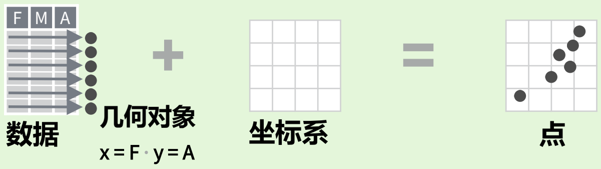
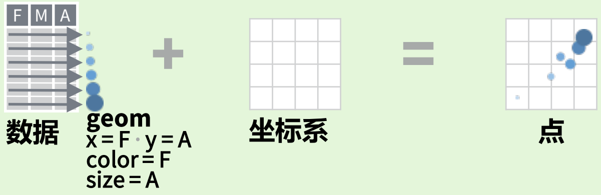
ggplot2数据可视化：：速查表

基础

ggplot2 基于图形语法，使用相同的组件（数据集、坐标系和表示数据点的几何对象）来构建图片。



为了获取显示值，数据中的变量映射到图形的视觉属性，如大小、颜色以及x和y位置。



完成以下模板来构建图形

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

必要

非必要，有默认值

ggplot(data = mpg, aes(x = cty, y = hwy)) 通过添加图层来完成图形，每层添加一个geom函数。

last_plot() 返回上一个图片。

ggsave("plot.png", width = 5, height = 5) 将最后一个图片保存至工作目录中名为“plot.png”的5'x 5'文件。 文件类型与文件扩展名相匹配。

参数 通用参数

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

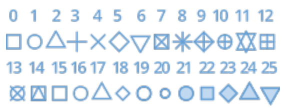
linetype - integer or string (0 = "blank", 1 = "solid", 2 = "dashed", 3 = "dotted", 4 = "dotdash", 5 = "longdash", 6 = "twodash")

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")



几何对象

使用geom函数表示数据点，使用geom的属性表示变量。 每个函数绘制一个图层。

基本图像

a <- ggplot(economics, aes(date, unemploy))
b <- ggplot(seals, aes(x = long, y = lat))

a + **geom_blank**() and a + **expand_limits**()
Ensure limits include values across all plots.

b + **geom_curve**(aes(yend = lat + 1, xend = long + 1), curvature = 1) - x, xend, y, yend, alpha, angle, color, curvature, linetype, size

a + **geom_path**(lineend = "butt", linejoin = "round", linemitre = 1)
x, y, alpha, color, group, linetype, size

a + **geom_polygon**(aes(alpha = 50)) - x, y, alpha, color, fill, group, subgroup, linetype, size

b + **geom_rect**(aes(xmin = long, ymin = lat, xmax = long + 1, ymax = lat + 1)) - xmax, xmin, ymax, ymin, alpha, color, fill, linetype, size

a + **geom_ribbon**(aes(ymin = unemploy - 900, ymax = unemploy + 900)) - x, ymax, ymin, alpha, color, fill, group, linetype, size

分段线

常用参数: x, y, alpha, color, linetype, size

b + **geom_abline**(aes(intercept = 0, slope = 1))
b + **geom_hline**(aes(yintercept = lat))
b + **geom_vline**(aes(xintercept = long))

b + **geom_segment**(aes(yend = lat + 1, xend = long + 1))
b + **geom_spoke**(aes(angle = 1:1155, radius = 1))

单变量 连续

c <- ggplot(mpg, aes(hwy)); c2 <- ggplot(mpg)

c + **geom_area**(stat = "bin")
x, y, alpha, color, fill, linetype, size

c + **geom_density**(kernel = "gaussian")
x, y, alpha, color, fill, group, linetype, size, weight

c + **geom_dotplot**()
x, y, alpha, color, fill

c + **geom_freqpoly**()
x, y, alpha, color, group, linetype, size

c + **geom_histogram**(binwidth = 5)
x, y, alpha, color, fill, linetype, size, weight

c2 + **geom_qq**(aes(sample = hwy))
x, y, alpha, color, fill, linetype, size, weight

离散

d <- ggplot(mpg, aes(fl))

d + **geom_bar**()
x, alpha, color, fill, linetype, size, weight

双变量

两个都连续

e <- ggplot(mpg, aes(cty, hwy))

e + **geom_label**(aes(label = cty), nudge_x = 1, nudge_y = 1) - x, y, label, alpha, angle, color, family, fontface, hjust, lineheight, size, vjust

e + **geom_point**()
x, y, alpha, color, fill, shape, size, stroke

e + **geom_quantile**()
x, y, alpha, color, group, linetype, size, weight

e + **geom_rug**(sides = “bl")
x, y, alpha, color, linetype, size

e + **geom_smooth**(method = lm)
x, y, alpha, color, fill, group, linetype, size, weight

e + **geom_text**(aes(label = cty), nudge_x = 1, nudge_y = 1) - x, y, label, alpha, angle, color, family, fontface, hjust, lineheight, size, vjust

一个离散，一个连续

f <- ggplot(mpg, aes(class, hwy))

f + **geom_col**()
x, y, alpha, color, fill, group, linetype, size

f + **geom_boxplot**()
x, y, lower, middle, upper, ymax, ymin, alpha, color, fill, group, linetype, shape, size, weight

f + **geom_dotplot**(binaxis = "y", stackdir = “center") x, y, alpha, color, fill, group

f + **geom_violin**(scale = "area")
x, y, alpha, color, fill, group, linetype, size, weight

两个都离散

g <- ggplot(diamonds, aes(cut, color))

g + **geom_count**()
x, y, alpha, color, fill, shape, size, stroke

e + **geom_jitter**(height = 2, width = 2)
x, y, alpha, color, fill, shape, size

连续二元分布

h <- ggplot(diamonds, aes(carat, price))

h + **geom_bin2d**(binwidth = c(0.25, 500))
x, y, alpha, color, fill, linetype, size, weight

h + **geom_density_2d**()
x, y, alpha, color, group, linetype, size

h + **geom_hex**()
x, y, alpha, color, fill, size

连续函数

i <- ggplot(economics, aes(date, unemploy))

i + **geom_area**()
x, y, alpha, color, fill, linetype, size

i + **geom_line**()
x, y, alpha, color, group, linetype, size

i + **geom_step**(direction = "hv")
x, y, alpha, color, group, linetype, size

可视化误差

df <- data.frame(grp = c("A", "B"), fit = 4:5, se = 1:2)
j <- ggplot(df, aes(grp, fit, ymin = fit - se, ymax = fit + se))

j + **geom_crossbar**(fatten = 2) - x, y, ymax, ymin, alpha, color, fill, group, linetype, size

j + **geom_errorbar**() - x, ymax, ymin, alpha, color, group, linetype, size, width
Also **geom_errorbarh**().

j + **geom_linerange**()
x, ymin, ymax, alpha, color, group, linetype, size

j + **geom_pointrange**() - x, y, ymin, ymax, alpha, color, fill, group, linetype, shape, size

地图

data <- data.frame(murder = USArrests$Murder,
 state = tolower(rownames(USArrests)))
map <- map_data("state")
k <- ggplot(data, aes(fill = murder))

k + **geom_map**(aes(map_id = state), map = map)
 + **expand_limits**(x = map$long, y = map$lat)
 map_id, alpha, color, fill, linetype, size

三变量

seals$z <- with(seals, sqrt(delta_long^2 + delta_lat^2)); l <- ggplot(seals, aes(long, lat))

l + **geom_contour**(aes(z = z))
x, y, z, alpha, color, group, linetype, size, weight

l + **geom_contour_filled**(aes(fill = z))
x, y, alpha, color, fill, group, linetype, size, subgroup

l + **geom_raster**(aes(fill = z), hjust = 0.5, vjust = 0.5, interpolate = FALSE)
x, y, alpha, fill

l + **geom_tile**(aes(fill = z))
x, y, alpha, color, fill, linetype, size, width

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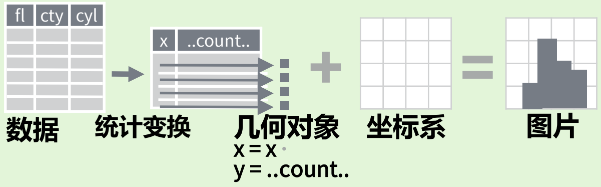
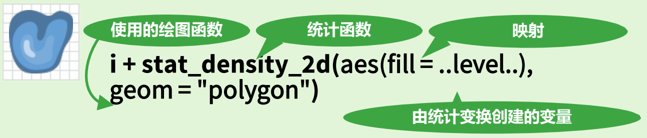
统计变换 另一种构建图层的方法

统计变换构建新变量来绘图（例如，count，prop）。



通过更改geom函数的默认统计信息，**geom_bar(stat="count")** 或者使用统计变化功能来绘图**stat_count(geom="bar")**，其调用默认图片来创建一个图层（相当于geom函数）。
使用 **..name..** 语法将统计变化映射到坐标。



i + stat_density_2d(aes(fill = ..level..),
geom = "polygon")

c + stat_bin(binwidth = 1, boundary = 10)
x, y | ..count.., ..ncount.., ..density.., ..ndensity..

c + stat_count(width = 1) **x, y** | ..count.., ..prop..

c + stat_density(adjust = 1, kernel = "gaussian")
x, y | ..count.., ..density.., ..scaled..

e + stat_bin_2d(bins = 30, drop = T)
x, y, fill | ..count.., ..density..

e + stat_bin_hex(bins = 30) **x, y, fill** | ..count.., ..density..

e + stat_density_2d(contour = TRUE, n = 100)
x, y, color, size | ..level..

e + stat_ellipse(level = 0.95, segments = 51, type = "t")

l + stat_contour(aes(z = z)) **x, y, z, order** | ..level..

l + stat_summary_hex(aes(z = z), bins = 30, fun = max)
x, y, z, fill | ..value..

l + stat_summary_2d(aes(z = z), bins = 30, fun = mean)
x, y, z, fill | ..value..

f + stat_boxplot(coef = 1.5)
x, y | ..lower.., ..middle.., ..upper.., ..width.. , ..ymin.., ..ymax..

f + stat_ydensity(kernel = "gaussian", scale = "area") **x, y** | ..density.., ..scaled.., ..count.., ..n.., ..violinwidth.., ..width..

e + stat_ecdf(n = 40) **x, y** | ..x.., ..y..

e + stat_quantile(quantiles = c(0.1, 0.9), formula = y ~ log(x), method = "rq") **x, y** | ..quantile..

e + stat_smooth(method = "lm", formula = y ~ x, se = T, level = 0.95) **x, y** | ..se.., ..x.., ..y.., ..ymin.., ..ymax..

ggplot() + xlim(-5, 5) + stat_function(fun = dnorm, n = 20, geom = “point”) **x** | ..x.., ..y..

ggplot() + stat_qq(aes(sample = 1:100))
x, y, sample | ..sample.., ..theoretical..

e + stat_sum() x, y, size | ..n.., ..prop..

e + stat_summary(fun.data = "mean_cl_boot")

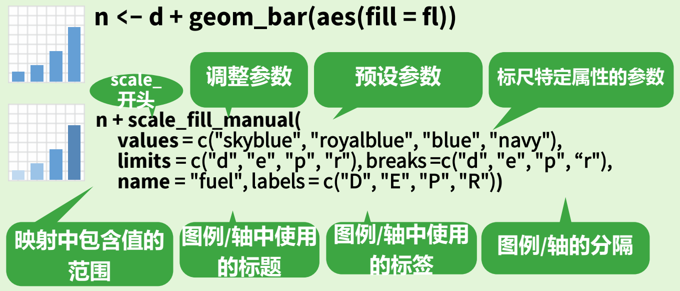
h + stat_summary_bin(fun = "mean", geom = "bar")

e + stat_identity()

e + stat_unique()

标尺 使用scales包覆盖默认值

将映射数据缩放到较为美观的比例。
添加新的标尺来改变映射。



```
n <- d + geom_bar(aes(fill = fl))

n + scale_fill_manual(
    values = c("skyblue", "royalblue", "blue", "navy"),
    limits = c("d", "e", "p", "r"), breaks =c("d", "e", "p", “r"),
    name = "fuel", labels = c("D", "E", "P", "R"))
```

标尺的一般用法

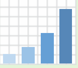
使用大多数参数

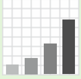
scale_*_continuous() - 将数据的连续取值映射为图形属性的取值
scale_*_discrete() - 将数据的离散取值映射为图形属性的取值
scale_*_binned() - 将数据的连续取值映射为离散的统计堆
scale_*_identity() - 使用数据的值作为图形属性的取值
scale_*_manual(values = c()) - 将数据的离散取值作为手工指定的图形属性的取值
scale_*_date(date_labels = "%m/%d"), date_breaks = "2 weeks") - 将数据值视为日期
scale_*_datetime() - 将数据x视为时间
参数和scale_x_date()一样。有关标签格式请参阅?striptime。

调整X和Y的比例

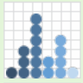
调整x和y的标尺(使用x为例)
scale_x_log10() - 以log10比例绘制x
scale_x_reverse() - 反转x轴方向
scale_x_sqrt() - 以平方根绘制x

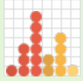
颜色和填充比例（离散）

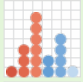

n + scale_fill_brewer(palette = "Blues")
选择调色板: RColorBrewer::display.brewer.all()

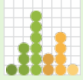

n + scale_fill_grey(start = 0.2, end = 0.8, na.value = "red")

颜色和填充比例（连续）


o <- c + geom_dotplot(aes(fill = ..x..))
o + scale_fill_distiller(palette = “Blues”)

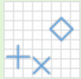

o + scale_fill_gradient(low="red", high=“yellow")

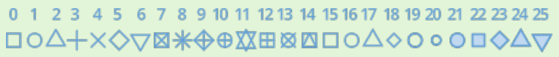

o + scale_fill_gradient2(low = "red", high = “blue”, mid = "white", midpoint = 25)

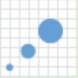

o + scale_fill_gradientn(colors = topo.colors(6))
也见: rainbow(), heat.colors(), terrain.colors(), cm.colors(), RColorBrewer::brewer.pal()

形状和尺寸比例

p <- e + geom_point(aes(shape = fl, size = cyl))
p + scale_shape() + scale_size()
p + scale_shape_manual(values = c(3:7))

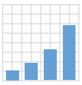




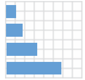

p + scale_radius(range = c(1,6))
p + scale_size_area(max_size = 6)

坐标系

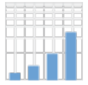
r <- d + geom_bar()


r + coord_cartesian(xlim = c(0, 5)) - xlim, ylim
默认笛卡尔坐标系

r + coord_fixed(ratio = 1/2)
ratio, xlim, ylim - x**和**y**单位之间固定长宽比的笛卡尔坐标**


ggplot(mpg, aes(y = fl)) + **geom_bar()**
通过切换x和y参数映射翻转笛卡尔坐标

r + coord_polar(theta = "x", direction=1)
theta, start, direction – **极坐标**

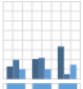

r + coord_trans(y = “sqrt") - x, y, xlim, ylim
转换后的笛卡尔坐标。将xtrans和ytrans设置为窗口函数的名称。

π + coord_quickmap()
π + coord_map(projection = "ortho", orientation = c(41, -74, 0)) - projection, xlim, ylim
从mapproj包中映射投影(mercator (default), azequalarea, lagrange, etc.)

位置调整

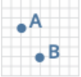
位置调整决定了如何安排原本会占据相同空间的图例

s <- ggplot(mpg, aes(fl, fill = drv))

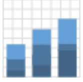

s + geom_bar(position = "dodge")
并排排列元素

s + geom_bar(position = "fill")
堆叠元素并标准化高度

e + geom_point(position = "jitter")
将随机抖动添加到每个元素的X和Y位置以避免重叠

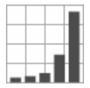


e + geom_label(position = "nudge")
标签稍远离数据点

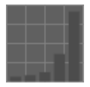

s + geom_bar(position = "stack")
堆叠元素

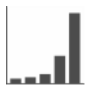
每个位置调整都可以重新编写为具有手动宽度和高度参数的函数:
s + geom_bar(position = position_dodge(width = 1))

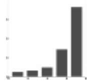
主题


r + theme_bw()
网格白色背景

r + theme_gray()
灰色背景（默认主题）


r + theme_dark()
黑色背景


r + theme_classic()
r + theme_light()


r + theme_linedraw()
r + theme_minimal()
简单主题

r + theme_void()
清空主题

r + theme() 自定义主题的各个方面，例如轴、图例、面板和构面属性。
r + ggtitle(“Title”) + theme(plot.title.postion = “plot”)
r + theme(panel.background = element_rect(fill = “blue”))

分面

根据一个或多个离散变量划分子图。

t <- ggplot(mpg, aes(cty, hwy)) + geom_point()

t + facet_grid(cols = vars(fl))
基于fl的列分面

t + facet_grid(rows = vars(year))
基于year的行分面

t + facet_grid(rows = vars(year), cols = vars(fl))
列和行的分面图

t + facet_wrap(vars(fl))
包裹成矩形布局的分面图

设置scales限制分面坐标轴
t + facet_grid(rows = vars(drv), cols = vars(fl),
scales = "free")
x和y轴适应各自的分面
"free_x" - 限制调整x轴
"free_y" - 限制调整y轴

设置labeller属性调整分面的标签
t + facet_grid(cols = vars(fl), labeller = label_both)
t + facet_grid(rows = vars(fl),

fl: c	fl: d	fl: e	fl: p	fl: r

labeller = label_bquote(alpha ^ .(fl)))

α^c	α^d	α^e	α^p	α^r

标签与图例

使用labs()标记图中的元素。
t + labs(x = "New x axis label", **y** = "New y axis label",
title ="Add a title above the plot",
subtitle = "Add a subtitle below title",
caption = "Add a caption below plot",
alt = "Add alt text to the plot",
<AES> = "New <AES> legend title")

t + annotate(geom = "text", x = 8, y = 9, label = “A")
Places a geom with manually selected aesthetics.**使用手动选择的参数调整几何对象的放置位置。**

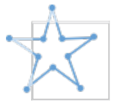
p + guides(x = guide_axis(n.dodge = 2)) **使用** guide_axis(n.dodge **或** angle)**避免拥挤或重叠的标签。**

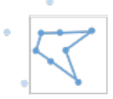
n + guides(fill = “none")**设置图例类型: colorbar, legend, or none (no legend)**

n + theme(legend.position = "bottom")
放置图例： "bottom", "top", "left", or "right"

n + scale_fill_discrete(name = "Title", labels = c("A", "B", "C", "D", "E"))
使用scale**函数设置图例标签**

缩放


没有裁剪（推荐）
t + coord_cartesian(xlim = c(0, 100), ylim = c(10, 20))


裁剪（删除看不见的数据点）
t + xlim(0, 100) **+ ylim**(10, 20)
t + scale_x_continuous(limits = c(0, 100)) **+ scale_y_continuous**(limits = c(0, 100))

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翻译：Guang-Teng Meng Email：druimeng@outlook.com