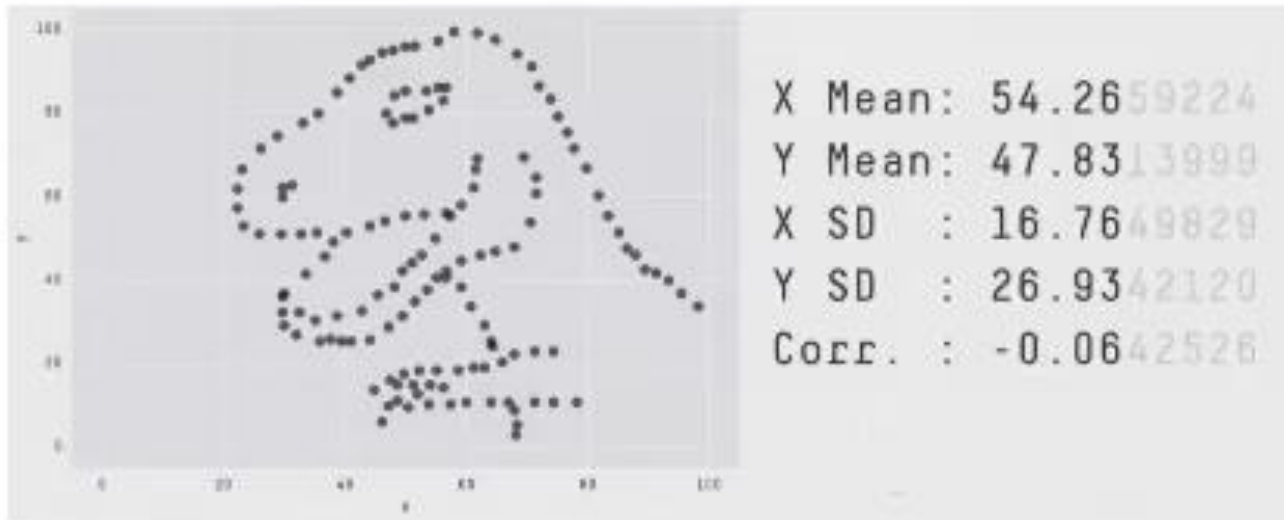


Fig 6. Animation showing the progression of the Datasaurus Dozen dataset through all of the target shapes.

<https://www.autodesk.com/research/publications/same-stats-different-graphs>

Visualization

data

aesthetics 美學

mapping

geometrics

label

save

coordinate space

facet 面板

theme

R: An Introduction Visualization

ggplot2

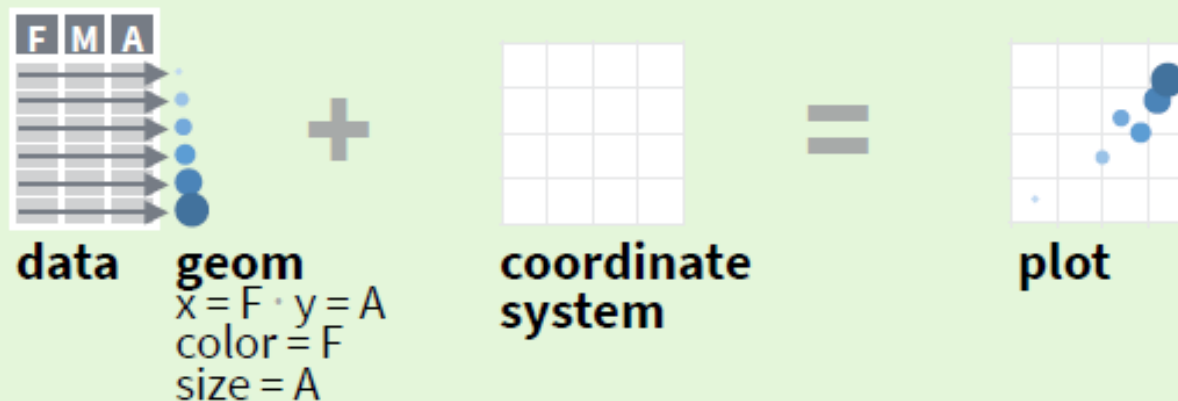
```
install.package( "ggplot2" )
```

<https://github.com/rstudio/cheatsheets/blob/master/data-visualization-2.1.pdf>

ggplot2 is based on the **grammar of graphics**, the idea that you can build every graph from the same components: a **data** set, a **coordinate system**, and **geoms**—visual marks that represent data points.



To display values, map variables in the data to visual properties of the geom (**aesthetics**) like **size**, **color**, and **x** and **y** locations.



Complete the template below to build a graph.

```
ggplot (data = <DATA>) +  
<GEOM_FUNCTION> (mapping = aes(<MAPPINGS>),  
  stat = <STAT>, position = <POSITION>) +  
<COORDINATE_FUNCTION> +  
<FACET_FUNCTION> +  
<SCALE_FUNCTION> +  
<THEME_FUNCTION>
```

required

Not required, sensible defaults supplied

ggplot(data = mpg, aes(x = cty, y = hwy)) Begins a plot that you finish by adding layers to. Add one geom function per layer.

last_plot() Returns the last plot.

ggsave("plot.png", width = 5, height = 5) Saves last plot as 5' x 5' file named "plot.png" in working directory. Matches file type to file extension.

Produce traditional graphics



High-level graphics setting



Low-level graphics setting



Output

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Aesthetic
Geometric
Save

Aes Common aesthetic values.

color and **fill** - string ("red", "#RRGGBB")

linetype - integer or string (0 = "blank", 1 = "solid", 2 = "dashed", 3 = "dotted", 4 = "dotdash", 5 = "longdash", 6 = "twodash")

lineend - string ("round", "butt", or "square")

linejoin - string ("round", "mitre", or "bevel")

size - integer (line width in mm)

shape - integer/shape name or a single character ("a")

0	1	2	3	4	5	6	7	8	9	10	11	12
□	○	△	+	×	◇	▽	⊠	✱	⊕	⊗	⊞	⊞
13	14	15	16	17	18	19	20	21	22	23	24	25
⊗	⊞	□	○	△	◇	○	○	●	■	◆	▲	▼

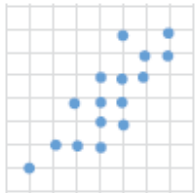
Visualization in ggplot

```
ggplot(data=  
  mapping = aes(x=, y=, color=))
```

+

```
geom_point(size=, shape=)
```

+



e + geom_point()

x, y, alpha, color, fill, shape, size, stroke

```
geom_line(size=, linetype=)
```



i + geom_line()

x, y, alpha, color, group, linetype, size

Visualization in ggplot



+

<https://ggplot2.tidyverse.org/reference/ggsave.html>

```
ggsave(filename,  
        device, png,eps,ps,tex,pdf,jpeg,tiff,bmp,svg,wmf  
        path,  
        width,  
        height,  
        units, ln,cm,mm,px  
        dpi,  
        bg) Background, bg = NULL
```



TRY
it
in
R



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R_Data_Visualization_a.R

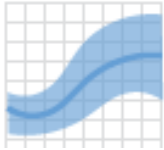
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Continuous Lines Smoothing

See what
the
trends
look like

Visualization in ggplot

geom_smooth()



e + geom_smooth(method = lm)

x, y, alpha, color, fill, group, linetype, size, weight

R: An Introduction Visualization Faceting

Divide a plot into subplots



`t + facet_grid(cols = vars(fl))`
Facet into columns based on fl.



`t + facet_grid(rows = vars(year))`
Facet into rows based on year.



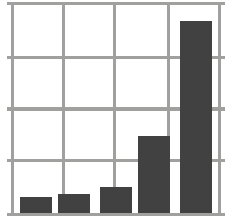
`t + facet_grid(rows = vars(year), cols = vars(fl))`
Facet into both rows and columns.



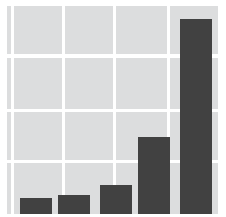
`t + facet_wrap(vars(fl))`
Wrap facets into a rectangular layout.

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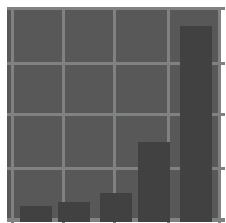
Theme Style



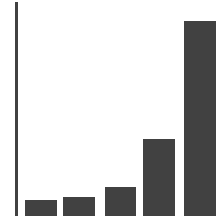
`r + theme_bw()`
White background
with grid lines.



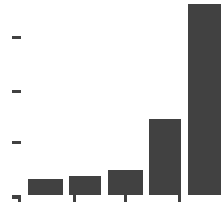
`r + theme_gray()`
Grey background
(default theme).



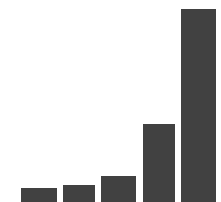
`r + theme_dark()`
Dark for contrast.



`r + theme_classic()`
`r + theme_light()`



`r + theme_linedraw()`
`r + theme_minimal()`
Minimal theme.



`r + theme_void()`
Empty theme.

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Modify
component
of theme

theme()

axis.text, **axis.text.x**, tick labels along axes (`element_text()`). Specify all axis tick labels

```
element_text(  
  family = NULL,  
  face = NULL,  
  colour = NULL,  
  size = NULL,  
  hjust = NULL,  
  vjust = NULL,  
  angle = NULL,  
  lineheight = NULL,  
  color = NULL,  
  margin = NULL,  
  debug = NULL,  
  inherit.blank = FALSE  
)
```


Visualization in ggplot

```
corrd_cartesian()  
+  
geom_smooth()  
+  
facet_wrap()  
+  
theme_bw()  
+  
theme(axis.text.x =)
```

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R_Data_Visualization_b.R

R: An Introduction Visualization **boxplot**

See distribution of data

Visualization in ggplot



`geom_boxplot()`

`+`

`corrd_flip()`

TRY
it
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R



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R_Data_Visualization_c.R

R: An Introduction Visualization Timeseries

Package “lubridate”

library(lubridate)

```
ymd( "1985-10-09" )
```

```
mdy( "October 10, 1985" )
```

```
ymd_hms( "1985-10-09 20:11:59" )
```

Object

"POSIXlt"

"POSIXct"

Package "gridExtra"

Multiple plots on a page

library(gridExtra)



grid.arrange(p1,p2,nrow=2)



R: An Introduction Visualization **barplot**

geom_bar

```
ggplot(data =, aes(x,y)) +  
geom_bar(stat = "identity" , color =)
```

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R_Data_Visualization_d.R

課堂練習1: 學號-姓名-Visualization.R

根據氣象站資料檔weatherdata.xlsx，請試著根據濕度(RH)及降雨(Rain)資料繪製並輸出圖檔學號-姓名-Visualization.png

