R Graphics Cookbook

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第一章　前言

第二章　R 基础

本章包含的基础知识：安装和使用包以及加载数据。

书中所有的实例需要在你的电脑上安装 ggplot2 和 gcookbook 两个包，如果你想快速开始的话，可以这样做：

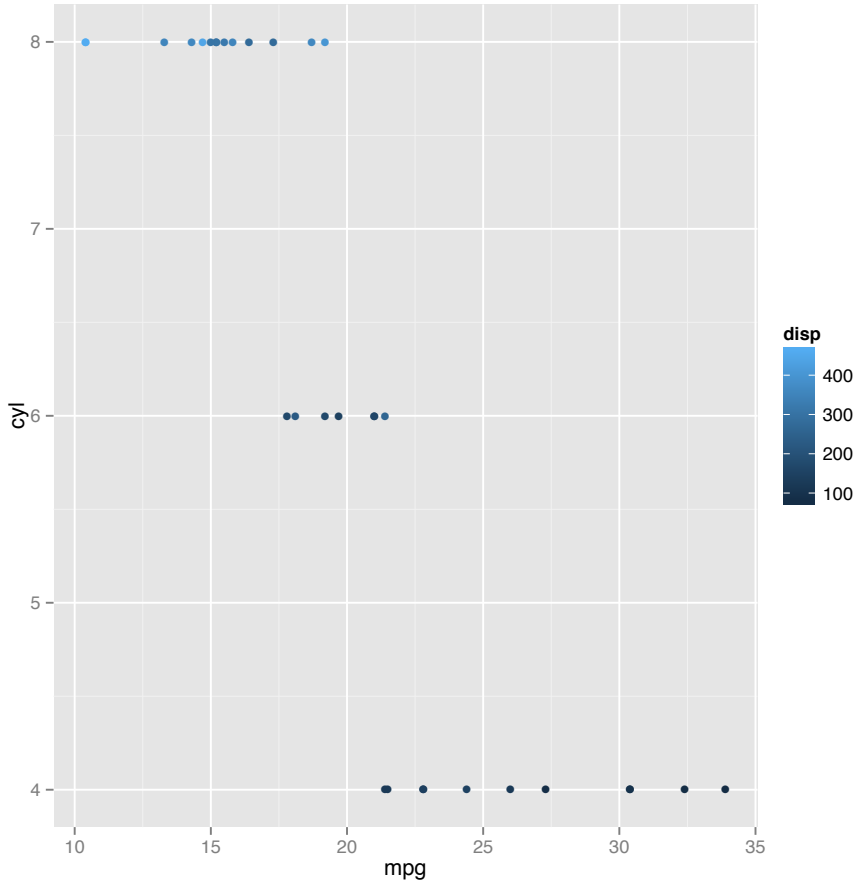
install.packages(c("ggplot2","gcookbook"))

然后在运行本书中例子的过程中，你要加载他们使用如下命令：

library(ggplot2)

library(gcookbook)

```
library(ggplot2)

## Loading required package:  methods

p <- ggplot(data = mtcars, aes(x = mpg, y = cyl, color = disp))
p + geom_point()
```



2.1　R 包安装

2.2　R 包加载

2.3　固定分割的文本数据加载

2.4　Excel 数据加载

2.5　SPSS 数据加载

第三章　条形图

3.1　创建散点图

问题：创建一个散点图

解决方案：用 plot() 绘制散点图，传递 x 值向量与 y 值向量。

```
plot(mtcars$wt, mtcars$mpg)
```

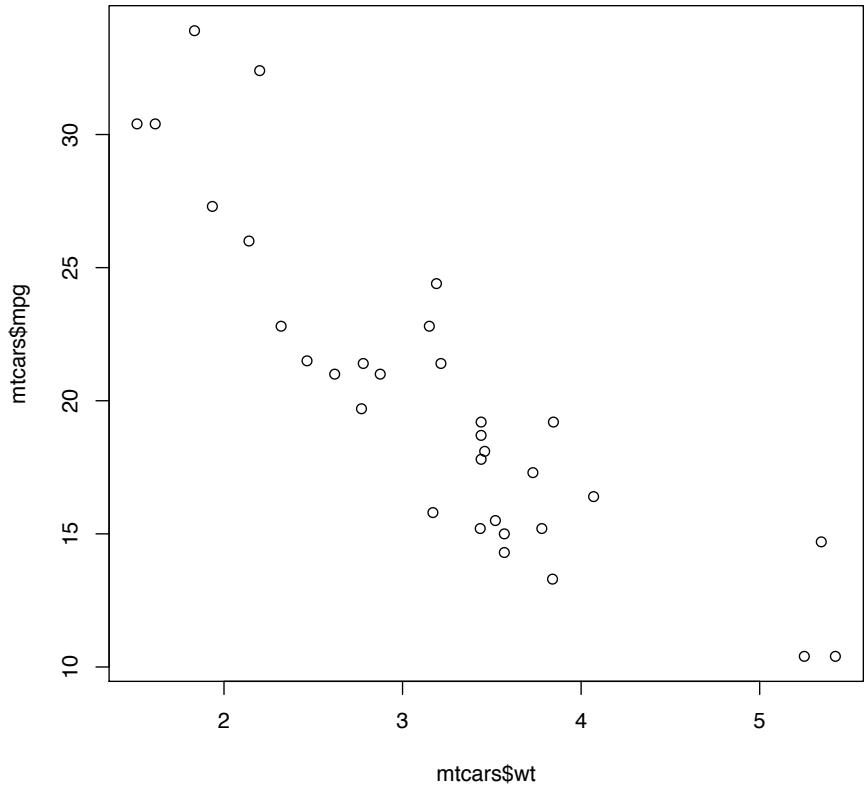
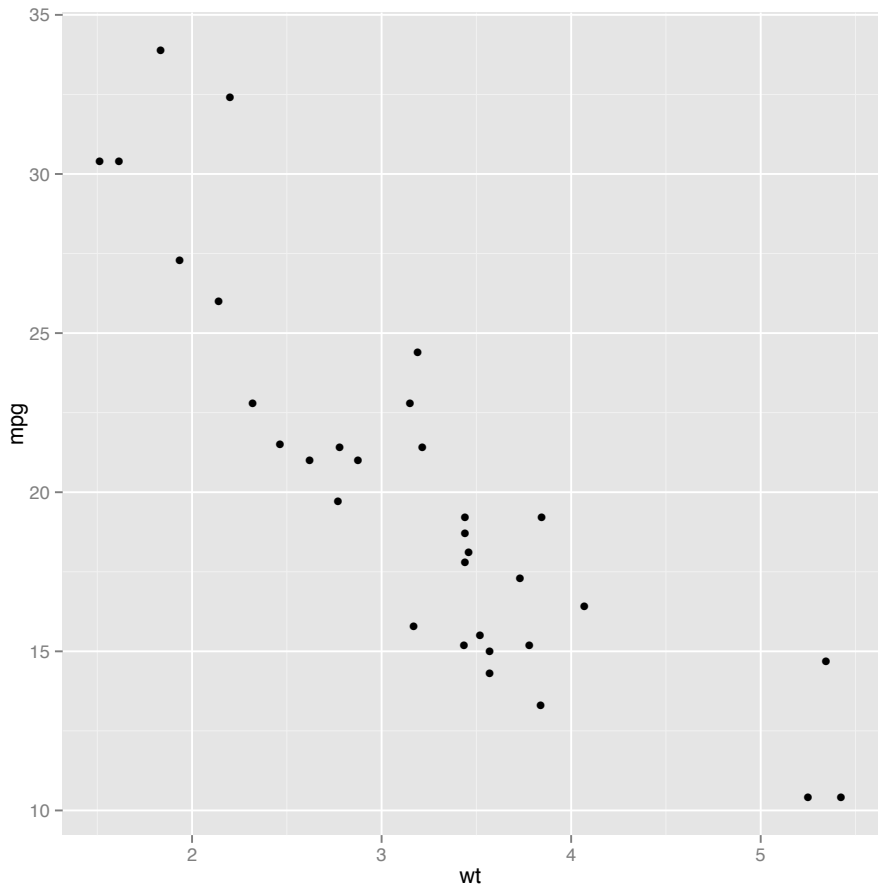
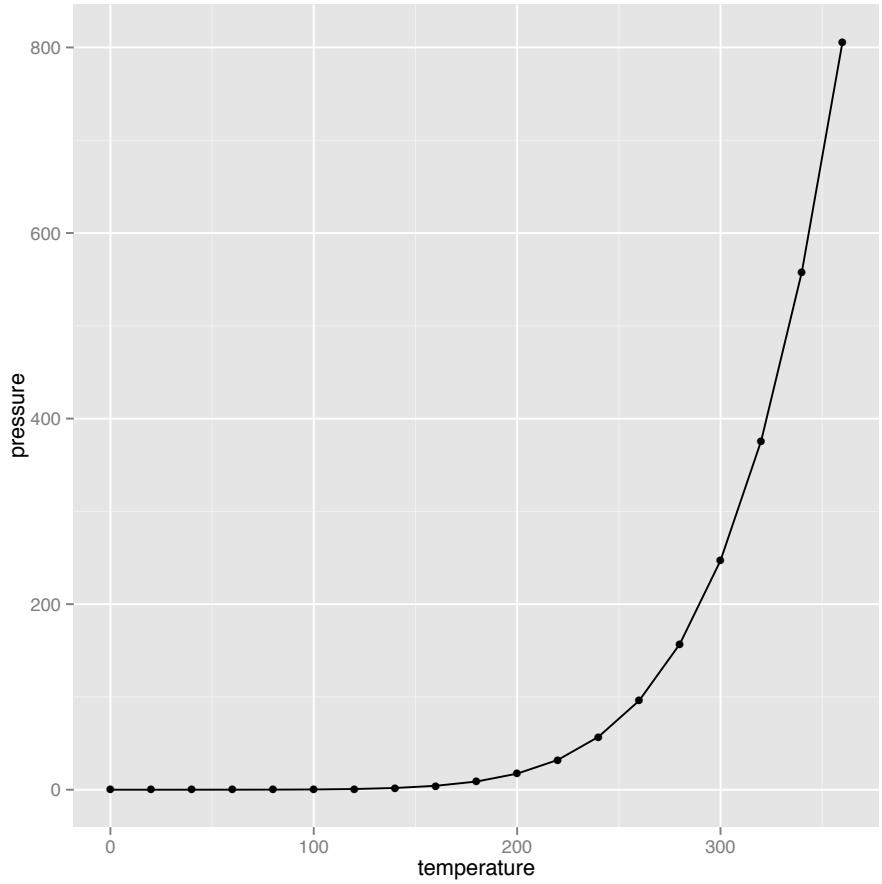


图 2-1. 基本图形函数绘制散点图

```
library(ggplot2)
ggplot(data = mtcars, aes(x = wt, y = mpg)) + geom_point()
```

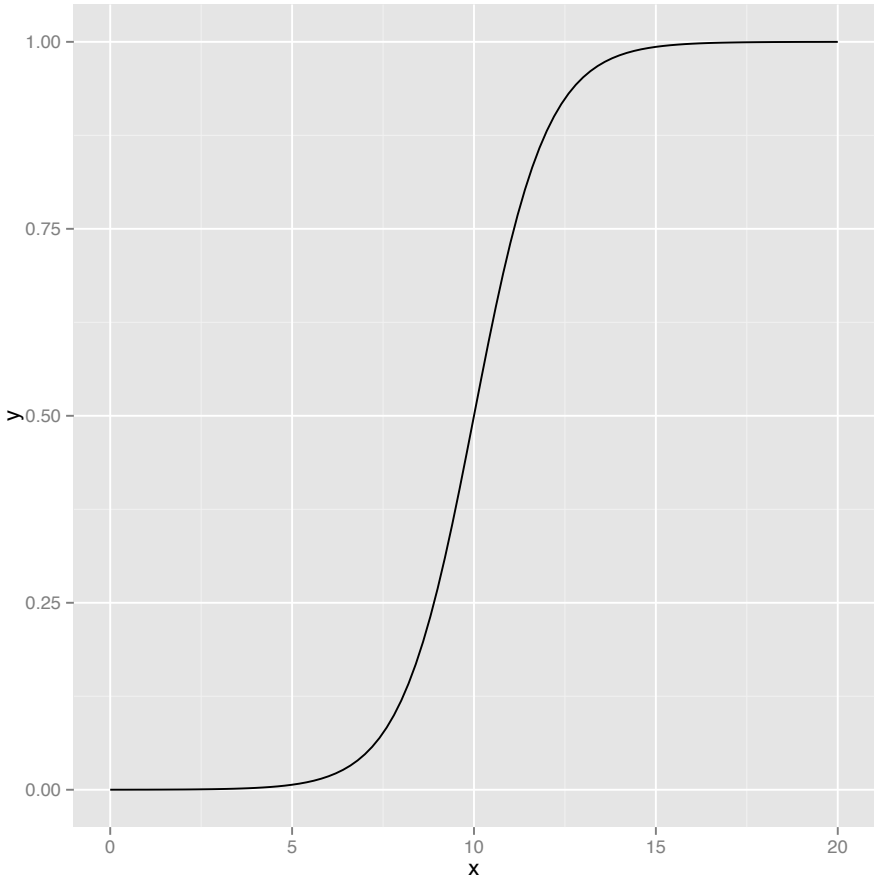



```
ggplot(data = pressure, aes(x = temperature, y = pressure)) + geom_line() +
    geom_point()
```



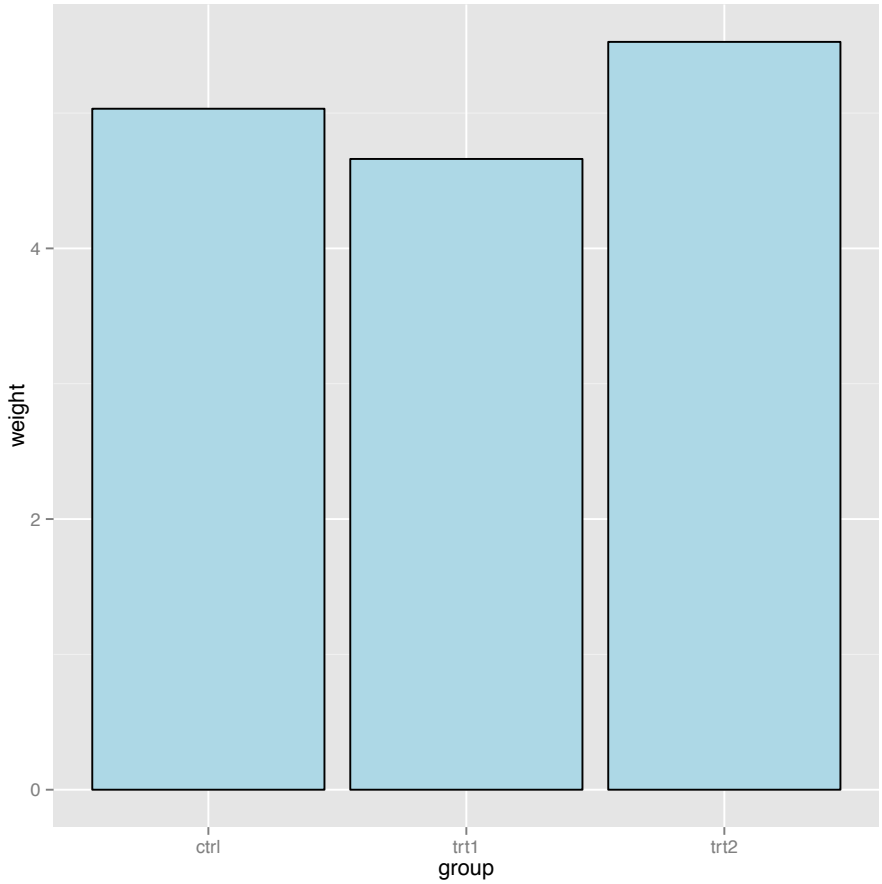
3.2　创建线图

```
myfun <- function(xvar) {
    1/(1 + exp(-xvar + 10))
}
ggplot(data = data.frame(x = c(0, 20)), aes(x = x)) + stat_function(fun = myfun,
    geom = "line")
```

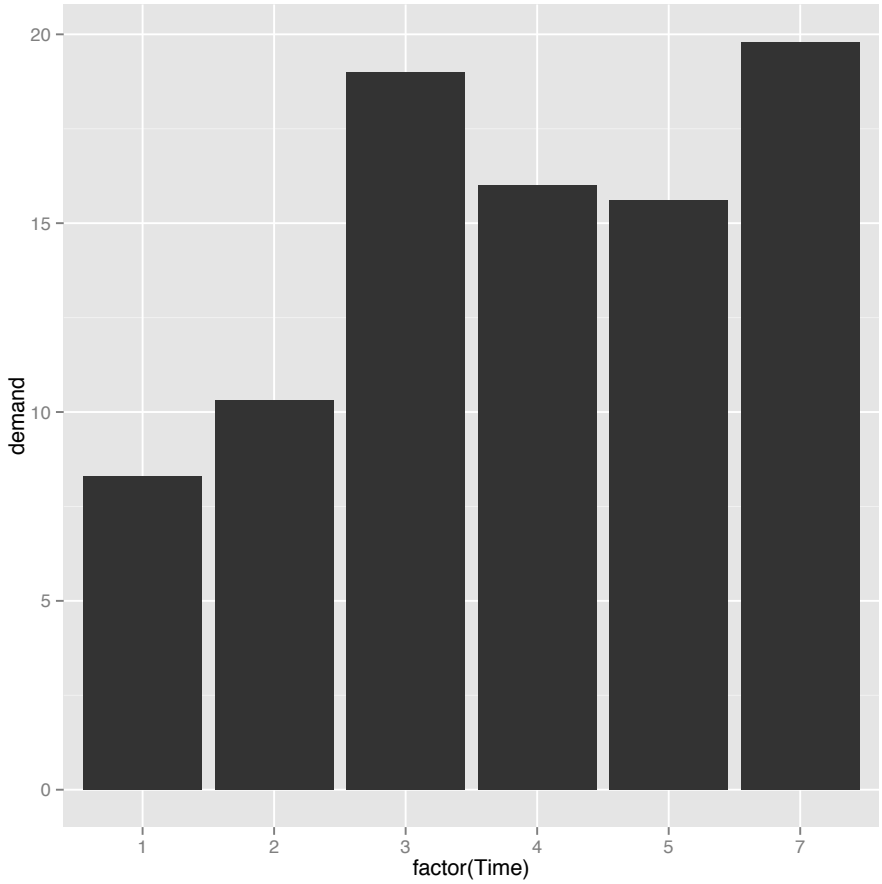


3.3　创建条形图

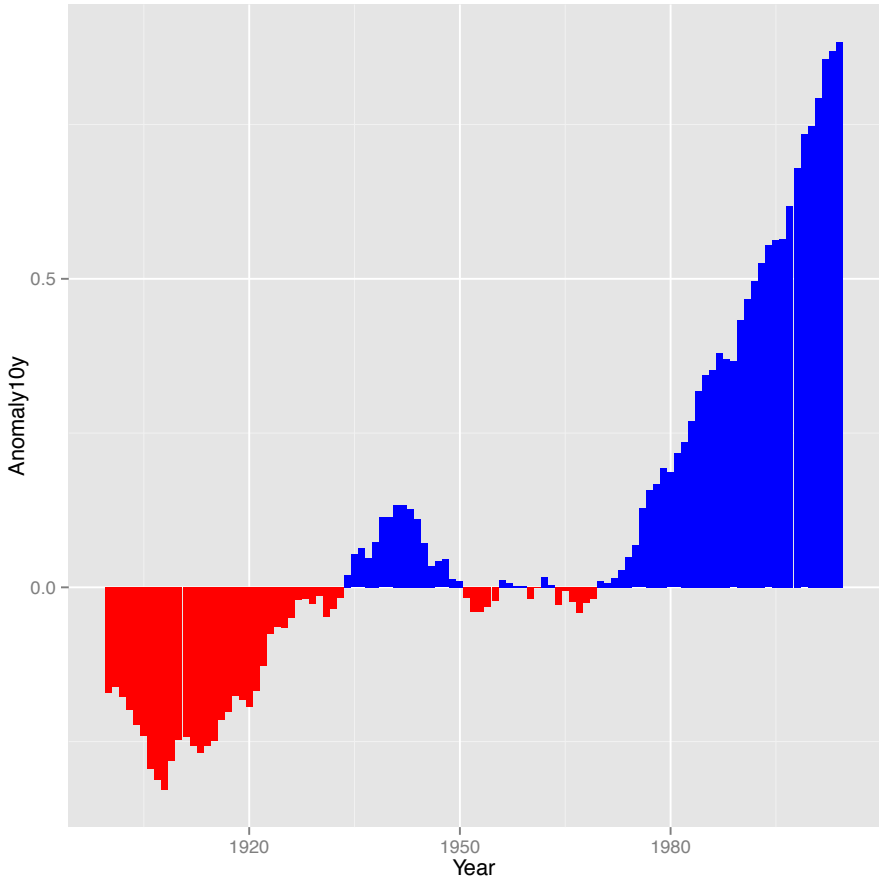
```
library(ggplot2)
library(gcookbook)
ggplot(data = pg_mean, aes(x = group, y = weight)) + geom_bar(stat = "identity",
    fill = "lightblue", color = "black")
```




```
library(ggplot2)
library(gcookbook)
ggplot(data = BOD, aes(x = factor(Time), y = demand)) + geom_bar(stat = "identity")
```

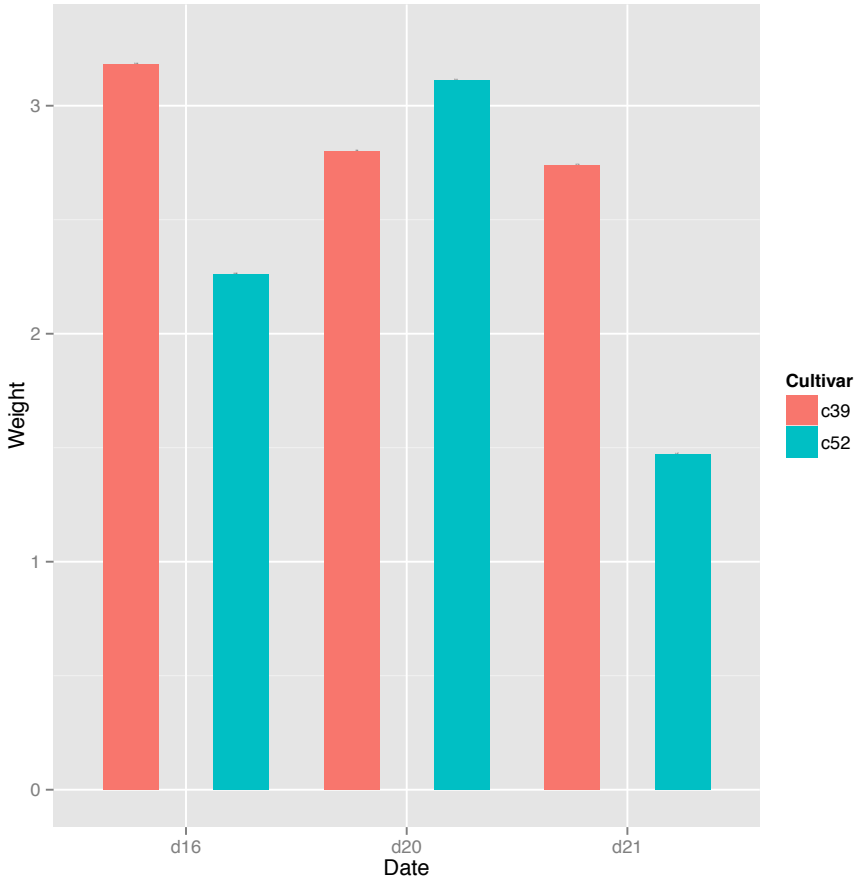



```
library(gcookbook)
csub <- subset(climate, Source == "Berkeley" & Year >= 1900)
csub$pos <- csub$Anomaly10y >= 0
ggplot(csub, aes(x = Year, y = Anomaly10y, fill = pos)) + geom_bar(stat = "identity") +
    scale_fill_manual(values = c("red", "blue"), guide = F)

## Warning:  Stacking not well defined when ymin != 0
```



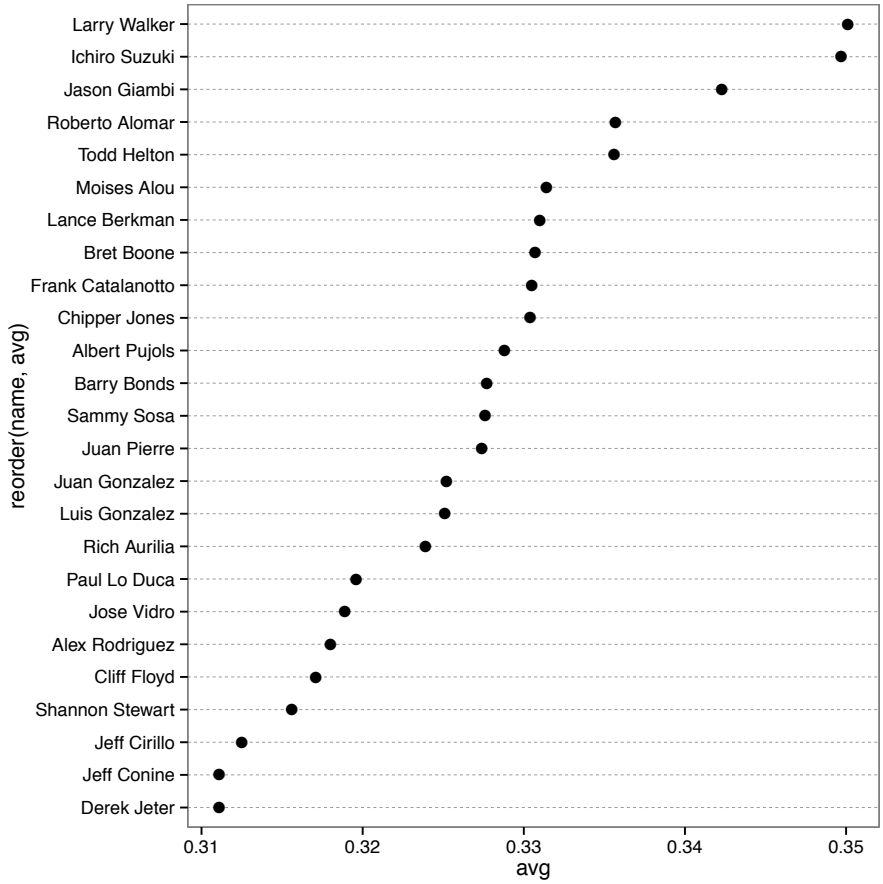
在柱状图上面加标记

```
library(gcookbook)
library(ggplot2)
ggplot(data = cabbage_exp, aes(x = Date, y = Weight, fill = Cultivar)) + geom_bar(stat
    position = position_dodge(1), width = 0.5) + geom_text(aes(label = Weight),
    vjust = -0.2, position = position_dodge(0.9), size = 0.3) + ylim(0, max(cabbage_exp
    0.1)

## ymax not defined:  adjusting position using y instead
```



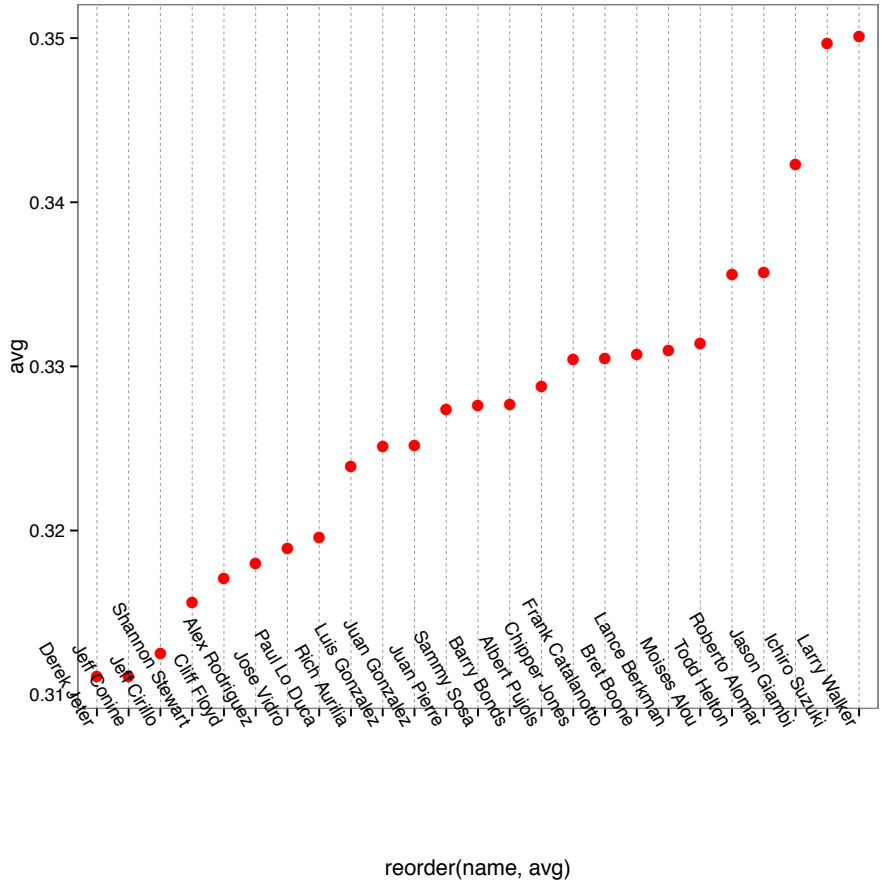
创建点图

```
library(gcookbook)
library(ggplot2)
tophit <- tophitters2001[1:25, ]
ggplot(tophit, aes(x = avg, y = reorder(name, avg))) + geom_point(size = 3) +
    theme_bw() + theme(panel.grid.major.x = element_blank(), panel.grid.minor.x = eleme
    panel.grid.major.y = element_line(colour = "grey60", linetype = "dashed"))
```



反转方向

```
library(gcookbook)
library(ggplot2)
tophit <- tophitters2001[1:25, ]
ggplot(tophit, aes(x = reorder(name, avg), y = avg)) + geom_point(size = 3,
    colour = "red") + theme_bw() + theme(axis.text.x = element_text(angle = -60,
    hjust = 1), panel.grid.major.y = element_blank(), panel.grid.minor.y = element_blan
    panel.grid.major.x = element_line(colour = "grey60", linetype = "dashed"))
```



3.4　创建柱状图

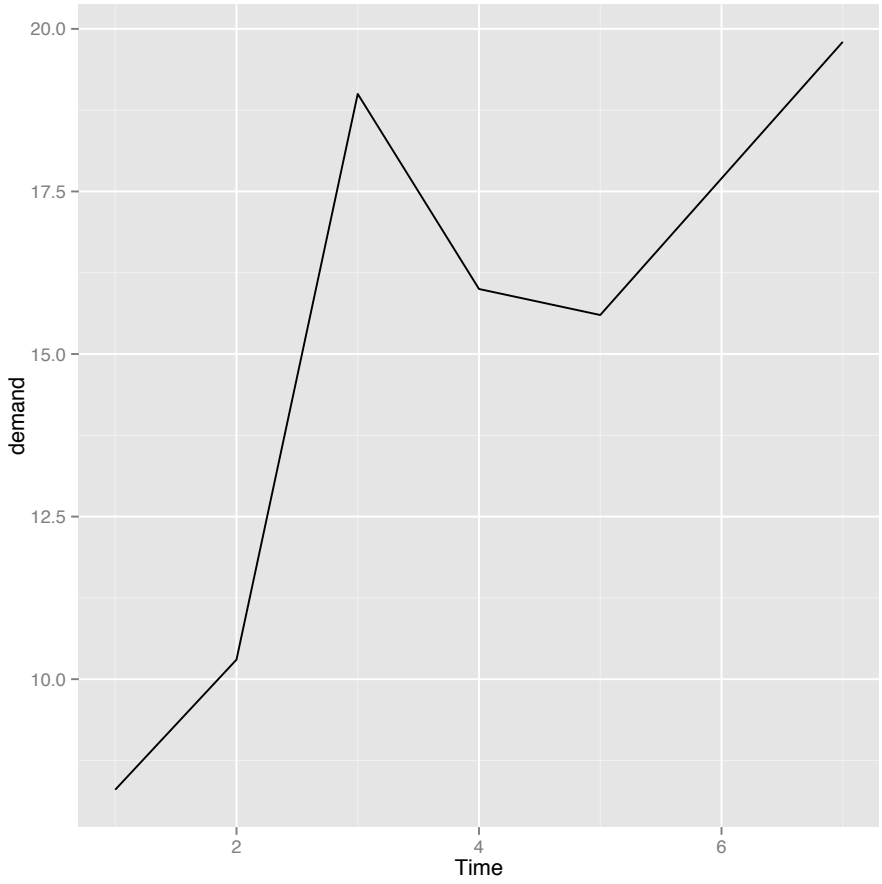
3.5　创建盒型图

3.6　绘制函数曲线

第四章　线形图

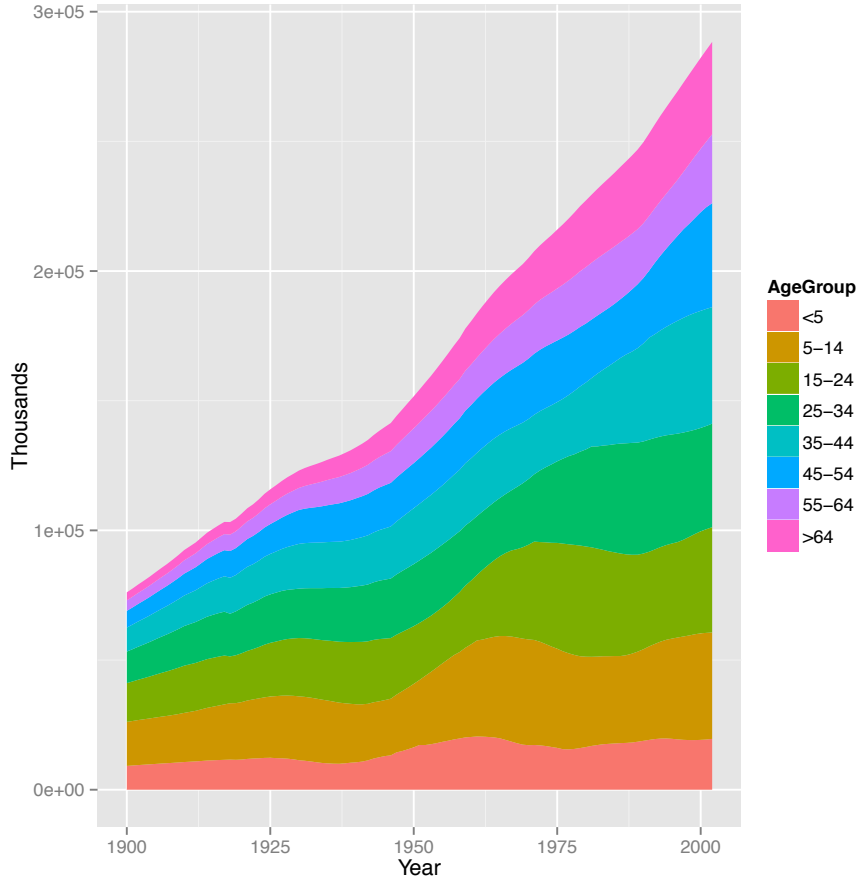
4.1　绘制基本线形图

```
library(ggplot2)
library(gcookbook)
ggplot(data = BOD, aes(x = Time, y = demand)) + geom_line()
```



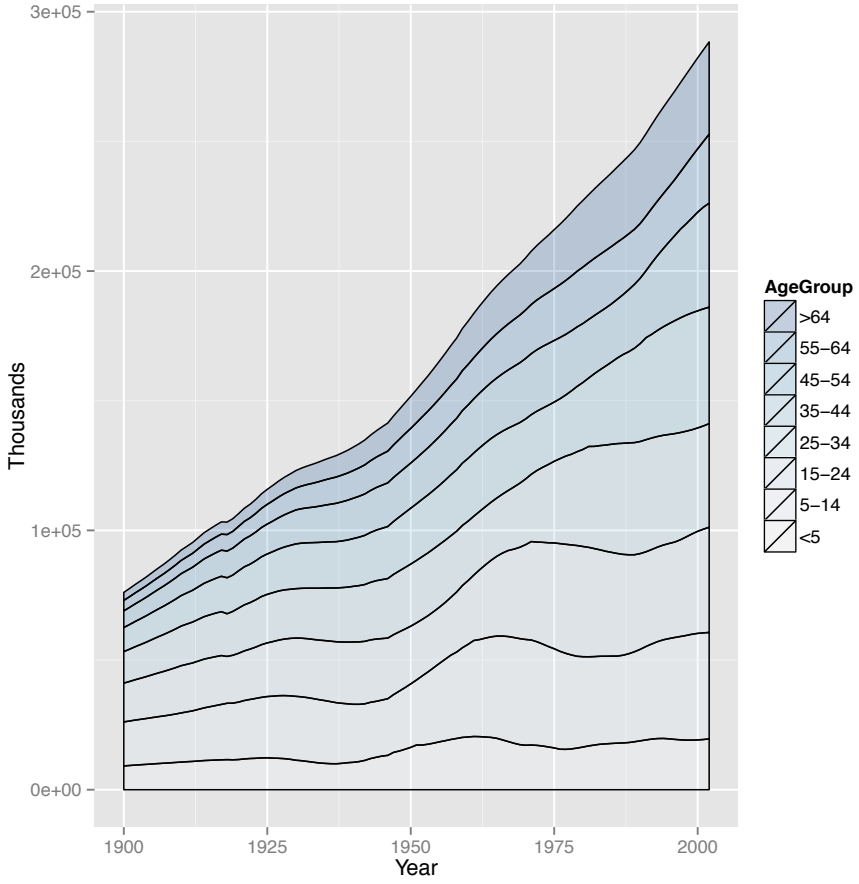
堆积图:

```
library(ggplot2)
library(gcookbook)
ggplot(data = uspopage, aes(x = Year, y = Thousands, fill = AgeGroup)) + geom_area()
```



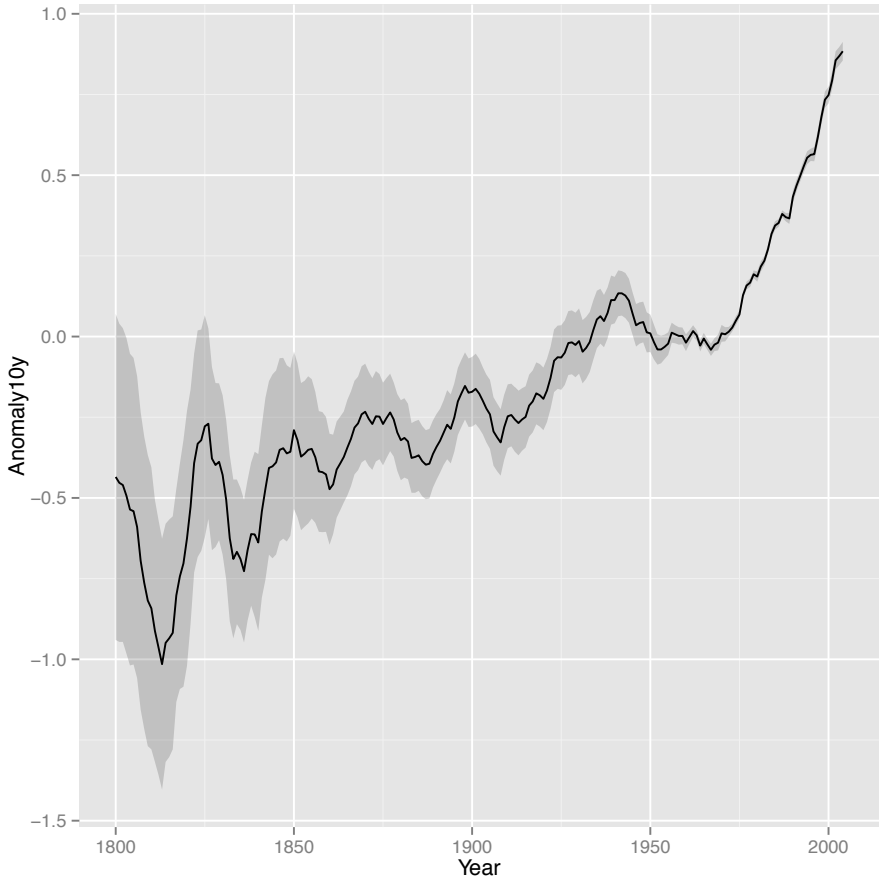
修改颜色配置:

```
library(ggplot2)
library(gcookbook)
ggplot(data = uspopage, aes(x = Year, y = Thousands, fill = AgeGroup)) + geom_area(colo
    size = 0.4, alpha = 0.2) + scale_fill_brewer(palette = "Blues", breaks = rev(levels
```



添加置信区间:

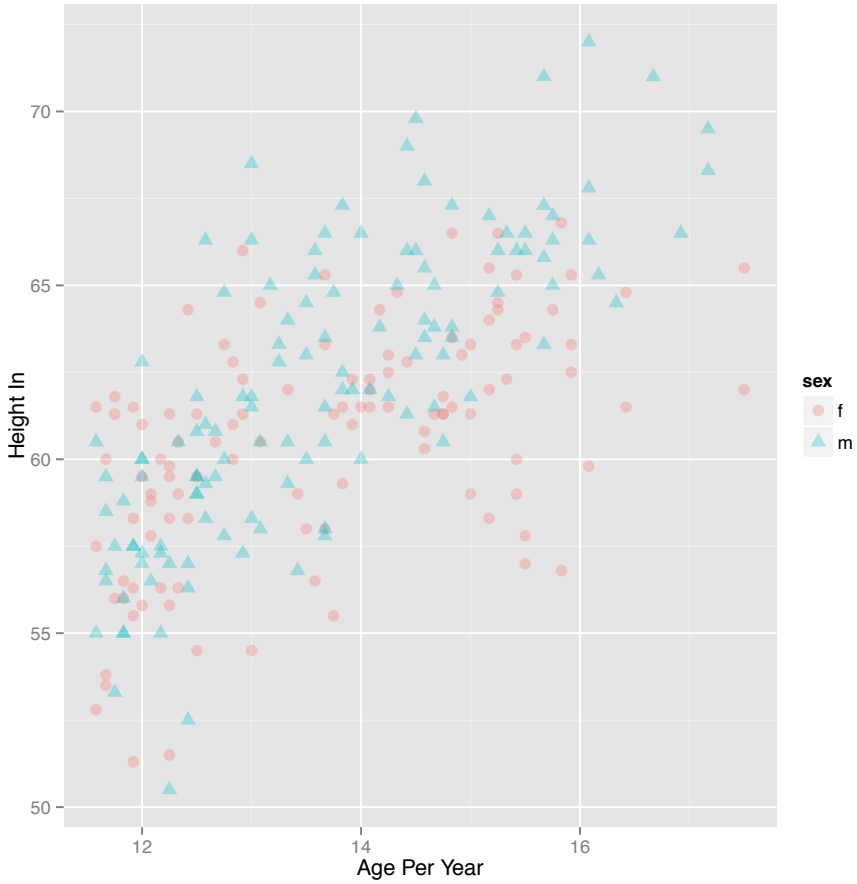
```
library(ggplot2)
library(gcookbook)
clim <- subset(climate, Source == "Berkeley", select = c("Year", "Anomaly10y",
    "Unc10y"))
ggplot(clim, aes(x = Year, y = Anomaly10y)) + geom_ribbon(aes(ymin = Anomaly10y -
    Unc10y, ymax = Anomaly10y + Unc10y), alpha = 0.2) + geom_line()
```


1.0
0.5
0.0
−0.5
−1.0
−1.5
Anomaly10y
1800
1850
1900
1950
2000
Year

第五章　散点图

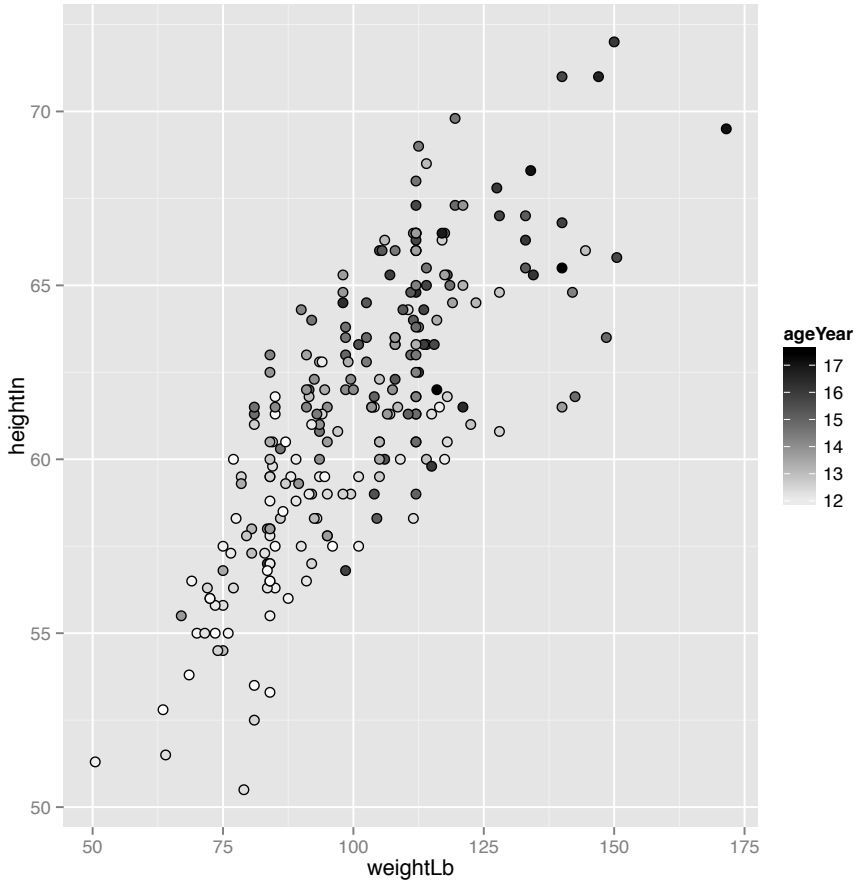
散点图:

```
library(ggplot2)
library(gcookbook)
ggplot(heightweight, aes(x = ageYear, y = heightIn, colour = sex, shape = sex)) +
    geom_point(size = 3, alpha = 0.3) + xlab("Age Per Year") + ylab("Height In")
```



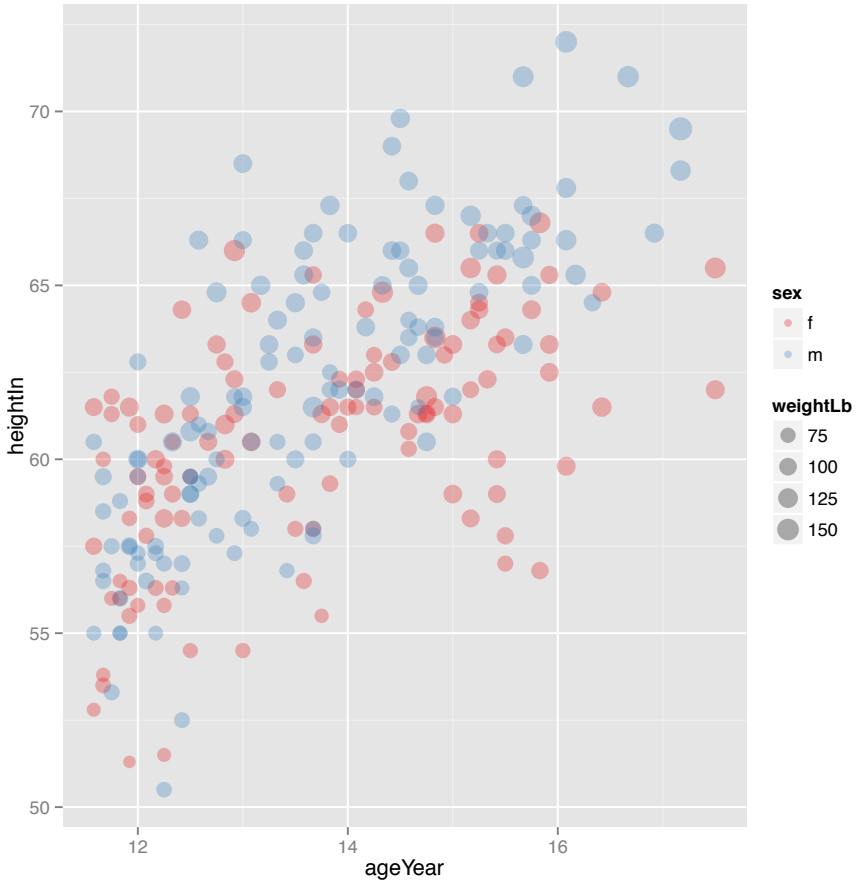
添加梯度:

```
library(ggplot2)
library(gcookbook)
ggplot(heightweight, aes(x = weightLb, y = heightIn, fill = ageYear)) + geom_point(shap
    size = 2.5) + scale_fill_gradient(low = "white", high = "black", breaks = 12:17)
```



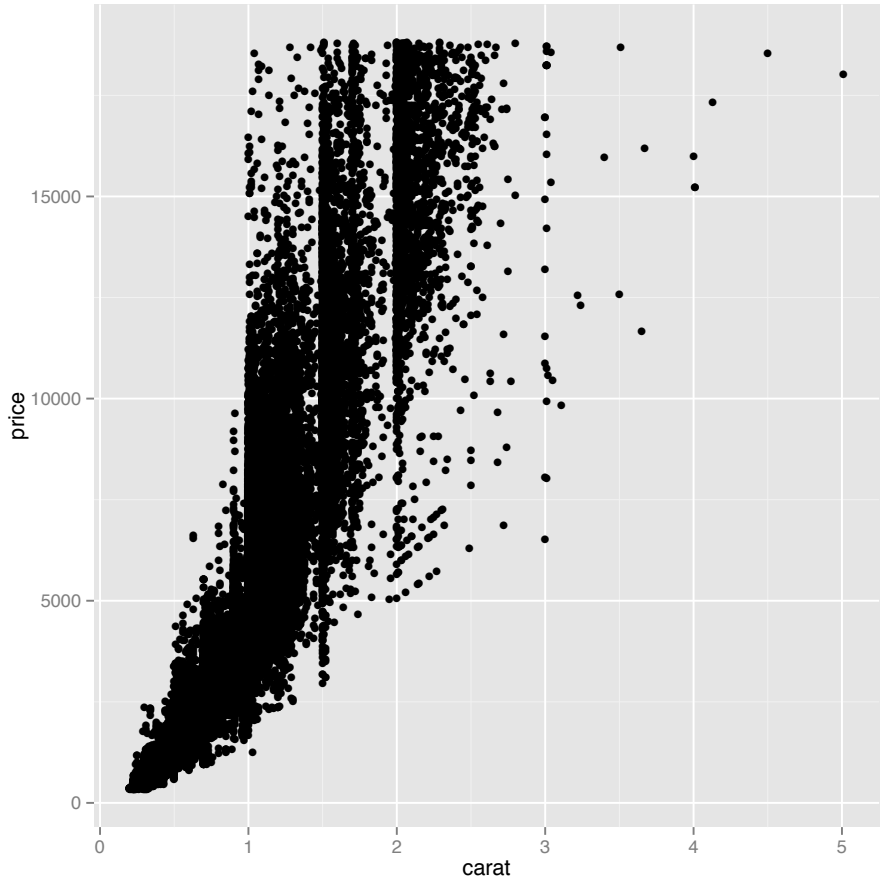
使用 area：

```
library(ggplot2)
library(gcookbook)
ggplot(heightweight, aes(x = ageYear, y = heightIn, size = weightLb, colour = sex)) +
    geom_point(alpha = 0.3) + scale_size_area() + scale_color_brewer(palette = "Set1")
```

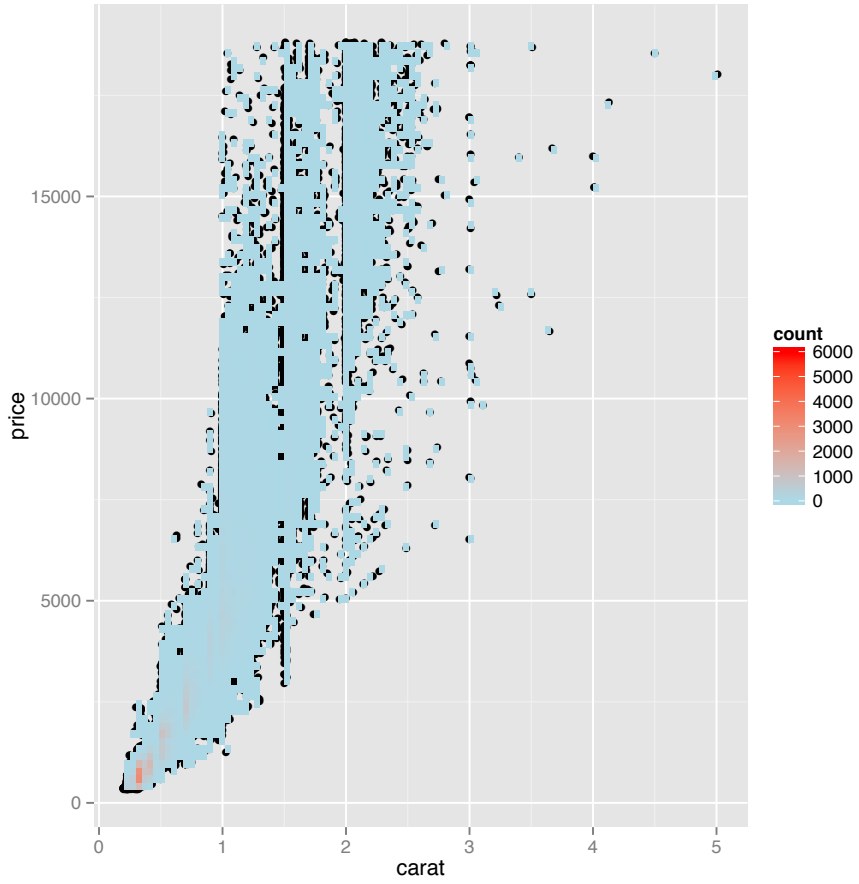


使用 stat_bin2d 避免过多点的 overlap：

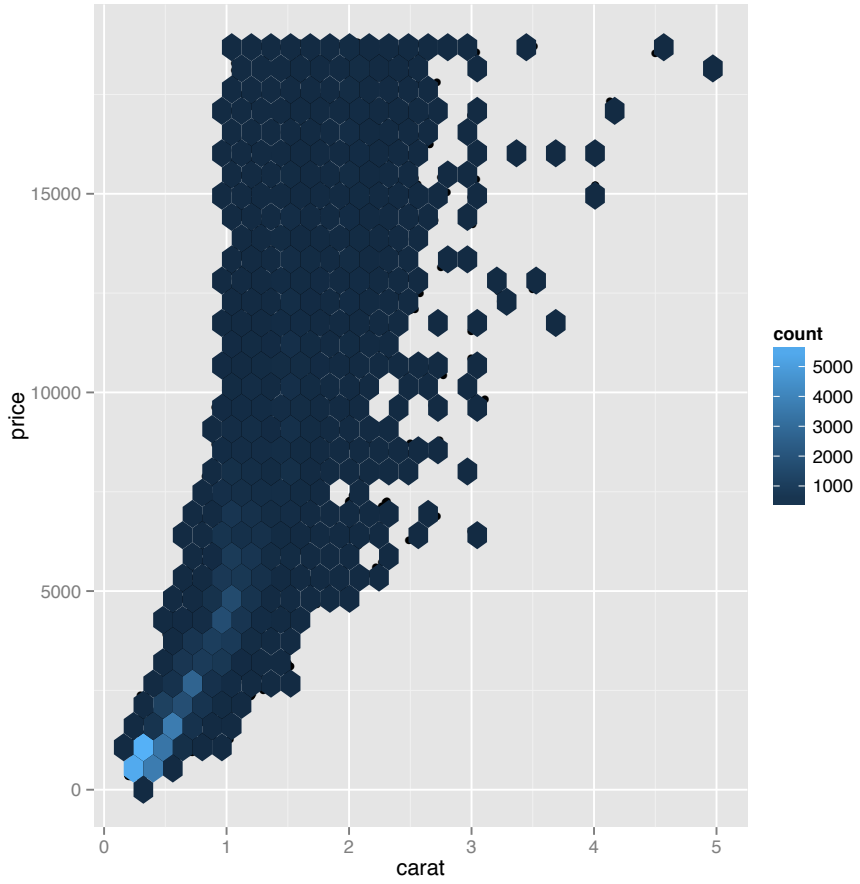
```
library(ggplot2)
library(gcookbook)
a <- ggplot(diamonds, aes(x = carat, y = price)) + geom_point()
a
```




```
b <- a + stat_bin2d(bins = 100) + scale_fill_gradient(low = "lightblue", high = "red",
    limits = c(0, 6000))
b
```

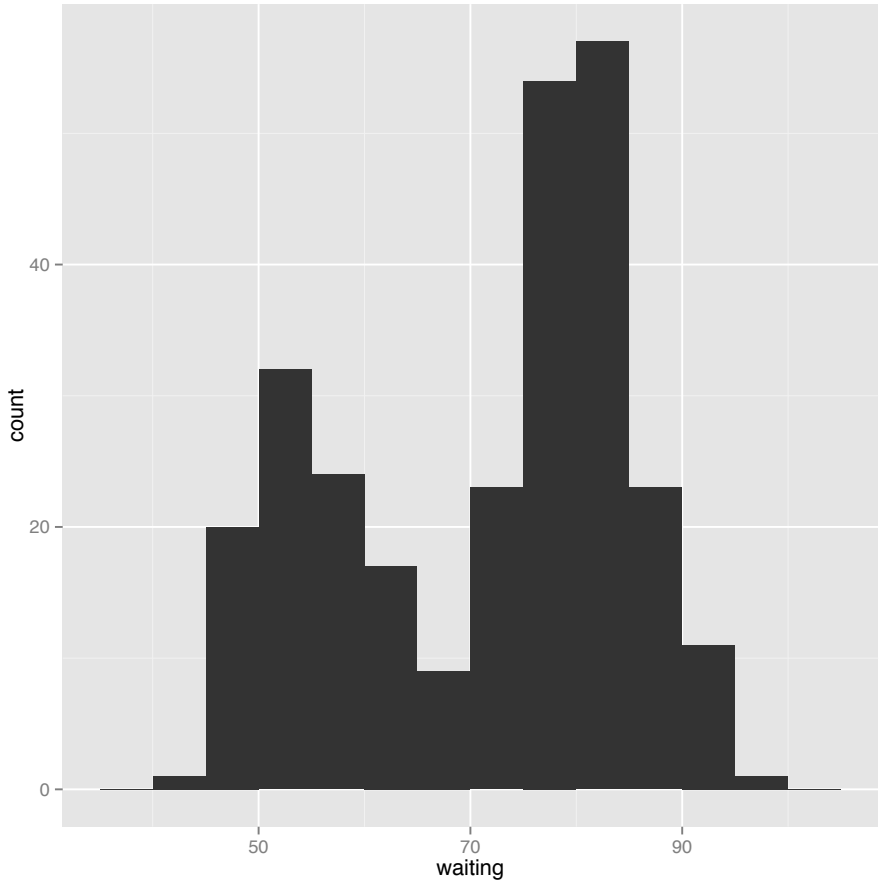



```
c <- a + stat_binhex()
c
```


price
15000
10000
5000
0
0
1
2
3
4
5
carat
count
5000
4000
3000
2000
1000

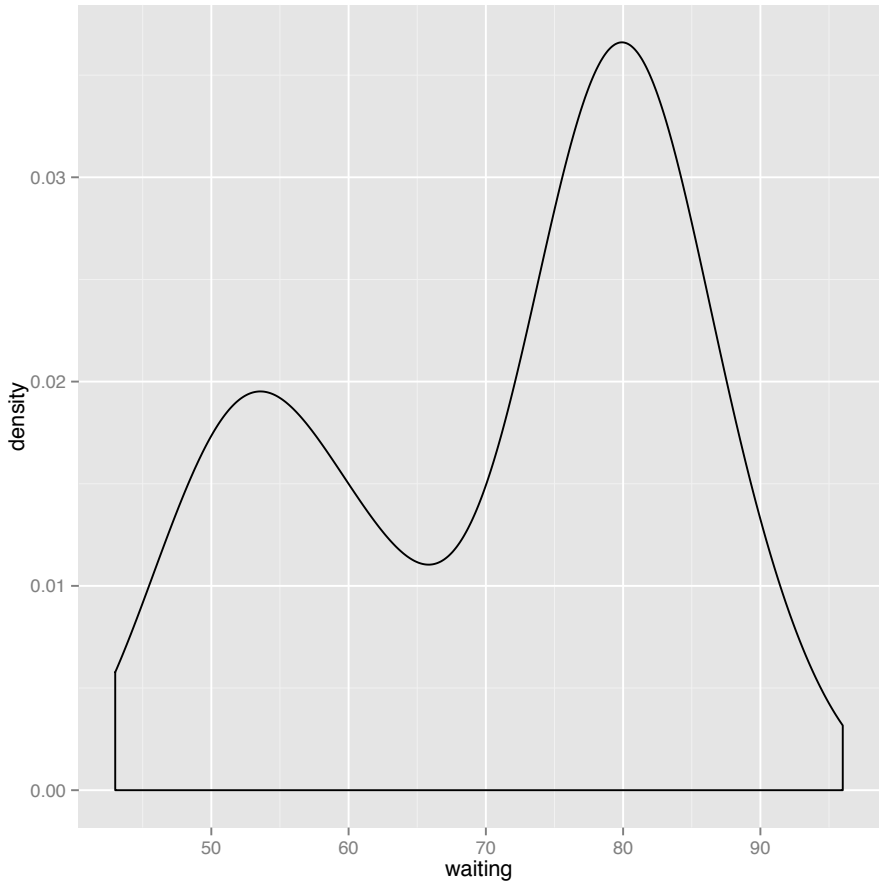
第六章　描述性数据分布

```
library(ggplot2)
library(gcookbook)
ggplot(faithful, aes(x = waiting)) + geom_histogram(binwidth = 5)
```

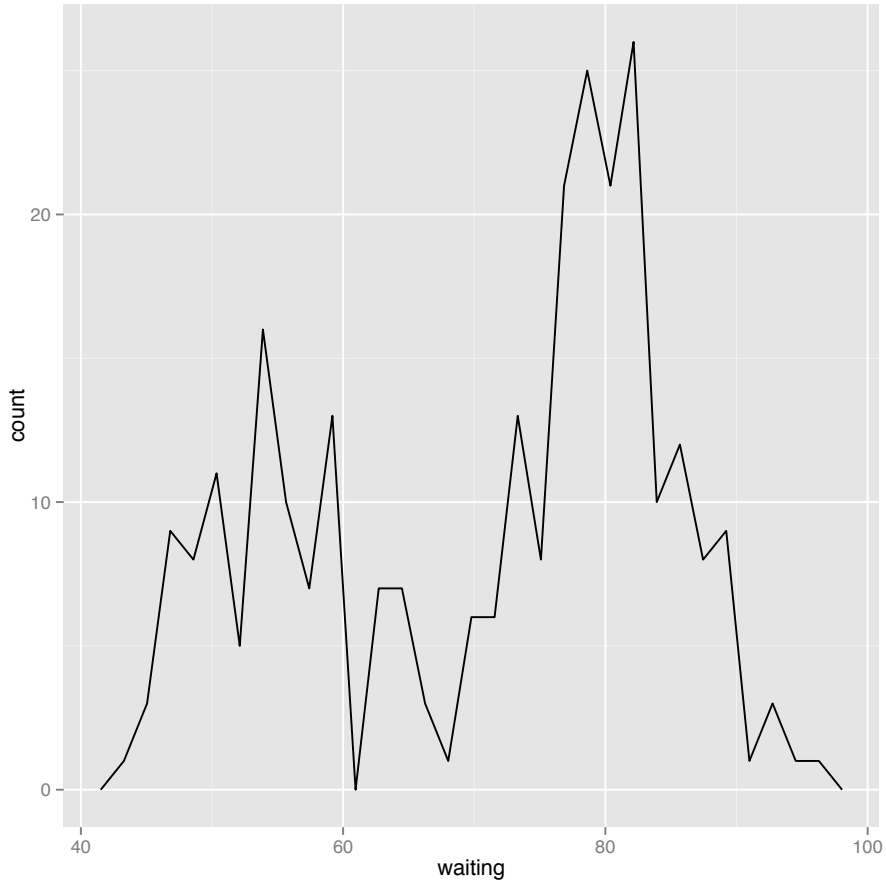


density line 例子:

```
library(ggplot2)
library(gcookbook)
ggplot(faithful, aes(x = waiting)) + geom_density()
```

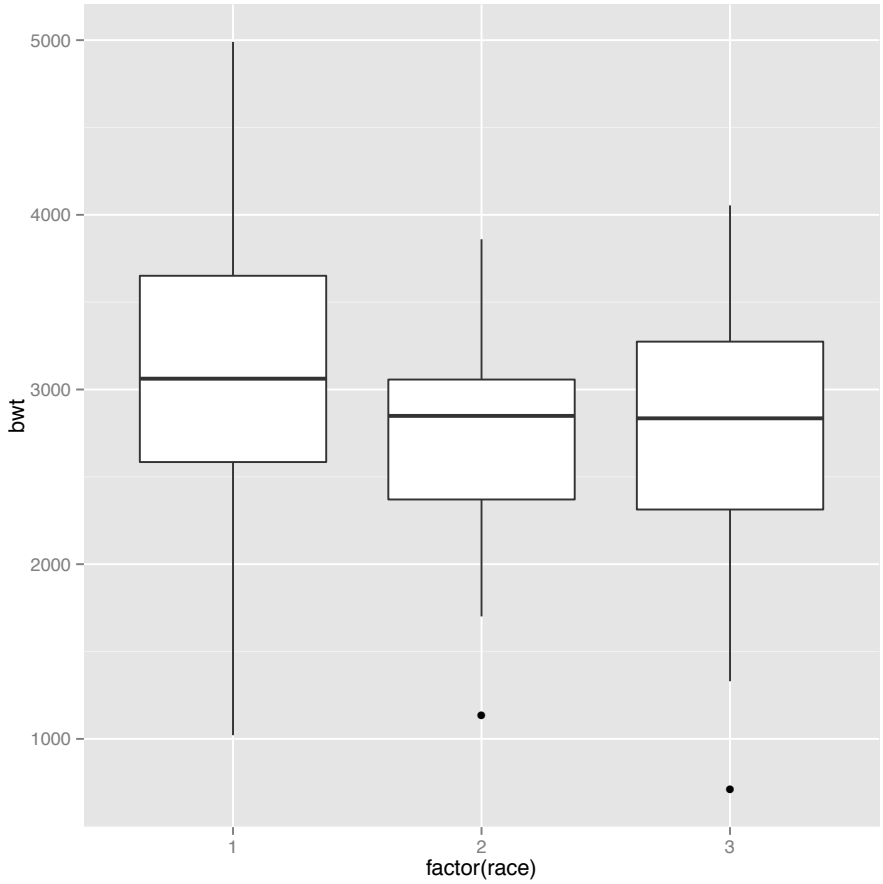



```
b <- ggplot(faithful, aes(x = waiting)) + geom_freqpoly()
b

## stat_bin:  binwidth defaulted to range/30.  Use 'binwidth = x'
to adjust this.
```

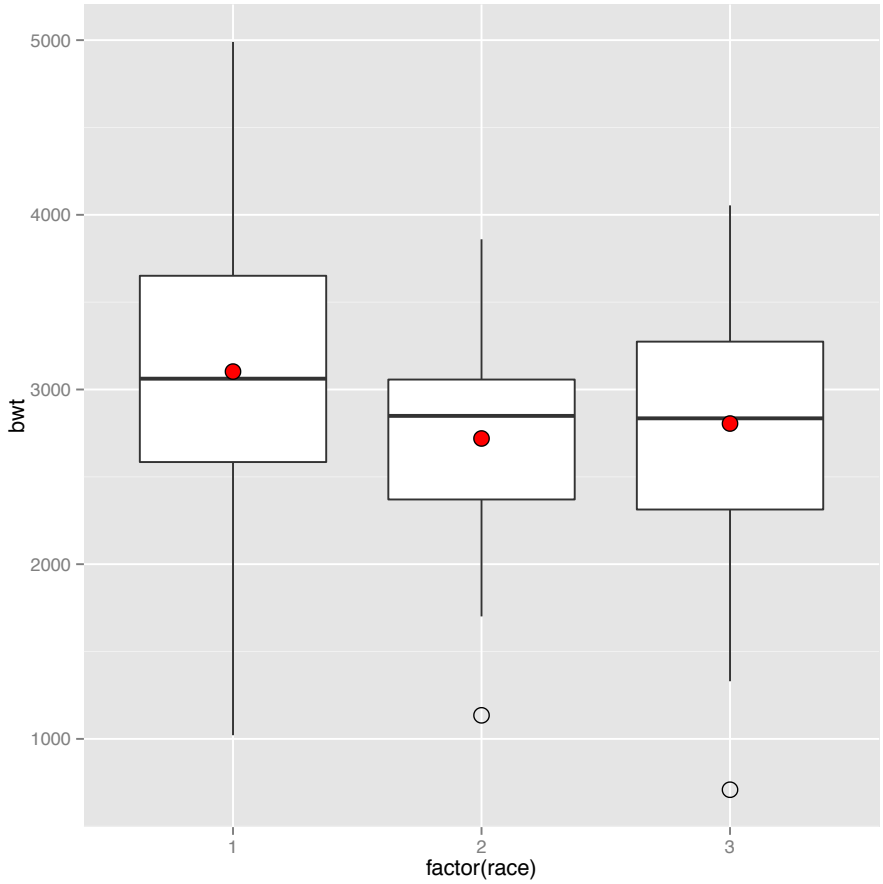


boxplot 例子：

```
library(MASS)
library(ggplot2)
library(gcookbook)
ggplot(birthwt, aes(x = factor(race), y = bwt)) + geom_boxplot()
```

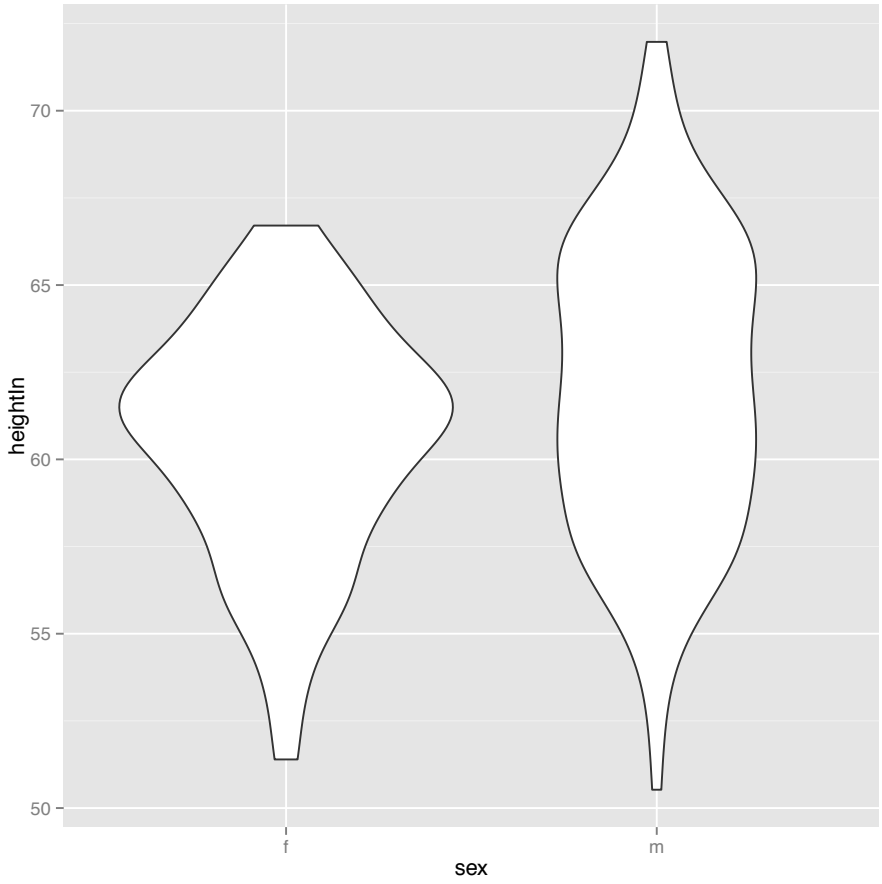



```
a <- ggplot(birthwt, aes(x = factor(race), y = bwt)) + geom_boxplot(outlier.shape = 21,
    outlier.size = 4) + stat_summary(fun.y = "mean", geom = "point", shape = 21,
    size = 4, fill = "red")
a
```



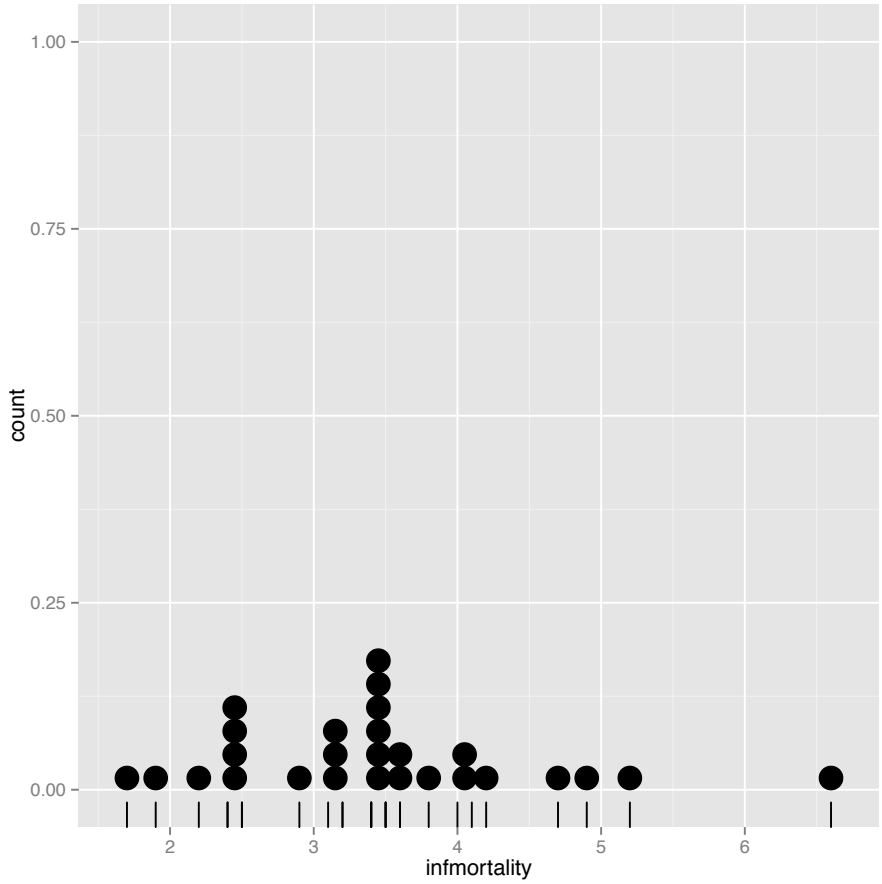
violin 例子：

```
library(ggplot2)
library(gcookbook)
ggplot(heightweight, aes(x = sex, y = heightIn)) + geom_violin()
```



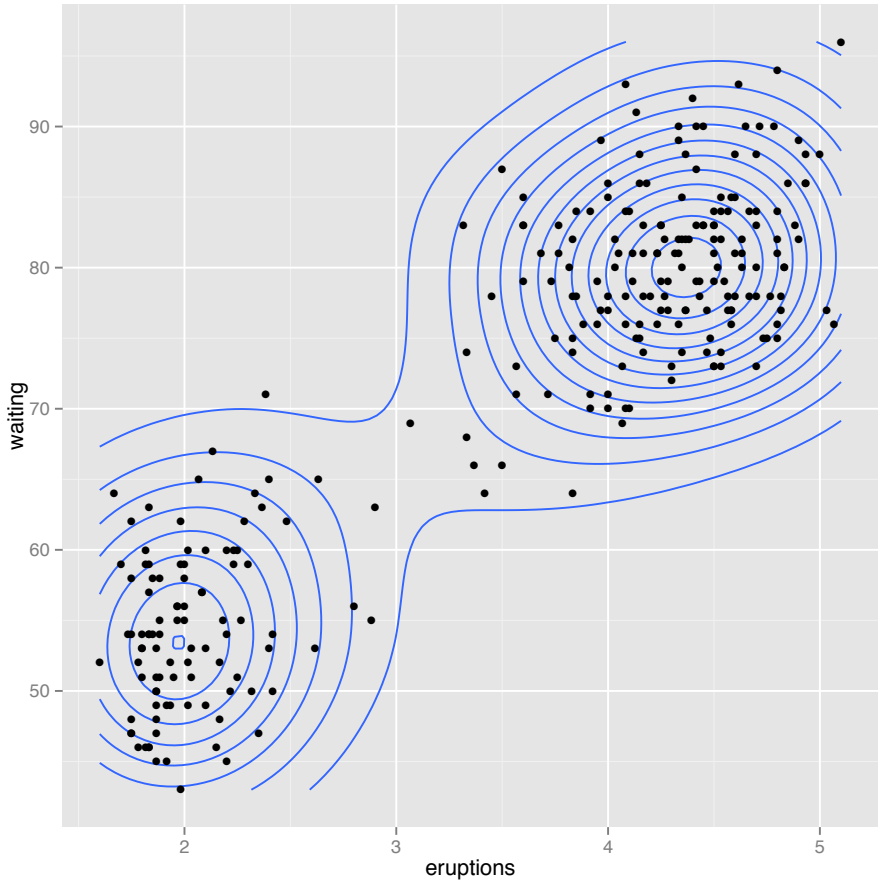
dot 例子：

```
library(ggplot2)
library(gcookbook)
countries2009 <- subset(countries, Year == 2009 & healthexp > 2000)
p <- ggplot(countries2009, aes(x = infmortality))
p + geom_dotplot() + geom_rug()

## stat_bindot:  binwidth defaulted to range/30.  Use 'binwidth
= x' to adjust this.
```



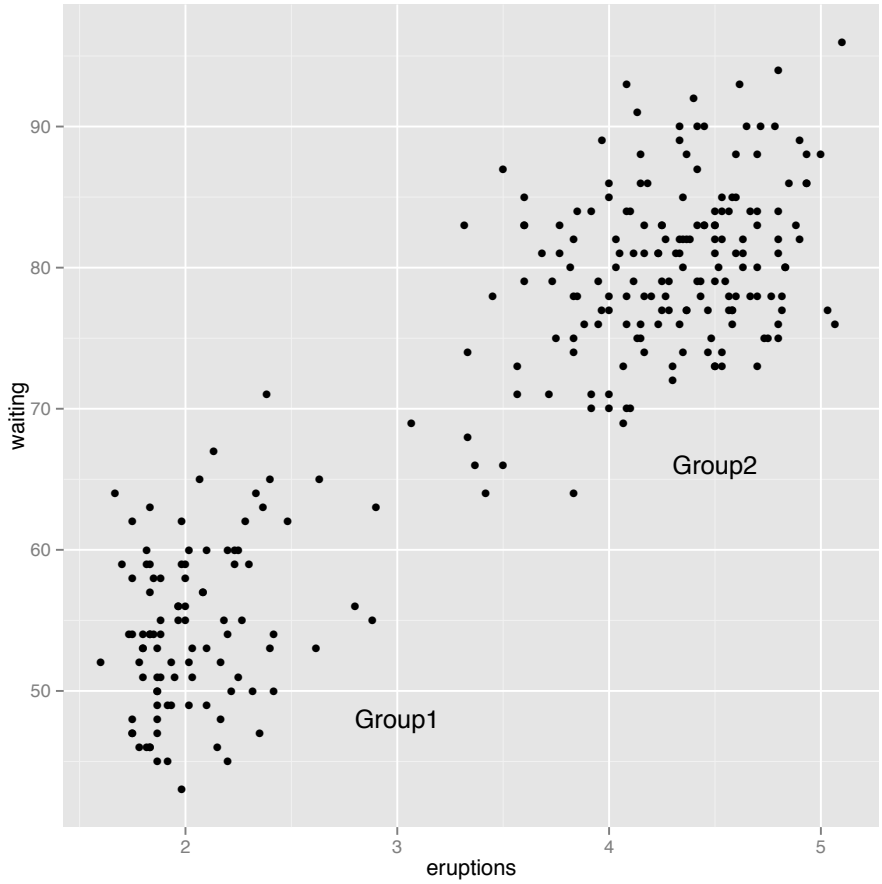
density 例子:

```
library(ggplot2)
library(gcookbook)
a <- ggplot(faithful, aes(x = eruptions, y = waiting)) + stat_density2d() +
    geom_point()
a
```


90
80
70
60
50
waiting
2
3
4
5
eruptions

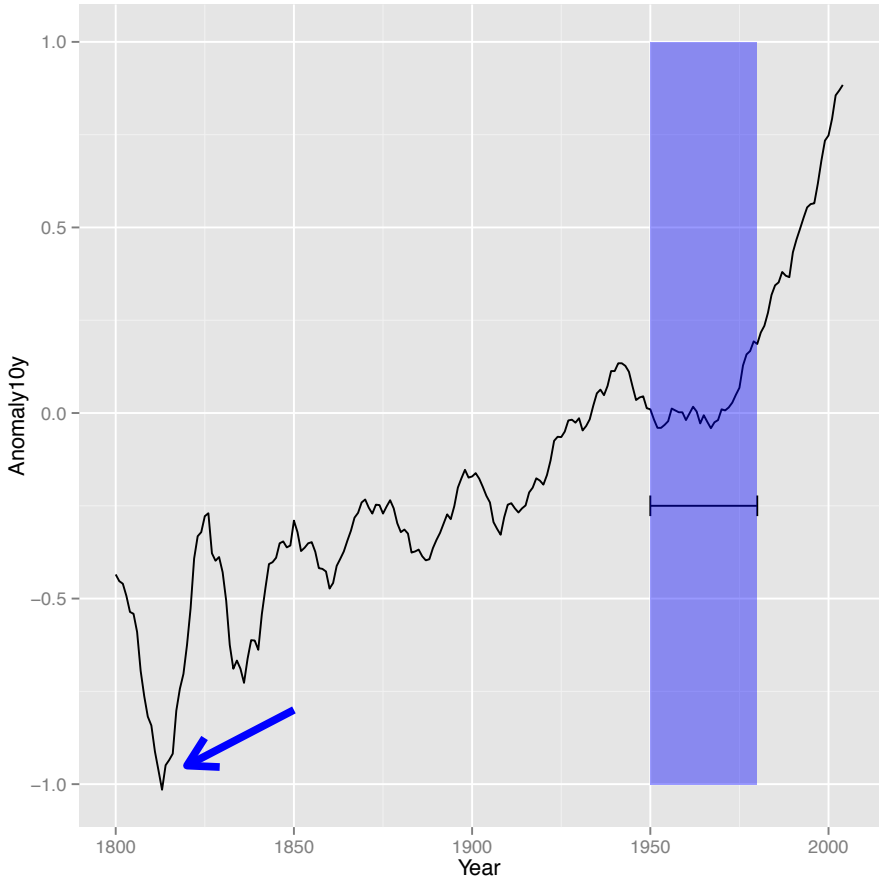
第七章　注释

```
library(ggplot2)
library(gcookbook)
p <- ggplot(data = faithful, aes(x = eruptions, y = waiting)) + geom_point()
p + annotate("text", x = 3, y = 48, label = "Group1") + annotate("text", x = 4.5,
    y = 66, label = "Group2")
```



箭头

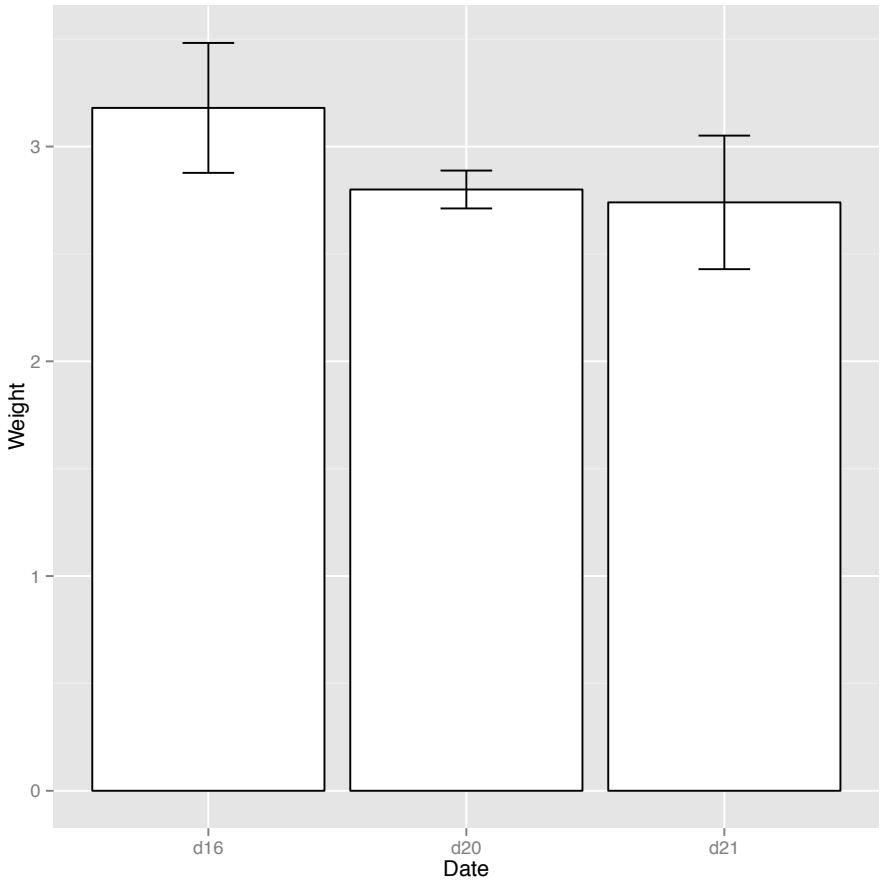
```
library(ggplot2)
library(gcookbook)
library(grid)
p <- ggplot(subset(climate, Source == "Berkeley"), aes(x = Year, y = Anomaly10y)) +
    geom_line()
p + annotate("segment", x = 1950, xend = 1980, y = -0.25, yend = -0.25, arrow = arrow(e
    angle = 90, length = unit(0.2, "cm"))) + annotate("segment", x = 1850, xend = 1820,
    y = -0.8, yend = -0.95, colour = "blue", size = 2, arrow = arrow()) + annotate("rec
    xmin = 1950, xmax = 1980, ymin = -1, ymax = 1, fill = "blue", alpha = 0.4)
```



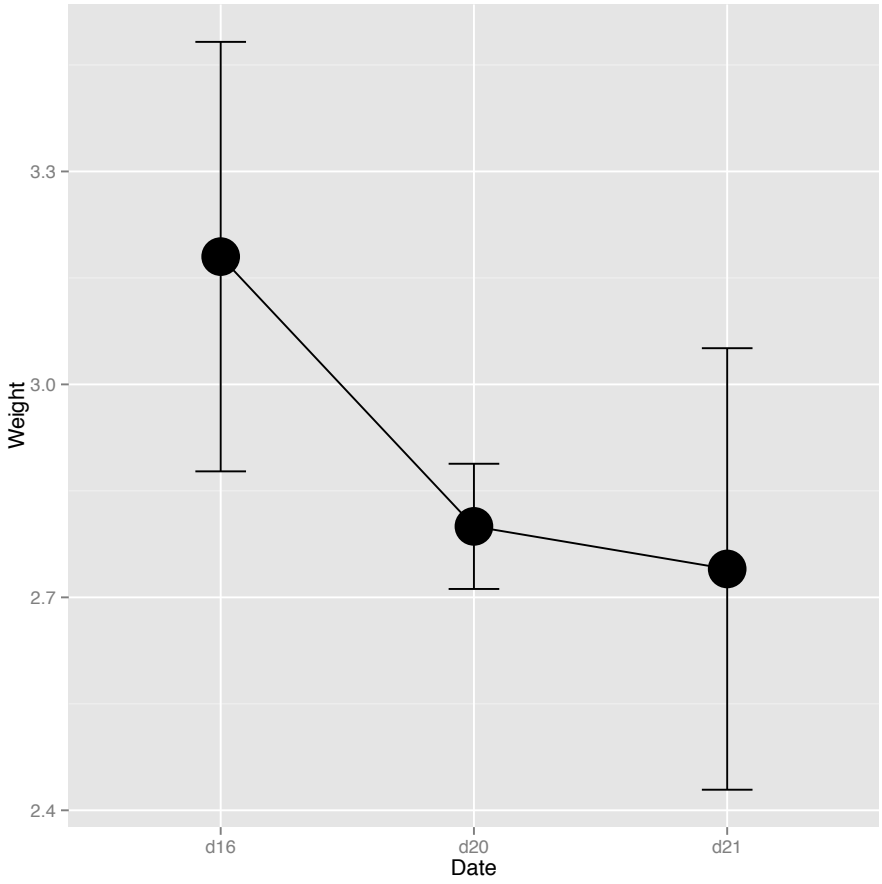
误差线:

```
library(ggplot2)
library(gcookbook)
p <- ggplot(subset(cabbage_exp, Cultivar == "c39"), aes(x = Date, y = Weight))
a <- p + geom_bar(fill = "white", color = "black") + geom_errorbar(aes(ymin = Weight -
    se, ymax = Weight + se), width = 0.2)
a

## Mapping a variable to y and also using stat="bin".
##  With stat="bin", it will attempt to set the y value to the count
of cases in each group.
##  This can result in unexpected behavior and will not be allowed
```

```
in a future version of ggplot2.
##  If you want y to represent counts of cases, use stat="bin" and
don't map a variable to y.
##  If you want y to represent values in the data, use stat="identity".
##  See ?geom_bar for examples.  (Deprecated; last used in version
0.9.2)
```



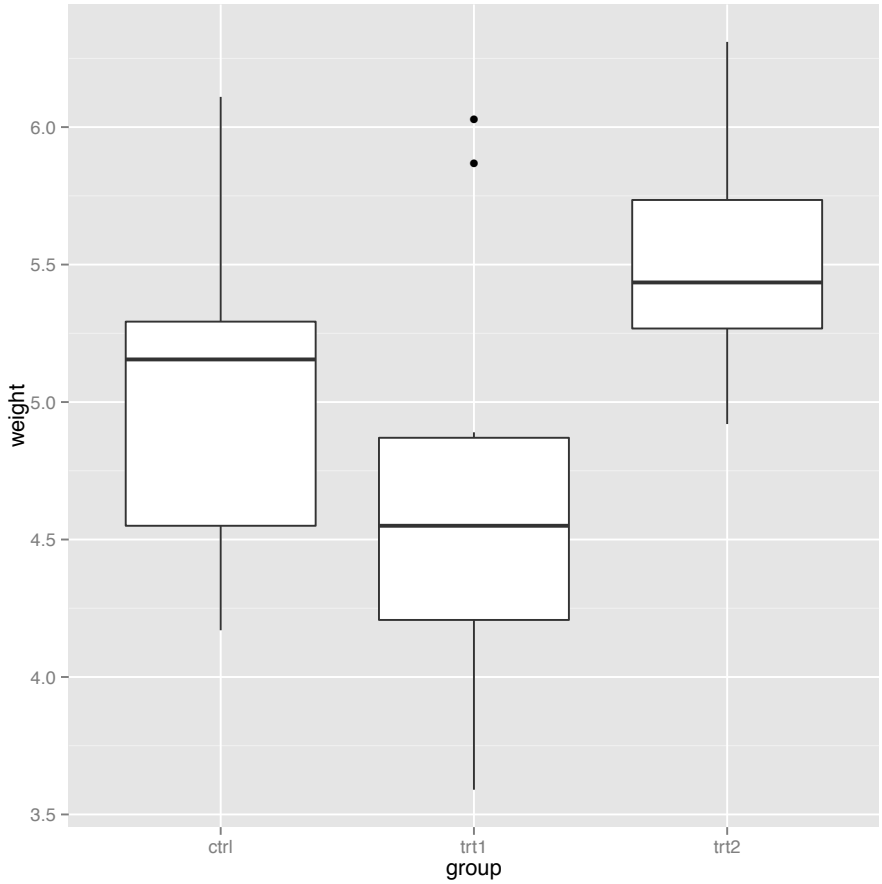

```
b <- p + geom_line(aes(group = 1)) + geom_point(size = 10) + geom_errorbar(aes(ymin = W
    se, ymax = Weight + se), width = 0.2)
b
```


3.3
3.0
2.7
2.4
Weight
d16
d20
d21
Date

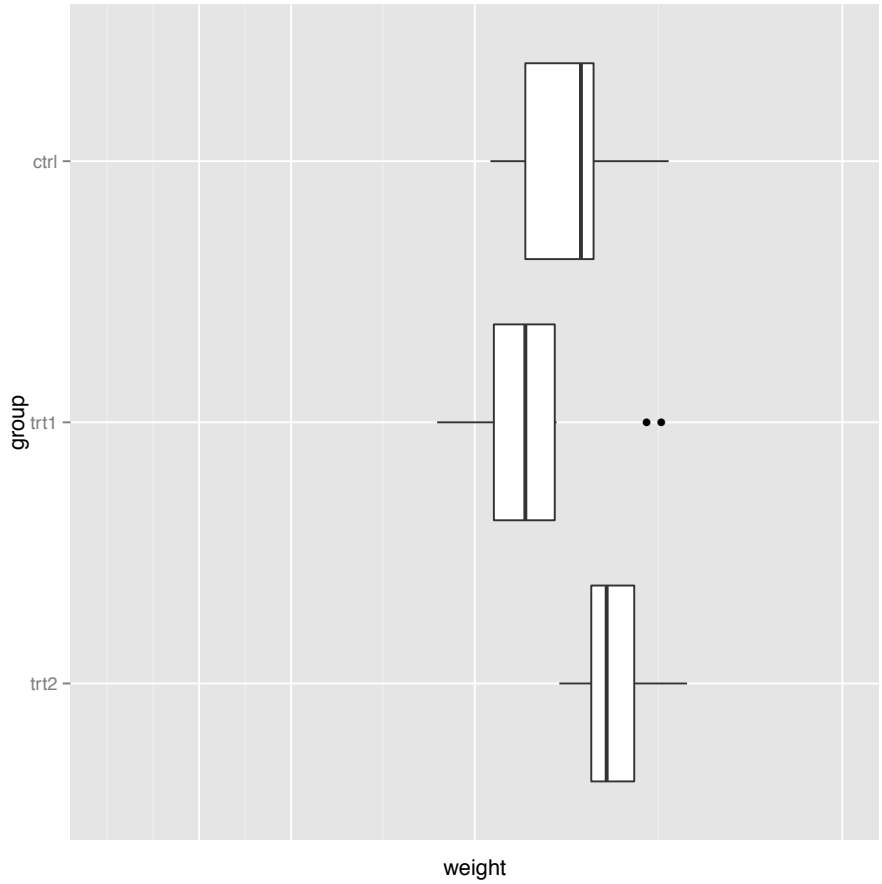
第八章　坐标轴

调整坐标刻度

```
library(ggplot2)
library(gcookbook)
p <- ggplot(data = PlantGrowth, aes(x = group, y = weight))
a <- p + geom_boxplot()
a
```

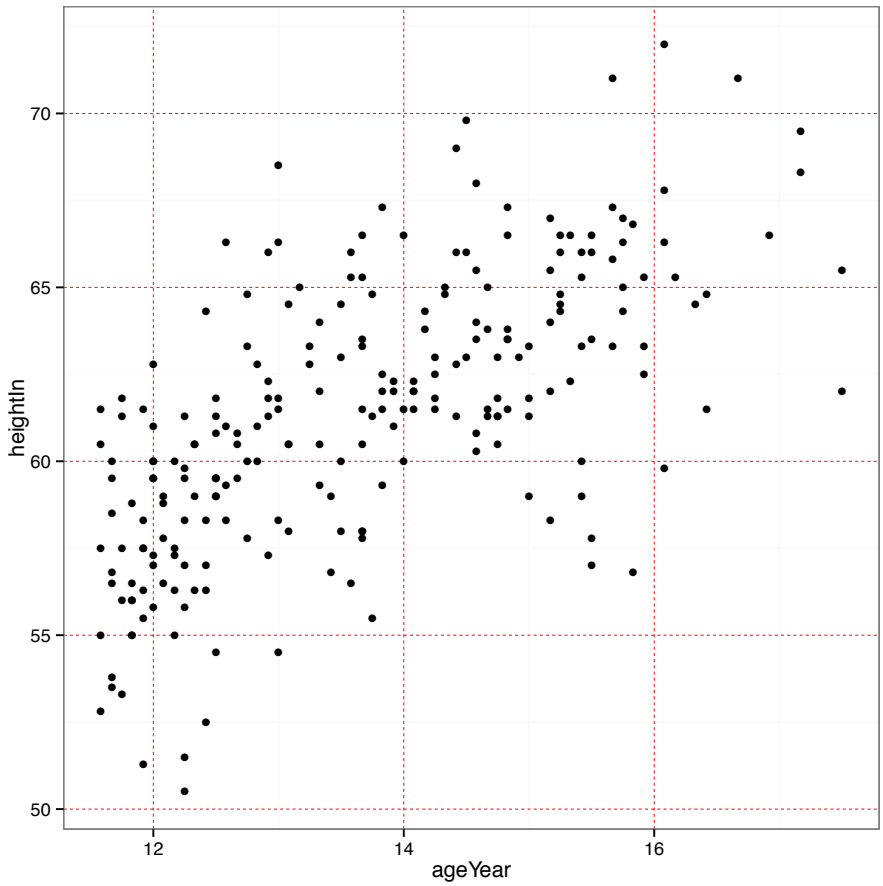



```
b <- p + geom_boxplot() + coord_flip() + scale_x_discrete(limits = rev(levels(PlantGrow
    scale_y_continuous(limits = c(0, 8), breaks = c(1, 2, 4, 8)) + theme(axis.text.x =
    axis.ticks.x = theme_blank())

## 'theme_blank' is deprecated.  Use 'element_blank' instead.  (Deprecated;
last used in version 0.9.1)
## 'theme_blank' is deprecated.  Use 'element_blank' instead.  (Deprecated;
last used in version 0.9.1)

b
```



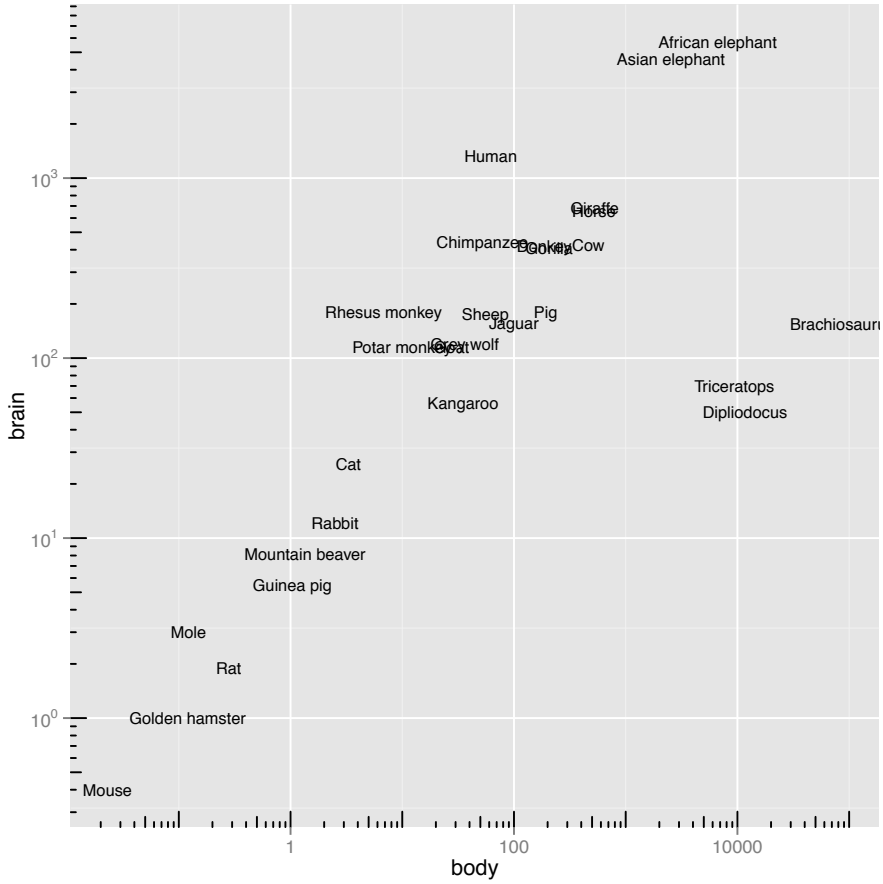
调整刻度线:

```
library(ggplot2)
library(gcookbook)
p <- ggplot(data = heightweight, aes(x = ageYear, y = heightIn)) + geom_point()
p + theme_bw() + theme(panel.grid.major = element_line(color = "red", linetype = "dashe
```



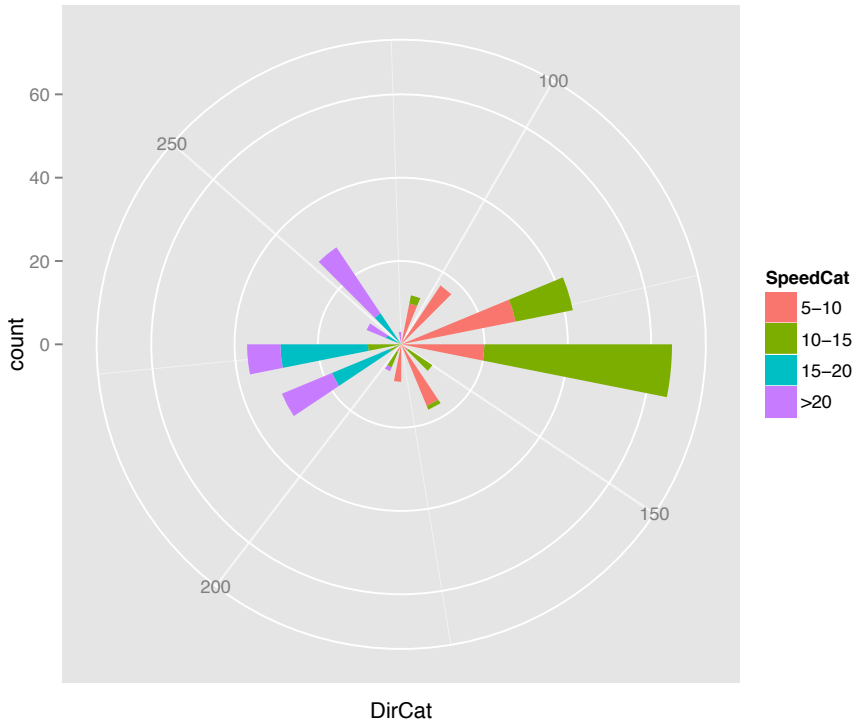
log 坐标刻度线绘制：

```
library(MASS)
library(scales)
library(ggplot2)
library(gcookbook)
ggplot(Animals, aes(x = body, y = brain, label = rownames(Animals))) + geom_text(size =
    scale_x_log10() + scale_y_log10(breaks = trans_breaks("log10", function(x) 10^x),
    labels = trans_format("log10", math_format(10^.x))) + annotation_logticks()
```



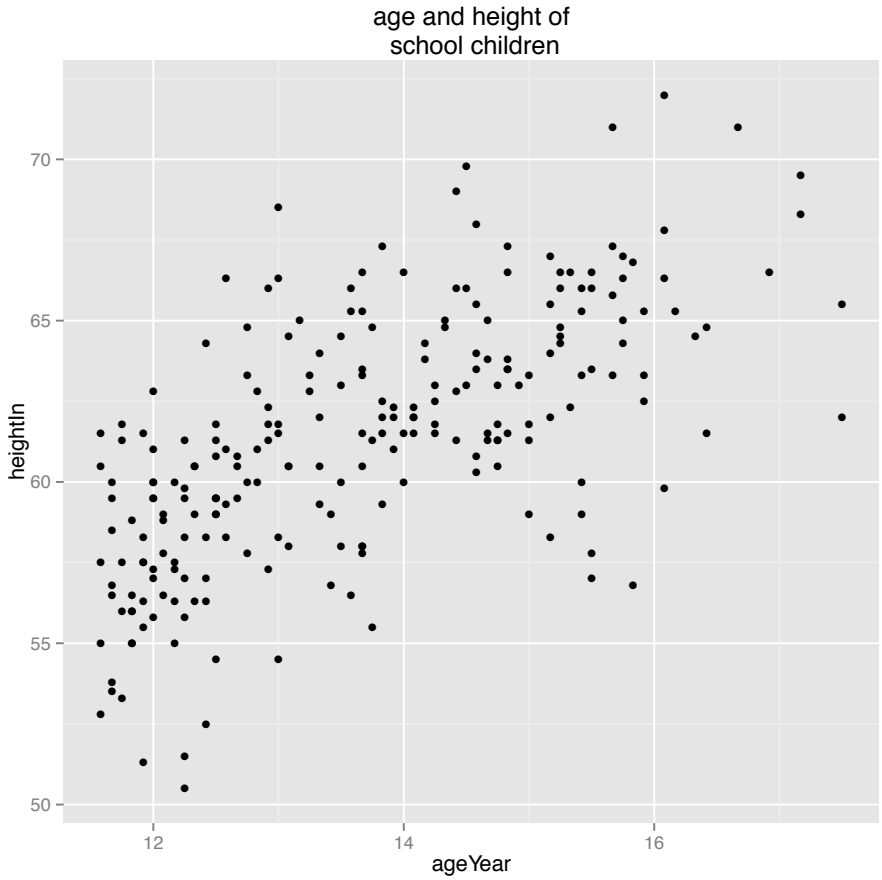
circle 图绘制：

```
library(ggplot2)
library(gcookbook)
ggplot(data = wind, aes(x = DirCat, fill = SpeedCat)) + coord_polar() + geom_histogram(

## stat_bin:  binwidth defaulted to range/30.  Use 'binwidth = x'
to adjust this.
```

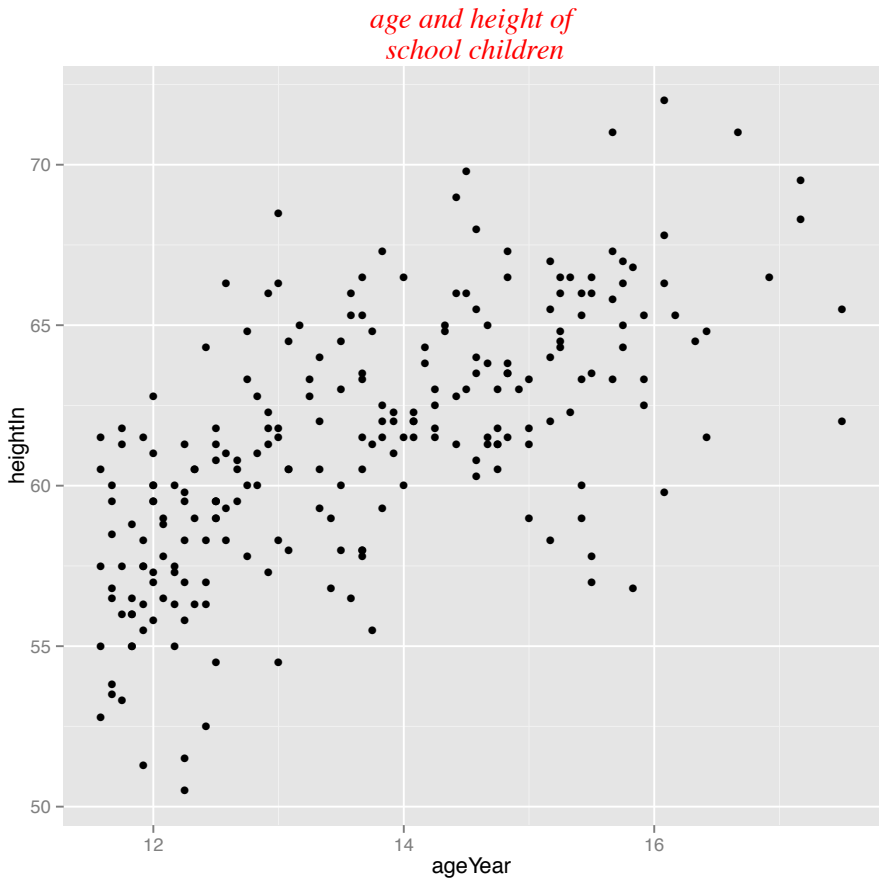

60
40
20
0
count
100
250
150
200
DirCat
SpeedCat
5–10
10–15
15–20
>20

第九章　图形全局参数控制

```
library(ggplot2)
library(gcookbook)
p <- ggplot(data = heightweight, aes(x = ageYear, y = heightIn)) + geom_point()
a <- p + ggtitle("age and height of\n school children")
a
```

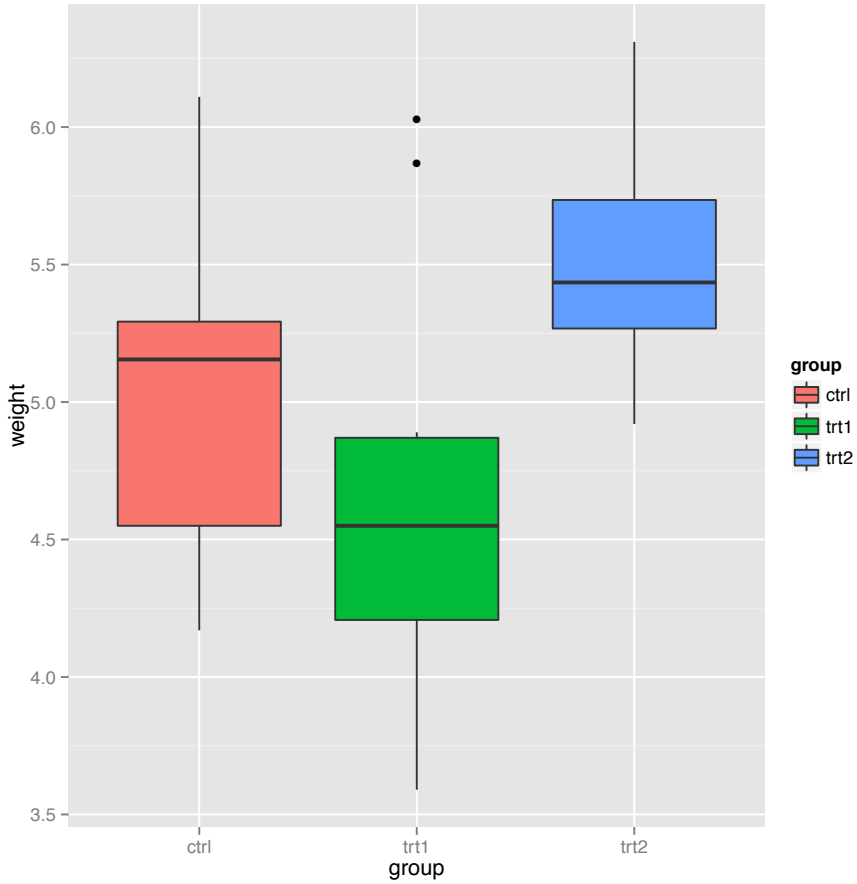



```
b <- a + theme(plot.title = element_text(size = I(16), lineheight = 0.9, family = "Time
    face = "italic", color = "red"))
b
```


age and height of
school children
70
65
60
55
50
heightIn
12
14
16
ageYear

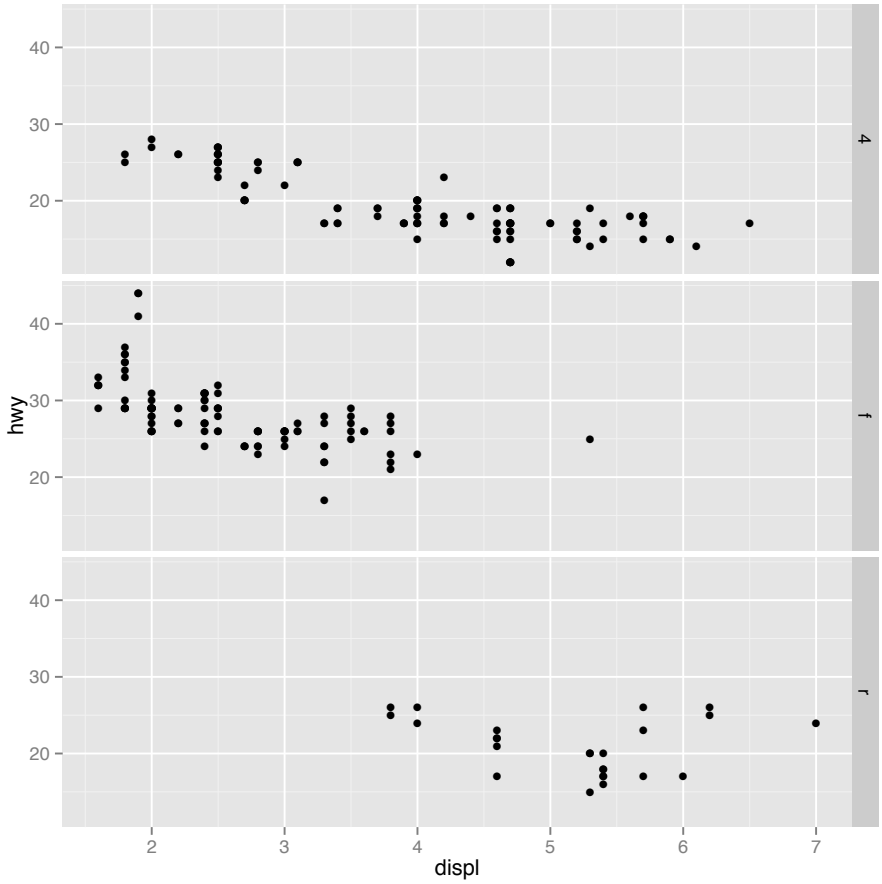
第十章　图例

```
library(ggplot2)
library(gcookbook)
p <- ggplot(PlantGrowth, aes(x = group, y = weight, fill = group)) + geom_boxplot()
p
```

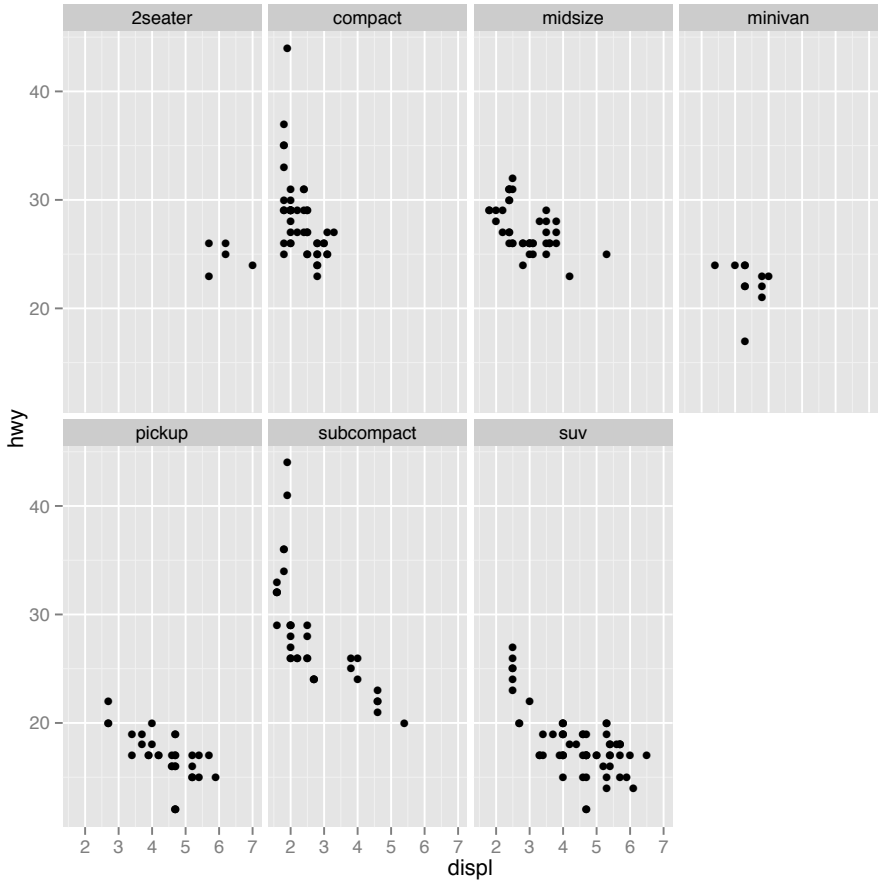

6.0
5.5
5.0
4.5
4.0
3.5
weight
ctrl
trt1
trt2
group
group
ctrl
trt1
trt2

第十一章　图层

```
library(ggplot2)
library(gcookbook)
p <- ggplot(mpg, aes(x = displ, y = hwy)) + geom_point()
a <- p + facet_grid(drv ~ .)
b <- p + facet_wrap(~class, ncol = 4)
a
```

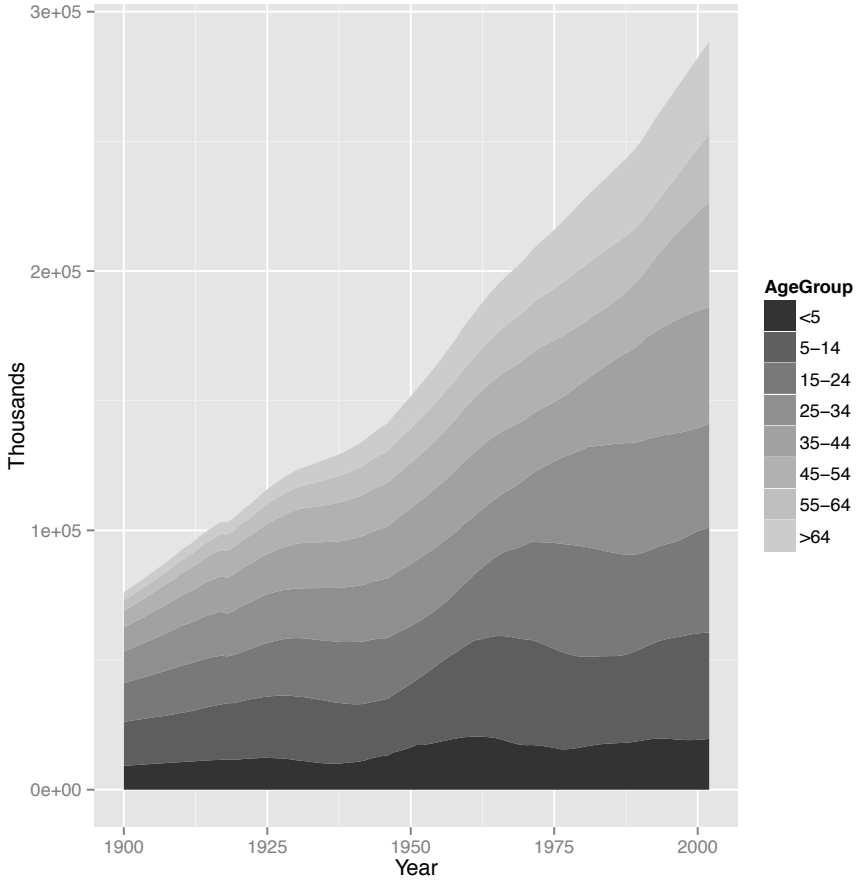



```
b
```

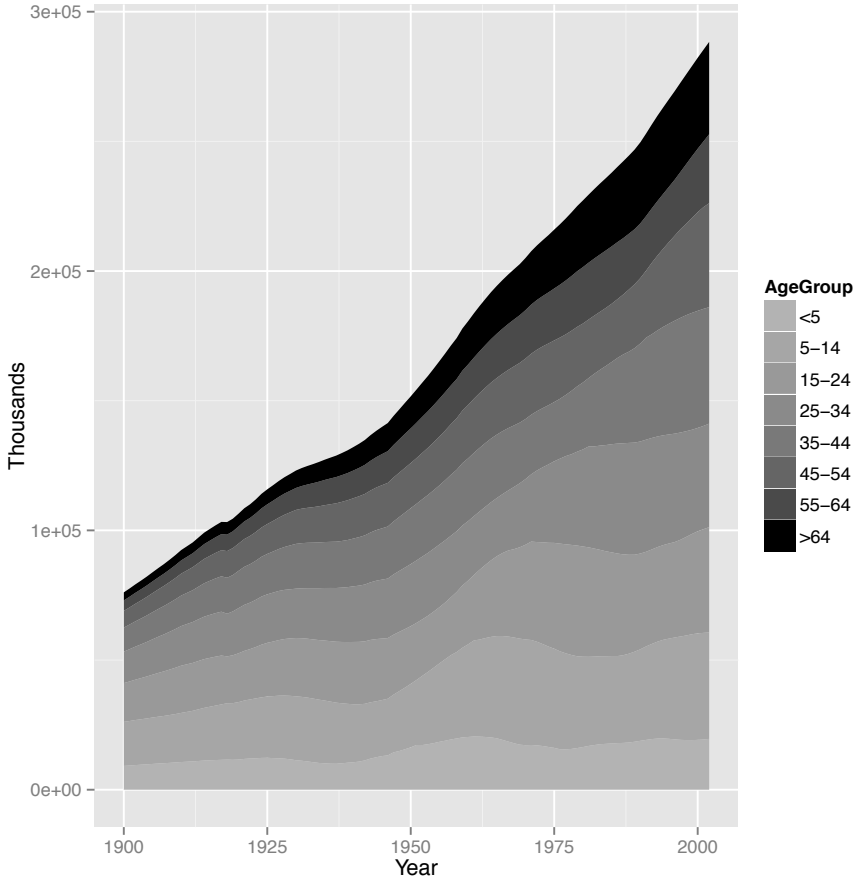

2seater
compact
midsize
minivan
pickup
subcompact
suv
hwy
displ
40
30
20
2
3
4
5
6
7

第十二章　颜色的使用

```
library(gcookbook)
library(ggplot2)
p <- ggplot(data = uspopage, aes(x = Year, y = Thousands, fill = AgeGroup)) +
    geom_area()
a <- p + scale_fill_grey()
a
```

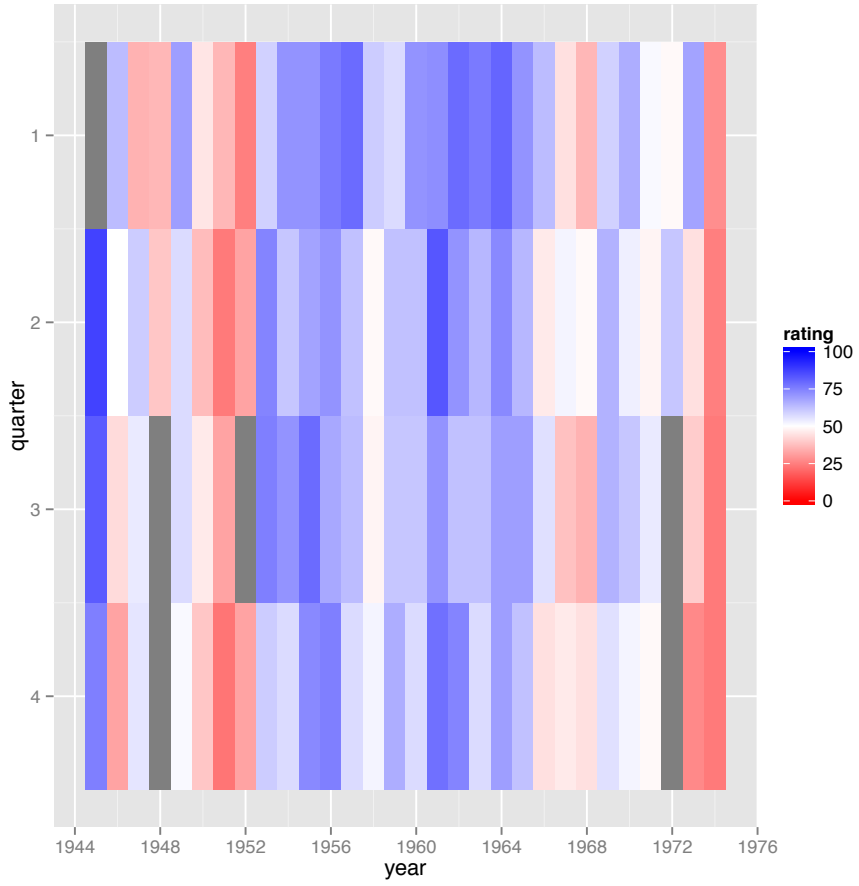



```
b <- p + scale_fill_grey(start = 0.7, end = 0)
b
```


3e+05
2e+05
1e+05
0e+00
Thousands
1900
1925
1950
1975
2000
Year
AgeGroup
<5
5–14
15–24
25–34
35–44
45–54
55–64
>64

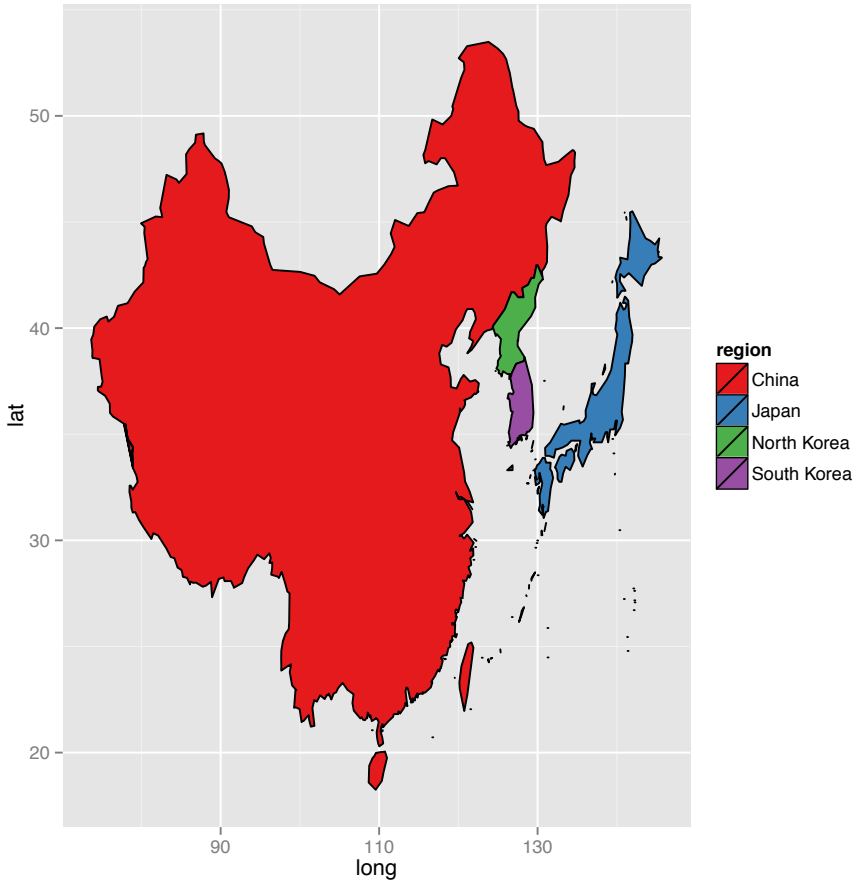
第十三章　图形实例

```
library(ggplot2)
library(gcookbook)
pres_rating <- data.frame(rating = as.numeric(presidents), year = as.numeric(floor(time
    quarter = as.numeric(cycle(presidents)))
p <- ggplot(pres_rating, aes(x = year, y = quarter, fill = rating))
p + geom_tile() + scale_x_continuous(breaks = seq(1940, 1976, by = 4)) + scale_y_revers
    scale_fill_gradient2(low = "red", high = "blue", midpoint = 50, limits = c(0,
        100))
```



地图

```
library(ggplot2)
library(gcookbook)
library(maps)
east_asia <- map_data("world", region = c("China", "Japan", "North Korea", "South Korea
p <- ggplot(east_asia, aes(x = long, y = lat, group = group, fill = region)) +
    geom_polygon(color = "black")
p + scale_fill_brewer(palette = "Set1")
```


50
40
30
20
lat
90
110
130
long
region
China
Japan
North Korea
South Korea

第十四章　图形输出格式

第十五章　数据处理

第十六章　A. ggplot2 介绍

第十七章　索引