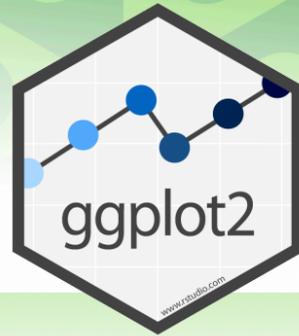


Data Visualization with ggplot2 : : CHEAT SHEET

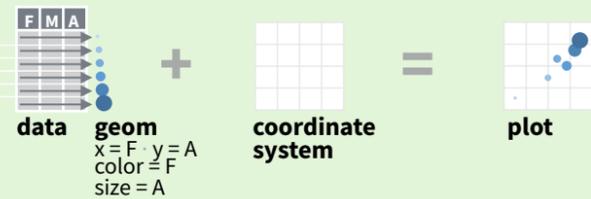


Basics

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.

aesthetic mappings data geom

qplot(x = cty, y = hwy, data = mpg, geom = "point") Creates a complete plot with given data, geom, and mappings. Supplies many useful defaults.

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.

Geoms

Use a geom function to represent data points, use the geom's aesthetic properties to represent variables. Each function returns a layer.

GRAPHICAL PRIMITIVES

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

- a + geom_blank()** (Useful for expanding limits)
- 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(group = group)) x, y, alpha, color, fill, group, 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

LINE SEGMENTS

common aesthetics: 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))

ONE VARIABLE continuous

- ```
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

### discrete

- ```
d <- ggplot(mpg, aes(fl))
```
- d + geom_bar**() x, alpha, color, fill, linetype, size, weight

TWO VARIABLES

continuous x , continuous y

- ```
e <- ggplot(mpg, aes(cty, hwy))
```
- e + geom\_label**(aes(label = cty), nudge\_x = 1, nudge\_y = 1, check\_overlap = TRUE) x, y, label, alpha, angle, color, family, fontface, hjust, lineheight, size, vjust
  - e + geom\_jitter**(height = 2, width = 2) x, y, alpha, color, fill, shape, size
  - 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, check\_overlap = TRUE) x, y, label, alpha, angle, color, family, fontface, hjust, lineheight, size, vjust

#### discrete x , continuous y

- ```
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

discrete x , discrete y

- ```
g <- ggplot(diamonds, aes(cut, color))
```
- g + geom\_count**() x, y, alpha, color, fill, shape, size, stroke

### THREE VARIABLES

- ```
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, colour, group, linetype, size, weight
 - 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

continuous bivariate distribution

- ```
h <- ggplot(diamonds, aes(carat, price))
```
- h + geom\_bin2d**(binwidth = c(0.25, 500)) x, y, alpha, color, fill, linetype, size, weight
  - h + geom\_density2d**() x, y, alpha, colour, group, linetype, size
  - h + geom\_hex**() x, y, alpha, colour, fill, size

### continuous function

- ```
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

visualizing error

- ```
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

### maps

- ```
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

