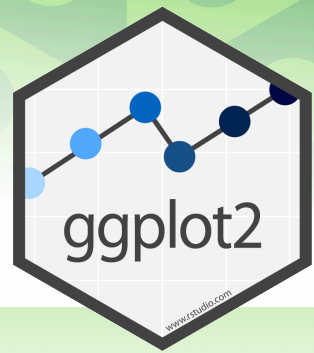


Data Visualization with ggplot2 :: CHEAT SHEET

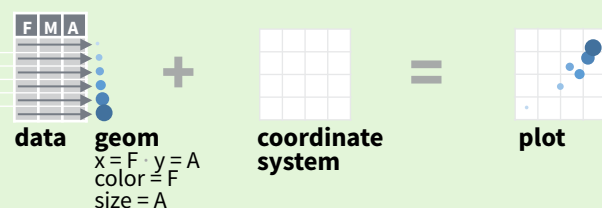


Basics

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.

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

```
sealsSz <- 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

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

