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density of data points
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In ggplot2, these transformations are done with stats

- **stat_bin**
  Bin data.

- **stat_bin2d**
  Count number of observation in rectangular bins.

- **stat_bindot**
  Bin data for dot plot.

- **stat_binhex**
  Bin 2d plane into hexagons.

- **stat_boxplot**
  Calculate components of box and whisker plot.

- **stat_contour**
  Calculate contours of 3d data.

- **stat_density**
  1d kernel density estimate.

- **stat_density2d**
In most cases we just need to call the appropriate geom and it calls a stat

```r
ggplot(iris, aes(x=Species, fill=Species)) + geom_bar()
```
In most cases we just need to call the appropriate geom and it calls a stat

```r
ggplot(iris, aes(x=Sepal.Length, y=Petal.Length)) + geom_point(aes(color=Species)) + geom_smooth(aes(group=Species))
```
However, sometimes it can be helpful to call the stat directly:

```r
ggplot(iris, aes(x=Sepal.Length, y=Petal.Length)) +
  stat_smooth(aes(group=Species), geom="ribbon", fill='gray70') +
  geom_point(aes(color=Species))
```
Scales define how to map data onto aesthetics

- **scale_x_continuous** (scale_x_log10, scale_x_reverse, scale_x_sqrt, scale_y_continuous, scale_y_log10, scale_y_reverse, scale_y_sqrt)
  Continuous position scales (x & y).

- **scale_x_date** (scale_y_date)
  Position scale, date

- **scale_x_datetime** (scale_y_datetime)
  Position scale, date

- **scale_x_discrete** (scale_y_discrete)
  Discrete position.
Scales define how to map data onto aesthetics

- `scale_colour_brewer` (scale_color_brewer, scale_fill_brewer)
  Sequential, diverging and qualitative colour scales from colorbrewer.org

- `scale_colour_gradient` (scale_color_continuous, scale_color_gradient,
  scale_colour_continuous, scale_fill_continuous, scale_fill_gradient)
  Smooth gradient between two colours

- `scale_colour_gradient2` (scale_color_gradient2, scale_fill_gradient2)
  Diverging colour gradient

- `scale_colour_gradientn` (scale_color_gradientn, scale_fill_gradientn)
  Smooth colour gradient between n colours

- `scale_colour_grey` (scale_color_grey, scale_fill_grey)
  Sequential grey colour scale.
Scales define how to map data onto aesthetics

- **scale_linetype** *(scale_linetype_continuous, scale_linetype_discrete)*
  Scale for line patterns.

- **scale_shape** *(scale_shape_continuous, scale_shape_discrete)*
  Scale for shapes, aka glyphs.

- **scale_size** *(scale_size_continuous, scale_size_discrete)*
  Size scale.
Example 1: Change scaling of x axis

ggplot(movies, aes(x=length, y=rating)) +
  geom_point() +
  scale_x_log10()
Example 1: Change scaling of x axis

```r
ggplot(movies, aes(x=length, y=rating)) +
  geom_point() +
  xlim(1, 50)
```
Example 2: Change color scaling

```r
ggplot(iris, aes(x=Species, fill=Species)) + geom_bar() + scale_fill_grey()
```
Example 2: Change color scaling

```r
ggplot(iris, aes(x=Species, fill=Species)) + geom_bar() + scale_fill_brewer()
```