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

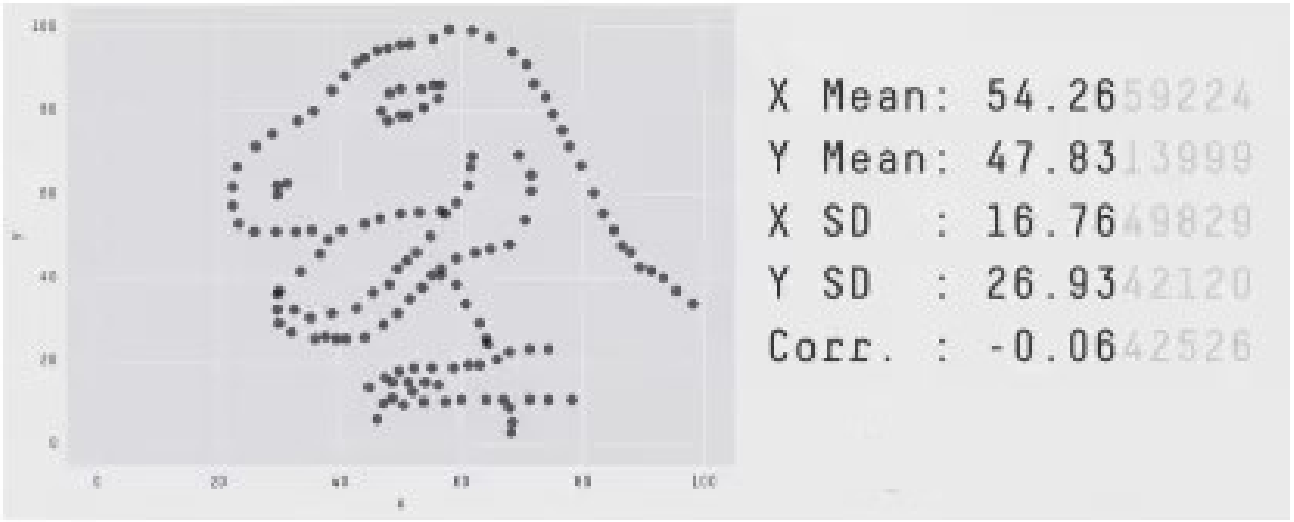


Fig 6. Animation showing the progression of the Datasaurus Dozen dataset through all of the target shapes.

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

Visualization

data
aesthetics(美學)
mapping
geometrics(幾何)
label
save
coordinate space
facet
theme(主題)

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.

data **geom** x = F · y = A **coordinate system** **plot**

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

data **geom** x = F · y = A color = F size = A **coordinate system** **plot**

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>
```

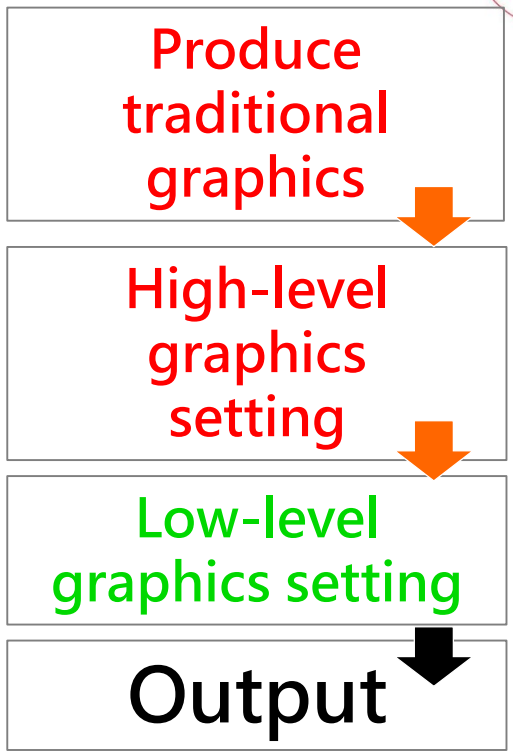
required

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.



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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")

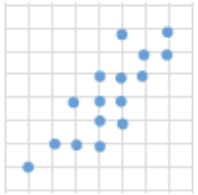
linejoin - string ("round", "mitre", or "bevel")

size - integer (line width in mm)

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

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,
       path,
       width,
       height,
       units,
       dpi,
       bg)
```

png,eps,ps,tex,pdf,jpeg,tiff,bmp,svg,wmf

In,cm,mm,px

Background, bg = NULL

TRY it in R

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R_Data_Visualization_a.R

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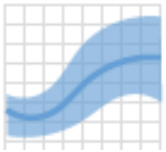
Visualization

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

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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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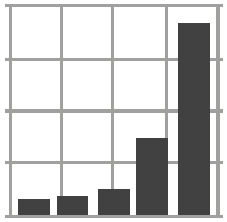
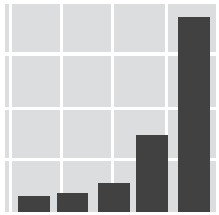
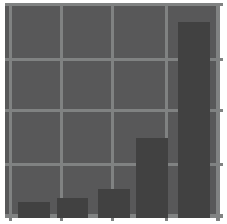
Theme Style



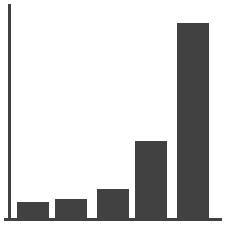
r + theme_bw()
White background with grid lines.



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

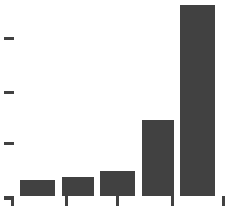


r + theme_dark()
Dark for contrast.



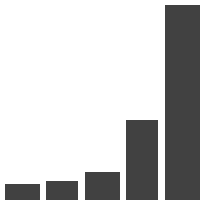
r + theme_classic()

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_light()
+
theme_bw()
+
theme(axis.text.x =)
```

TRY it in R

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R_Data_Visualization_b.R

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boxplot

See distribution of data

Visualization in ggplot

geom_boxplot()
+
corrd_flip()

TRY it in R

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R_Data_Visualization_c.R

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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)

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barplot

geom_bar

```
ggplot(data =, aes(x,y)) +

geom_bar(stat =  "identity" , color =)
```

TRY it in R

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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